
IDB Project LO-3344/OC-BL: GEORGE PRICE HIGHWAY REHABILITATION PROJECT
Government of Belize – Ministry of Works – PEU



Consulting Service for the Supervision of Works for the George Price Highway Rehabilitation Project

Monthly Progress Report May 2018

Submitted by
IMC Worldwide Limited, UK

Quality Management

Monthly Progress Report – May 2018

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IMC Worldwide Ltd

64 – 68 London Road, Redhill, Surrey RH1 1LG,
United Kingdom

Tel: +44 (0)1737 231400, Fax: +44 (0)1737 771107

www.imcworldwide.com

Consulting Service for the Supervision of Works for the George Price Highway Rehabilitation Project Monthly Progress Report May 2018

Table of Contents	Page
Executive summary	2
1. Project Background	3
1.1 Project Description	3
1.2 The Scope of the Works	3
2. Consultancy Services Contract.....	5
2.1 Resources Deployed	5
2.2 Organogram IMC Worldwide	6
2.3 Office Details.....	6
2.4 Deliverables	7
3. construction contract section i (lot 1)	8
3.1 Contract Data	8
3.2 Physical Progress.....	8
3.2.1 Construction Works May 2018.....	9
3.2.2 Construction works Undertaken to date	10
3.2.3 Utility Relocation works Undertaken to date	11
3.3 Mobilisation Status	12
3.4 Method Statements	13
3.5 Contractor's Resources Deployed.....	13
3.5.1 Equipment	13
3.5.2 Staff.....	14
3.6 Quality Control.....	14
3.6.1 Laboratories	14
3.6.2 Testing	15
3.6.3 Certificates.....	15
3.7 Environment and Social Compliance Report	15
3.8 Design Modifications.....	15
3.8.1 Number of piles:	17
3.8.2 Location of Pile caps:.....	17
3.8.3 Length of Abutment Piles:	18
3.9 Site Instructions	18
3.10 Variation Orders.....	18
3.11 Financial Status	19
3.12 Claims	20
3.13 Difficulties Affecting Section I	20
4. Construction Contract Section II (Lot 2)	21
4.1 Contract Data	21

4.2	Physical Progress.....	21
4.2.1	Construction Works May 2018.....	22
4.2.2	Construction works Undertaken to date	23
4.2.3	Utility Relocation works Undertaken to date	23
4.3	Mobilisation Status	24
4.4	Method Statements	25
4.5	Contractors Resources Deployed.....	25
4.5.1	Equipment	25
4.5.2	Contractor's Staff	26
4.6	Quality Control.....	27
4.6.1	Laboratories	27
4.6.2	Testing.....	27
4.6.3	Certificates.....	27
4.7	Environmental and Social Issues	27
4.7.1	Environmental and Social Compliance Report	27
4.7.2	Health and Safety.....	28
4.8	Design Modifications.....	28
4.8.1	Horizontal Alignment	28
4.8.2	Vertical Alignment.....	28
4.8.3	Topsoil	29
4.8.4	Culverts C213 and C217.....	29
4.8.5	Fill Specification.....	29
4.9	Site instructions	29
4.10	Variation Orders.....	29
4.11	Financial Status	30
4.12	Claims	31
4.13	Difficulties Affecting Section 2	31
5.	Appendices.....	32
5.1	Photographs.....	32
5.1.1	Section I (Lot 1).....	32
5.1.2	Section II (Lot 2).....	34
5.2	Programmes.....	36
5.2.1	Section I (Lot 1).....	36
5.2.2	Section II (Lot 2).....	38
5.3	Financial Status Charts.....	40
5.3.1	Section I (Lot1).....	40
5.3.2	Section II (Lot 2).....	41
5.4	Quality Control.....	42
5.4.1	Lot 1 Concrete Test Result Summary.....	42
5.4.2	Lot 2 Concrete Test Result Summary.....	43
5.4.3	Lot 1 Concrete Aggregate Testing Summary.....	44
5.4.4	Lot 2 Summary of Laboratory Materials Testing.....	45
5.4.5	Lot 2 Summary of Density Tests for May 2018.....	46

ACRONYMS AND ABBREVIATIONS

PEU.....	Project Execution Unit
BTL	Belize Telemedia Limited
BWSL	Belize Water Services Limited
BEL	Belize Electrical Limited
ToR.....	Terms of reference
DoE.....	Department of the Environment
DCP.....	Dynamic Cone Penetrometer
ECP	Environmental Compliance Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
IDB.....	Inter-American Development Bank
IoA.....	Institute of Archaeology
GOB.....	Government of Belize
GPH	George Price Highway
GPHRP	George Price Highway Rehabilitation Project
M&M.....	M&M Engineering Consultants Ltd
MoW	Ministry of Works
T&S.....	Teichroeb and Sons

Consulting Service for the Supervision of Works for the George Price Highway Rehabilitation Project

Monthly Progress Report - May 2018

EXECUTIVE SUMMARY

The scale of the redesign for both Lot 1 and 2 involves revising or replacing almost every drawing from the original design. Both Contractors have taken a proactive stance to the challenges faced and continue to make progress with the redesign by producing the most critical sections first to get approved and commence the works before the onset of the rainy season. This method of working is not ideal but at least provides the means for the Contracts to continue rather than grind to a halt. It should be noted that the weather towards the end of the month began to deteriorate and may have a considerable influence in the coming months.

The progress to date for Lot 1 is 10% including general items but of that only 5% is from physical work items which is after 28% (5 months) of the time has elapsed. The main works carried out this month was the casting of the pier and abutment piles at the precast yard. Many of the immediate design issues were resolved this month as the Contractor and Consultant's Bridge Engineers had multiple meetings to push forward the 'value engineering' works. Physical works on site became more obvious this month with the Contractor excavating for the pile caps and the first set of piles being transported to site in readiness for pile driving next month. Critical issues will be the finalisation of the seismic design so that pile cap drawings can be approved and whether the pier piling and pile caps can be completed before the river level rises

The Lot 2 Contractor is working on the redesign and commenced the first section of road works between km11 and km12 this month. Lack of proper coordination between the design engineers and site teams is causing inefficiencies in the work but it is hoped that once the full design is complete these issues can be resolved. With 4 months or 22% of the time elapsed the total progress is 6% including General Items with only 1.5% progress of the actual physical works. Significant milestones this month were the commencement of topsoil strip, roadbed compaction, fill and scarifying the existing road between km11 and 12, the casting of the blinding at the C217 culvert and the completion of the 8-inch water line relocation works. The excavation of the 'S' curve area is continuing but slope stability issues in this area has initiated the investigation of the possibility of purchasing additional land to enable the benches to be wider and the cut slopes lower. The main issues affecting the Section II is the redesign of the vertical and horizontal road alignment which is now being carried out by the Contractor under 'value engineering', the lack of clarity over the final design of the BWSL watermain works, the Community water relocation works and the stability of the 'S' Bend cut which could all influence both the time and budget.

The Consultant has raised the concern regarding the modification of the Lot 3 design which were identified in the Design Review Report February 2018. If no action is taken to produce a practical redesign the Lot 3 Contract will be in a similar position as Lot 1 and 2 whereby the Contractor is redesigning and both costs and time will be extended.

1. PROJECT BACKGROUND

1.1 Project Description

The George Price Highway (GPH) is one of four main highways in Belize. The highway was built in the 1930s and was originally known as the Western Highway, renamed as the George Price Highway in 2012. The road connects Belize City – Belmopan - San Ignacio and Santa Elena-Benque Viejo town (near Guatemalan border). The project includes rehabilitation of GPH road section from mile 47.9 to 67.3 (total length 19.4 miles) and the replacement of Roaring Creek Bridge. The road is a two-lane highway passes through a flat terrain until reaching the Guatemalan Border.

The George Price Highway Rehabilitation Project will substantially improve road connectivity within Belize's main districts through the upgrading of road infrastructure between Belmopan and Santa Elena

The scope of the rehabilitation work includes horizontal and vertical realignment of the roadway to meet international safety standards, as well as the upgrading of drainage and construction of runoff channels to improve climate resilience of the road. The project will also address the replacement of major culverts at key locations, clearing of the road reserve, removal of any obstructions, construction of safety barriers, increased road signage and support the maintenance of the works, once the rehabilitation is completed.

The extent of the project has been divided into three (3) Lots/Sections with one lot being assigned the construction of the new Roaring Creek Bridge and the other two Lots/Sections being assigned to the road rehabilitation, as presented in the following section.

1.2 The Scope of the Works

The project has been split into three lots as summarised in Table 1.

TABLE 1. PROJECT SECTIONS (LOTS)			
Construction Section	Length	Contractor	Contract Amount
Section I Construction of Roaring Creek Bridge	0+000 to 0+485km	M&M Engineering Consultants Limited.	BZ\$11,346,823.17
Section II Roaring Creek to Iguana Creek Junction	0+485 to 15+870km	Teichroeb & Sons Limited	BZ\$20,540,823.19
Section III Iguana Creek Junction to Santa Elena Town	15+870 to 32+450km	Tender stage	-

Lot 1: Section I Construction of new Roaring Creek Bridge

This lot includes the construction of the new Roaring Creek Bridge alongside the existing bridge that is an old structure - reportedly built in the 1930's or 1940's.

Lot 2: Section II Roaring Creek to Iguana Creek Junction

This section is 15.385km long, starting on the western bank of Roaring Creek at km0+485 to just before the Iguana Creek Junction. This Road Section shows deterioration in the latter half of the section, with the most common defects include edge cracking and shoulder drop-off. Some Large Culverts will be replaced and the near vertical drops of the hill in the Z-curves (in Teakettle) will be trimmed to improve the road alignment in this area due to safety concerns. The trimming of the back slope will require considerable cut in this area.

Lot 3: Section III Iguana Creek Junction to Santa Elena Town

This section is 17.084km in length, starting just before the Iguana Creek Junction and extending to the Santa Ellen Roundabout. This section also shows deterioration in sections particularly in the villages with edge cracking and lane drop-offs. These defects for the most part include patching, depressions, weathering and ravelling. Drainage will be addressed by replacing of some of the existing culverts to mitigate against flooding.

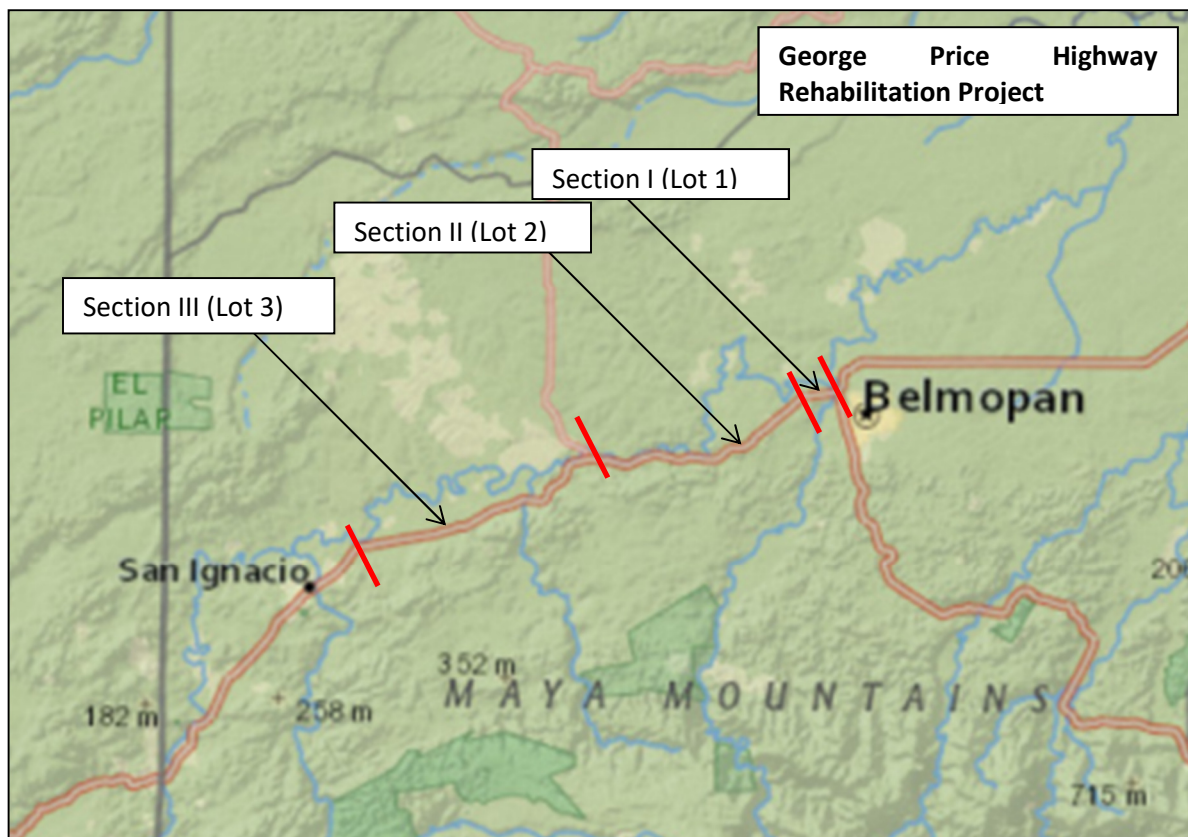


Figure 2: - Map of George Price Rehabilitation Project showing the three main project sections.

Project funding provided by the Inter-American Development Bank and the European Commission (CIF).

2. CONSULTANCY SERVICES CONTRACT

2.1 Resources Deployed

The permanent supervision teams are now working on a full-time basis from the main office and the two site offices with the remaining inspector Mr. Zadiel Smith joining the team during this month. The Senior Bridge Engineer visited the Project from 6th to 19th May to finalise some of the 'Value Engineering' redesign on Lot 1. There continues to be constant dialogue with the Senior Geotechnical / Materials Engineer Expert who have been reviewing the Method Statements and materials test submittals. The staff inputs to date are shown in the table below as either part-time (PT) or full-time (FT) inputs: -

IMC DESIGN REVIEW AND SITE SUPERVISION STAFF			
POSITION	NAME	MOBILIZED	DEMOBILIZED
Senior Resident Engineer / Team Leader	Andrew Clough	28/11/17 – 07/01/18 PT 08/01/18 FT	
Resident Engineer 1	Julio Chia	28/11/17 – 07/01/18 PT 01/02/18 FT	
Resident Engineer 2	Ramy Chia	28/11/17 – 16/02/18 PT 19/02/18 FT	
Resident Engineer 3	Tudel Torres	-	
Senior Bridge Engineer	David Jones	28/11/17 PT	
Senior Pavem't/Mat. Eng.	Zafar Chowdhury / Tim Harris	28/11/17 PT	
Environmental/Social Specialist	Michael Somerville	26/02/18 PT	
Licensed Surveyor	TBA	-	
Quantity Surveyor	Hubert Enriquez	15/01/18 PT	
Materials Technician Lot 1	Oswald Patt	11/01/18 FT	
Inspector of Works Lot 1	Victor Tatum	01/02/18 FT	
Materials Technician Lot 2	Romero Manolo	01/02/18 – 23/02/18 PT 26/02/18 FT	
Inspector of Works Lot 2	Zadiel Smith	16/05/18 FT	
Secretary	Denise Morales	30/01/18 FT	
AutoCAD Technician	Linden Simmons	19/03/18 PT	
Pool of Specialist			
Hydrologist	Robin Wardlaw	28/11/17 PT	
Road Safety Expert	John White / John Aldridge	14/02/18 PT	
Geotechnical Expert	Tim Harris	30/01/18 PT	
Head Office Project Management and Backstopping Support			
Project Director	Nigel Penfold	28/11/17 PT	
Project Manager	Abdullah Miah	28/11/17 PT	

Main Office Belmopan Belize

Lot 5113 Doyle's Delight,
East Piccinni Area,
Belmopan City,
Cayo District,
Belize.

Tel: + 501 6076769 (mobile)
+ 501 8021749 (landline)

Email Andrew.Clough@imcworldwide.com.

- **Team Leader / Senior Resident Engineer - Andrew Clough**

2.4 Deliverables

The following Reports and Deliverables have been submitted as part of the Supervision Contract: -

- **Inception Report** – submitted on 22nd February 2018 in draft and final version on 7th March 2018.
- **Safety Audit Report** – submitted Final draft on 1st March 2018.
- **Design Review Report** – Itemised recommendation list submitted on 3rd March 2018 and the Design Review Report submitted on 9th March 2018.

The designs for the three contracts (Lots 1, 2 and 3) have significant numbers of omissions and design queries that are itemized in the Design Review Recommendation Table which forms part of the Design Review Report. The itemized list covers all aspects of the design and has at times significant bearing on the functionality, safety, buildability, budgetary constraints of the Contracts.

The Lot 1 and Lot 2 are being redesigned under 'value engineering' to be formalized under variation orders under the contracts and with the final design being signed off by the MoW. The Consultant has submitted a proposal to carry out the redesign of Lot 3 and a separate proposal to deal with the issues seen in Lot 4 which is not part of the present Consultancy Contract.

- **Seismic Design Review Report** – this was submitted on 22nd March 2018 as an appendix to the Design Review Report.
- **Quality Assurance Manual** – this manual was submitted on the 23rd March 2018.
- **Construction Supervision Manual** – this was submitted on 3rd April 2018.
- **Monthly Progress Reports** – submitted for February, March, April and May 2018.
- **Monthly Environmental and Social Reports** – submitted for March, April and May 2018.
- **Quarterly Progress Report** – the first was submitted for period February to April 2018

3. CONSTRUCTION CONTRACT SECTION I (LOT 1)

3.1 Contract Data

Section I (Lot 1) Construction of Roaring Creek Bridge, George Price Highway Rehabilitation Project	
Km 0+000 to Km 0+485	Contract No.315 of 17/18
Contractor	M&M Engineering Consultants Limited, 2 miles Philip Goldson Highway, Belize City
Managing Director	Mr. Roque Matus
Date of Contract Signing	18 th December 2017
Letter of Acceptance	18 th December 2017
Site Possession Date	December 2017
Start Date	December 2017
Completion Date	April 2019 (* Should read 18 th June 2019 to be corrected)
Construction Period	18 months
Contract Price	BZ\$11,346,823.17
Defects Liability Period	12 months
End of Defects Liability Period	June 2020

3.2 Physical Progress

Contractor has not submitted the Monthly Progress Report or IPC #6 by the end of the reporting period so the progress to date and financial summaries for the month are based upon the Consultant's estimates.

The estimated progress for the month of May in Lot 1 was 2.9% making an overall progress to date of 9.8% of which 5.1% comprises actual works and 4.7% is for preliminaries items. The progress this month was mainly from the fabrication of the remaining 24 number 9m pier piles of 450x450mm cross-section and cast with a steel rock shoe. An additional 32 piles for the abutments were fabricated in different sizes (450x450mm and 350x350mm) and different lengths (14meters and 17 meters); which gives a total of 54 piles fabricated during this month. To date a total of 84 piles units have been precast out of 124 piles units recommended from the redesign. The pile fabrication is 68% complete.

The physical works at the bridge site became more noticeable to the public this month with the excavation commencing for the pier and abutment pile caps on eastern side of the bridge. In addition, 54 piles were brought from the precast yard to site in readiness for pile driving in the coming month of June. The site is being prepared with further topsoil stripping to allow space for aggregate storage and concrete batching. The topsoil stripping is now almost 80% complete.

The Contractor continues to provide supplies for the Engineer Office, security on site and maintenance to the vehicles. The Contractor continues to liaise with the utility companies.

LOT 1 Progress to Date					
Bill No.	Description	Contract Amounts [BZ]	% of Contract Amount	Estimate May 2018 %	Estimated Total Disbursement to May, 2018
1	PRELIMINARY AND GENERAL	\$ 1,226,020.00	10.8%	0.2%	4.7%
2	DEMOLITION AND SITE CLEARANCE	\$ 26,750.00	0.2%	0.0%	0.2%
3	EARTHWORKS AND ROADWORKS	\$ 1,148,421.01	10.1%	0.02%	0.1%
4	DRAINAGE	\$ 90,800.00	0.8%	0%	0%
5	BRIDGE WORKS	\$ 6,349,082.25	56.0%	2.1%	3.5%
6	RETAINING WALLS	\$ 712,586.25	6.3%	0%	0%
7	ROAD LIGHTING	\$ 56,130.00	0.5%	0%	0%
8	BRIDGE REPAIRS	\$ 276,208.75	2.4%	0%	0%
9	SCOUR PROTECTION	\$ 920,500.00	8.1%	0%	0%
10	CONTINGENCIES	(\$ 825,533.90)	7.7%		
	VARIATIONS - VO1 Pile Shoes	155,520.00	1.4%	0.6%	1.4%
	VO2 Value Engineering	117,850.00	1.0%		
A	WORK ITEMS - Bill 2,3,4,5,6,7,8,9	\$ 9,580,478.26	84.4%	2.1%	3.8%
B	WORK ITEMS - BILL 2,3,4,5,6,7,8,9 + Contingencies	\$ 10,120,803.17	89.2%	2.7%	5.1%
C	Total Contract Amount	\$ 11,346,823.17	100.0%	2.9%	9.8%

3.2.1 Construction Works May 2018

Construction work carried out for the month of May 2018 is summarized below: -

Bill Item No 1- PRELIMINARY AND GENERAL

- Bill Item No 1.3.01-Erection of site offices and provision of office furniture and equipment for the Engineer until completion of the Contract. As detailed in the Specifications-14.22%
- Bill Item No 1.3.02- Servicing and maintenance of site offices, furniture and equipment for the Engineer until completion of the Contract – 5.6%
- Bill Item No 1.3.05- Provide security for the site offices and compound – 5.6%
- Bill Item No 1.4.01- Maintenance of two vehicles for the Engineer for period of the Contract – 1.65%
- Bill Item No 1.5.02- Testing of Materials (aggregates for concrete)-5.88%
- Bill Item No 1.5.02- Testing of Materials (Concrete Cubes)-5.88%
- Bill Item No 1.10.01- PROVISIONAL: Allow for liaison with Utility Authorities on location and diversion of utilities affected by the Works - 5.88%
- Bill Item No 1.10.14-Engineer's telephone calls/line charges/internet-5.56%

Bill Item No 3 - EARTHWORKS AND ROADWORKS

- Bill Item No 3.1.01-General excavation topsoil; maximum depth not exceeding 0.25m (on East Abutment) – 5.16%
- Bill Item No 3.1.04-Stockpile topsoil for re-use – 5.16%

Bill Item No 5 - BRIDGE WORKS

- Bill Item No 5.1.4-Excavation for foundations, material other than topsoil, rock or artificial hard material: maximum depth not exceeding 2m. (East abutment and East Pier)- 41.1%
- Bill Item No 5.1.5-Excavation for foundations, material other than topsoil, rock or artificial hard material: depth 2m - 5m. (East abutment and East Pier)- 10.48%
- Bill Item No 5.6.01 b) VO-04-Supply and install **350mm x 350mm x 17 meters (long)** square, precast, prestressed concrete piles for pile caps: at west abutment and wingwalls (Only Fabrication)- 32.0%
- Bill Item No 5.6.02 a) VO-04 Supply and install 450mm x 450mm x **14 meters (long)** square, precast, prestressed concrete piles for pile caps: at east abutment and wingwalls (Only Fabrication)-100%
- Bill Item No 5.6.02 b) VO-04 Supply and install **350mm x 350mm x 14 meters (long)** square, precast, prestressed concrete piles for pile caps: at east abutment and wingwalls (Only Fabrication)-67%
- Bill Item No 5.6.04 VO-003-Supply and install 450mm x 450mm x 9 meters (long) for Piers (Only fabrication) – 35.69%

Contingency /Variation Orders

- VO-001 PILE SHOE-Supply and install 1.8 m Rock pile shoe- 45%
- VO-003 Increase Pier piles from 7m to 9m.-45%

3.2.2 Construction works Undertaken to date

The Construction work carried out to date is summarized below: -

Bill Item No 1- PRELIMINARY AND GENERAL

- Bill Item No 1.1.01- Performance Bond-100 %
- Bill Item No 1.1.02- Insurance of works -100 %
- Bill Item No 1.1.03-Third party insurance-100%
- Bill Item No 1.1.04- Advance payment guarantee -100%
- Bill Item No 1.3.01- Erection of site offices and provision of office furniture and equipment for the Engineer until completion of the Contract- 100%
- Bill Item No 1.3.02- Servicing and maintenance of site offices, furniture and equipment for the Engineer until completion of the Contract-13.89%
- Bill Item No 1.3.03- Establishment, maintenance and removal of site offices, messing facilities, stores, plant, equipment, workshops and site compound for the Contractor until completion of the Contract-70.00%
- Bill Item No 1.3.04- Mobilization of crane to site, establishment of pile driving guide and platform to install piles (East Site Only)-30%
- Bill Item No 1.3.05- Provide security for the site offices and compound-25.00%
- Bill Item No 1.4.01- 4WD Crew Cab Pick Up vehicle for the Engineer for period of the Contract-79.2%
- Bill Item No 1.5.02- Testing of Materials (aggregates for concrete)-29.41%
- Bill Item No 1.5.02- Testing of Materials (Concrete Cubes)-29.41%
- Bill Item No 1.10.01- PROVISIONAL: Allow for liaison with Utility Authorities on location and diversion of utilities affected by the Works-29.4%
- Bill Item No 1.10.12- Additional testing of materials as instructed by the Engineer-16.87%
- Bill Item No 1.10.14-Engineer's telephone calls/line charges/internet-11.11%

Bill Item No 2- DEMOLITION AND SITE CLEARANCE

- Bill Item No 2.1.01- General Site Clearance-59.17%
- Bill Item No 2.1.02- Removal and disposal of trees, girth 0.5m - 2m and disposed of to an approved landfill site-125.00%.
- Bill Item No 2.1.03- Removal and disposal of trees, greater than 2m girth and disposed of to an approved landfill site-110%

Bill Item No 3 - EARTHWORKS AND ROADWORKS

- Bill Item No 3.1.01-General excavation topsoil; maximum depth not exceeding 0.25m (on areas where access road and platform was constructed)-25.24%
- Bill Item No 3.1.04-Stockpile topsoil for re-use-29.34%

Bill Item No 5 - BRIDGE WORKS

- Bill Item No 5.1.4-Excavation for foundations, material other than topsoil, rock or artificial hard material: maximum depth not exceeding 2m. (East abutment and East Pier)- 41.1%
- Bill Item No 5.1.5-Excavation for foundations, material other than topsoil, rock or artificial hard material: depth 2m - 5m. (East abutment and East Pier)- 10.48%
- Bill Item No 5.6.03- Allow for Static Load Test-100%
- Bill Item No 5.6.01 b) VO-04-Supply and install **350mm x 350mm x 17 meters (long)** square, precast, prestressed concrete piles for pile caps: at west abutment and wingwalls (Only Fabrication)- 32.0%
- Bill Item No 5.6.02 a) VO-04 Supply and install 450mm x 450mm x **14 meters (long)** square, precast, prestressed concrete piles for pile caps: at east abutment and wingwalls (Only Fabrication)-100%
- Bill Item No 5.6.02 b) VO-04 Supply and install **350mm x 350mm x 14 meters (long)** square, precast, prestressed concrete piles for pile caps: at east abutment and wingwalls (Only Fabrication)-67%
- Bill Item No 5.6.04 VO-003-Supply and install 450mm x 450mm x 9 meters (long) for Piers (Only fabrication) – 35.69%

Contingency /Variation Order

- VO-001 PILE SHOE-Supply and install 1.8 m Rock pile shoe- 100%
- VO-003 Increase Pier piles from 7m to 9m.-100%

3.2.3 Utility Relocation works Undertaken to date

- BEL - Liaison with Belize Electricity Limited (BEL) for the relocation of one high voltage utility pole on the western embankment of the river and felling of tree to facilitate works. The pole and high voltage wires was initially located within the foundation footprint of the western abutment foundation. The bridge is now free of encumbrances from the BEL utilities although the road and retaining wall works are still affected by two poles on the western side of the bridge. The relocation of these poles will be confirmed once the final redesign of the road approaches has been completed.
- BTL and Cable – Proposal for temporally relocation of the existing BTL line was submitted, confirmation and approval are pending. Liaison with BTL and Cable company for identification of existing service lines on the western side of the Roaring Creek bridge is completed. The underground fiber optic line shall be relocated prior the pile driving on the Western abutment of the Bridge and after confirmation of the final design.
- BWSL - the relocation and upgrade work to be confirmed and new drawings submitted. The new pipes are proposed to be placed upon the new bridge and BWSL provided a design for the attachments and approach to the bridge. The attachments are being reviewed by the Consultant. After identification of the existing water line on the western abutment this one shall be relocated prior pile installation and after confirmation of the final design.

3.3 Mobilisation Status

The Contractor has mobilized all equipment that was required for work executed on May. While the Contractor seems to have the construction experience and capability of constructing the Bridge, he lacks experience regarding the submittal requirements.

To date the status of submittals required under the Conditions of Contract and Specification are as follows: -

SUBMITTALS REQUIRED FROM CONDITIONS OF CONTRACT				
No.	Clause	Description	Required Date	Status
13	Insurances	Policies and Certificates.	Jan. 2018	Delivered
27	Program	To be submitted 14 days from letter of acceptance.	07/02/18	Delivered
41	Cash Flow	Should be submitted with the program	07/02/18	Delivered
52	Securities	Performance Security	14/02/18	Delivered

SUBMITTALS REQUIRED FROM SECTION VII TECHNICAL SPECIFICATION				
No.	Clause	Description	Required Date	Status
104(5) and (6)	Existing Services	The Contractor to ascertain the location of existing services.	Initial Survey	Delivered – east and the west side
105(2)	Levels and Ref. Points	The Contractor shall obtain DOS benchmarks that he proposes to use.	Initial Survey	Delivered
112	Project Signboard	1 month after order to commence	24/02/18	Installed 26/04/18
202(3)	Material inspection	Copies of orders to allow for inspection		On-going
206(2)	Diversion of traffic	Traffic Diversion work to be submitted to the Engineer	In advance of any work	No Diversion is needed at this time
216	Fences	Any Temporary fencing requirements to enclose the site should be submitted.	In advance of any work	Completed
217(1) and (3)	Contractors Accommodation	Written approval to erect Contractors buildings on site	Mobilisation	On-going
225	Engineer's Office and Appendix 2/2	Provide specified office, equipment, Consumables and laboratory equipment.	Mobilisation	On-going 100%. Laboratory equipment ordered.
226(1) and GCC 18	Method Statements and Temporary Work	Submit detailed method statements for construction operations from program	28 days prior to works on program	Methodology for the pile cap construction and roadwork fill to be submitted.
227	Engineers Vehicles	Two vehicles to be supplied	Mobilisation	Delivered 12/02/18
230	QC Testing	Site laboratory within one month	24/02/18	Geotech Lab. approved
610	Quarries and Borrow Pits	Provide evidence of Quality and Quantity at the sources indicated.	Mobilisation	Concrete aggregates approved

1705	Cement Testing	Submit compliance certificates	Prior to order	Submitted and approved
1708	Aggregate	Submit testing for fine and coarse aggregate.	Prior to mix	Submitted
1714	Concrete mix design	Submit for approval	Prior to mix	Volume mix Design for C-35 approved and updated
1736	Formwork	Methods and materials for formwork	Before on site	Pending to submission
1743(2)	Precast Concrete	Methodology and shop drawings		Submitted for piles

3.4 Method Statements

The Contractor has submitted the following Method Statements for the works in accordance with Clause 226(1) of the Specifications and GCC 18.

METHOD STATEMENTS SUBMITTAL LIST				
No.	Letter Ref. #	Description	Date Submitted	Status
MS-001	(018)	Pile Construction	5-Feb-18	Approved for Construction
MS-002		Pile Installation	8-Mar-18	Approved for Construction
MS-003		Static Load Test	1-Mar-18	Approved for Construction
MS-004		Construction of Pile Cap	2-May-18	Draft (Pending Review & Approval)

3.5 Contractor's Resources Deployed

3.5.1 Equipment

The Contractor has mobilized the equipment listed below for the month of May. The equipment is mainly based at the pre-cast yard located at mile 13 on the Philip Goldson Highway, Belize District 65 miles and tends to be mobilised to the Roaring Creek site on an as needed basis. As such the equipment will be shown offsite for the periods it is away from site. The pre-cast yard equipment is also used for M&M works elsewhere and will only be shown working when the production is for the project site.

Lot 1 - Equipment Utilization Schedule for May 2018					
Equipment	Down Time (Days)	Standby Time (Days)	Working Time (Days)	Offsite (Days)	Remarks
On Site (Roaring Creek)					
JCB Excavator	9	4	9		Machine was broken down for two weeks this month
CAT Excavator			5	17	On site since Sunday May, 27
D6 Tractor		2	1	19	On site since May 29
Vibrator Roller	0	3	5	14	On Site since May 22, 3pm
Grader			1	21	Only work on May 15
Dump Truck			3	19	Rented as needed
Water Truck			1	21	Rented as needed
Crane		2	4	16	On site since May 26

Precast Yard (Mile 13 Philip Goldson Highway)					
Concrete Batch Plant			6		

3.5.2 Staff

The Contractor has the following staff mobilised to site. The key-staff have not been mobilised to the site office for the initial stage of the project and seem to be based in the Belize pre-cast yard and office. The surveyor is brought in intermittently to carry out works as required. An increase in site staff will be required as the works increase in the coming months.

Lot 1 - Site Attendance of Contractor's Personnel for May 2018				
Personnel	No.	Onsite (Days)	Offsite (Days)	Remarks
<u>Key Staff</u>				
Project Manager/Bridge Engineer	1	7	15	
Construction Manager/Structural Engineer	1	3	19	
Licensed Surveyor	1	4	18	
Quality Control	1	-	-	
Quantity Surveyor/Engineer	1	0	22	
<u>Supplemental Site Staff</u>				
Executive Assistant	1	5	17	
Office Manager	1	22	0	
Site Engineer/Requisitions Manager	1	20	2	
Health & Safety Officer	1	22	0	
Document Control/Assistant Site Engineer	1	7	15	
<u>Plant Operator/Drivers</u>	3	21		May 1 to May 25, 1 Operator
<u>Labourers</u>	10	21		May 1 to May 25, 2 Labourers

3.6 Quality Control

3.6.1 Laboratories

The Contractor has submitted updated calibration certificates for Geotech Lab. based on 8 Miles George Price Highway, as his new material laboratory for quality control. Geotech Lab has performed all testing regarding concrete and soils for the contractor satisfactory.

The Contractor has also purchased and delivered to site a new E.L.E brand compression machine for his used on the project.

The Contractor has delivered to the engineer two new Dynamic Cone Penetrometer, one 4.5kg Digital Clegg Hammer and one Concrete test rebound hammer for the use of the engineer according to Appendix 2/2of the Technical Specification.

3.6.2 Testing

For the month of May 126 concrete cube test samples were taken for the precast concrete pier and abutment piles. The cubes were crushed at 18 hours, 7 days and 28 days. All cube tests carried out on the permanent works have met the specified requirements for the C35 MPa concrete. An additional 15 tests were carried out with the rebound hammer to follow up the quality and actual strength of the piles. A summary of the concrete testing results is provided in the appendices.

Concrete aggregates and fill for the road were sampled and tested this month at the Geotech laboratory.

With respect to the testing of roads works, the contractor has schedule several times to do proof rolling on the excavated topsoil area for the eastern approach to the bridge but, insufficient equipment and lack of experience on road work resulted in tests not being completed satisfactorily. The contractor does not seem to be placing the road works as critical at this point in the project.

3.6.3 Certificates

No further certificates have been submitted by the Contractor this month but as works ramp up the certificates for the reinforcement, prestress wires and cement need to be submitted at regular intervals.

3.7 Environment and Social Compliance Report

3.7.1 Environmental and Social Compliance Report

The IMC Environmental and Social Specialist (ESS) has been monitoring compliance with the use of checklist and reviewing on a weekly basis during site visits. Site inspections have been ongoing, and some minor concerns were noted. May 2018 Compliance Report is submitted as a separate report.

Concerns pointed out by the specialist:

- No fire extinguisher and only First Aid Kit at the contractor workers camp.
- Uncovered garbage receptacles
- No erosion control and sediment retention measures are in place where bridge pier construction works are taking place on the east side and west of the Roaring Creek.
- No drainage measures in place to divert storm water from construction area.

Contractor agreed to mitigate these as soon as possible.

3.7.2 Health and Safety

The Contractor has submitted Health and Safety documents. To date there have been no accidents or H&S incidents reported on the site.

3.8 Design Modifications

The preliminary design reviews concluded that some major design queries existed within the bridge design and these were discussed with MoW in a meeting held on 13th January 2018. A way forward was agreed

whereby the Contractor will carry out any amendments to the design under 'Value Engineering' and the MoW will sign off on the revised designs. This is to prevent major delays to the project which has already mobilized. The initial changes to the design have been listed below and redesign works are on-going between the Contractor and Consultant. The 'Value Engineering' inputs are to be recompensed under Variation Order 002. The design modifications are to be formally submitted by the Contractor, checked by the Consultant and signed off by the MoW under Variation Orders.

ROARING CREEK BRIDGE DESIGN MODIFICATION LIST				
Item no.	Activity	Purpose of Changes	Benefits	Status
1	Piles	Reduce quantity of Piles required	cost savings	VO-004 submitted to PEU 29/05/18
2	Pile Caps	Review size and quantity of reinforcement and size of caps	cost savings /constructability	Pending submission
3	Abutments	Eliminate fin walls and use stem wall design. Reduce reinforcement and remove hang down slab from deck	cost savings /constructability	Geometric design Draft Submitted
4	Columns	review column reinforcement for seismic loadings	safety	Pending
5	Bents	Reinforcement may be reduced. Adjust details of reinforcement for easy construction and change geometry	cost savings /constructability	Pending
6	Shear Key	Design standard shear Keys	safety	Pending
7	Plinths	Design standard Plinths/remove plates that will cause corrosion issues	cost savings / safety/constructability	Pending
8	Girder	Girder and design debonding strands	durability and safety	Draft Submitted
9	Precast Deck Slab	Redesign deck slabs to include for shear connections	safety/ constructability	Pending
10	Slab pour sequence	practical standard dimensions for easy construction	Safety/constructability	Pending
11	Diaphragms	Lack intermediate diaphragms, End diaphragms have excessive	safety/constructability/ cost savings	Pending
12	Wingwalls	No jacking point for maintenance / Redesign and modify, reduce reinforcement and relocate	constructability	Pending
13	Retaining Walls	Redesign and modify, reduce rebars, relocate for constructability. Wall may need to be taller	constructability	Pending

The 'Value Engineering' work this month concentrated on the pile designs and the pile cap positions which has resulted in a reduction of 40% from the original number of piles. The redesign was formalised under VO-

004 'Pile Layout and Abutment Piles' and discussed with the PEU and Ministry of Works at a Bridge Meeting Update on 16th May 2018. The design issues discussed and agreed are as follows:-

3.8.1 Number of piles:

The number of piles determined for the piers remains as per the original design. The number of piles required for the west abutment has been determined to be 27 only, based on 18 'working' 450mm square piles with 9 number 350mm square tension piles that are needed temporarily during the girder installation operations. The piles for the wing walls have been determined as 8 number 350mm square piles for each wall. Thus, the total number of piles for the west abutment is 18 number 450mm square piles and 25 number 350mm square piles.

The geometry of the abutment and associated wing walls at the eastern end of the bridge is being amended as it is intended to have 'flying' wing walls out from the ends of the abutments so separate foundations for the wing walls will not be required. A similar arrangement of piles will be required at this abutment as on the west abutment.

Thus, the total number of piles required for the whole bridge has been revised to 90 number 450 mm square piles and 34 number 350mm square piles making a total of 124 piles. The cost saving is in the order of B\$558,000.00.

3.8.2 Location of Pile caps:

Now that the work is advancing towards installing the pier piles and the location of the pile caps have been set out by the surveyors it has become apparent that the Designer did not take cognisance of the effect of the bend in the river on the west pier piles and pile cap construction. The current location of the pile caps meant that the western pile cap cannot be constructed without first providing an access platform into the river below it. To determine the extent of the problem a survey of the river channel has been undertaken which has shown that to effectively provide a working platform would entail almost completely blocking the river channel with fill material that would be prone to wash out at times when the river level rises. A temporary sheet pile wall was also discussed but it is thought that there is insufficient founding material above the bedrock exists to enable the sheet piles to be adequately founded to support the imposed loads during the works thus it is considered prudent not to go with this approach.

To construct the west pier on dry land moving the whole bridge to the west was considered, however this approach cannot be used as this would create a similar problem of founding the east pier in the river. As the bridge girder design is still ongoing and issues have been found in the design review that require further work to be undertaken it was decided to amend the location of the west pier by amending the deck spans and thus the girder design.

As the west pier needs to be moved westwards by about 5m it is not possible to make the amendment to the middle span only as increasing the current span of 35m to 40m would give too many issues in the manufacture and installation of the girders. Thus, the preferred approach would be to move both the east and west pier locations to enable a manageable middle span girder length to be created. It has been determined that the east pier can be moved westwards by 2m without any detriment effect on its construction and long-term integrity, thus the east span will be lengthened to 32m.

To obtain the additional 3m to locate the west pier on dry land the middle span has been increased to 38m from the original 35m. The additional weight of the girder has been offset by removing the concrete from the non-standard height of the top flange of the girder (this has the added advantage of making the design of the girders easier as the standard properties can be obtained from the Tables of Properties provided by AASHTO).

To keep the overall length of the bridge to 95m the west span has been reduced to 25m.

There will be no change to the cost of the piers and their piling for these amendments as there is no impact on their actual design.

The cost of the changes made to the girders is likely to be a saving due to the reduction in the overall weight of the girders by reducing the height of the top flange. It is envisaged that there will be no change to the cost of the installation of the girders.

3.8.3 Length of Abutment Piles:

As with the pier piles it is considered prudent to increase the length of the abutment piles by 2m to take account of the variability of the rock head. Thus, the west abutment piles will now be 14m long and the east abutment piles will be 17m long. This is an increase of B\$60,000.00 to the project but as there is a B\$558,000.00 saving in the number of piles it is considered inconsequential to the overall costs of the foundations.

3.9 Site Instructions

There were no site instructions issued for the month of May 2018. The following site instructions have been issued to date on the Lot 1 project: -

SITE INSTRUCTIONS ISSUED TO DATE			
Date	Number	Description	Payment Details
22/02/18	001	Additional testing using auger machine to confirm the bedrock level.	Payment under Item 1.10.12 Additional testing of materials.

3.10 Variation Orders

The status of the Variation Orders prepared to date is shown below: -

VARIATION ORDERS STATUS TO DATE				
Date	No.	Description	Cost (BZ\$)	Status
27/03/18	001	Rock Shoes for Pier Piles	\$155,520.00	Approved on 03/05/18
27/03/18	002	'Value Engineering' Works	\$117,850.00	Approved on 03/05/18
18/04/18	003	Pile Lengths	\$ 0.00	Approved on 03/05/18
29/05/18	004	Pile Layout and Abutment Piles	-\$ 558,579.00	Submitted PEU 29/05/18

The Variation Order 001 to 003 have been signed by MoW and PEU and forwarded to the Contractor. The VO-004 submitted to PEU on 29th May 2018 was verbally approved at a Bridge Meeting Update on the 16th May 2018 by the Project Manager (PEU) and Chief engineer (MoW) as a way forward. The date of approval for the VO's may well be critical when assessing the extension of time.

3.11 Financial Status

The IPC #5 for BZ\$ 149,400.56 submitted and approved in May 2018 for the works executed in April, was paid to the contractor. To date the Contractor has not submitted an IPC #6 for May but the Consultant has estimated a value of \$213,707.41 BZE dollars related to works. The Contractor's projected cash flow was BZ\$1,956,074.40 compared to his actual to date of BZ\$780,828.63 which is 40% of his projected at this point in the project.

Lot 1 – FINANCIAL STATUS					
Month	Contractors Projected Cash Flow (BZ\$)		IPC No.	Interim payment Certificates - Actual Cash Flow (BZ\$)	
	Monthly	Cumulative (excluding Advance)		Monthly	Cumulative (excluding Advance)
	First Advance	1,134,682.31	001	1,134,682.31	1,134,682.31
1	499,100.00	449,190.00	002	367,030.89	367,030.89
	Second Advance	1,134,682.31	003	1,134,682.31	2,636,395.53
2	450,900.00	855,000.00	004	50,689.77	417,720.66
3	499,966.00	1,304,969.40	005	149,400.56	567,121.22
4	723,450.00	1,956,074.40	006 Est	213,707.41	780,828.63
5	770,890.00	2,649,875.40			
6	801,670.00	3,371,378.40			
7	764,900.00	4,059,788.40			
8	673,600.00	4,666,028.40			
9	570,656.00	5,179,618.80			
10	620,800.00	5,738,338.80			
11	789,070.00	6,448,501.80			
12	725,230.00	7,101,208.80			
13	690,145.00	7,722,339.30			
14	763,439.00	8,409,434.40			
15	540,980.00	8,896,316.40			
16	462,713.00	9,312,758.10			
17	458,989.26	9,725,848.43			

3.12 Claims

In April the Contractor submitted his first claim for extension of time. The claim is being reviewed but on initial inspection lacks adequate back-up and substantiation to make a recommendation in accordance with Clause 44 of the GCC.

3.13 Difficulties Affecting Section I

The main difficulties affecting Lot 1 are as follows: -

- Utility Diversions – temporary diversions will be necessary on the western side of the bridge for the watermain and the telecoms fibre optic. These temporary diversions will need to tie into the final designs so there is an urgency to finalise the designs.
- Value Engineering - The significant number of design issues and modifications to be made to both the bridge and the road design need to be issued in a timely manner. The bridge redesign is being carried out by the Contractor who is now behind on the deadlines for submittal. However, without the signed variation order from MoW the start date for these works has not been formally confirmed. It will be essential that the VO's are signed in a timely manner.
- Road Design Works – the road design either side of the bridge has significant omissions and corrections to be made as detailed in the Consultant's Design Review Report. Pedestrian routes have not been catered for in the original design and there are clashes with the buildings on the western approach RHS which will need to be resolved. Surveys are being carried out and the Consultant is actively looking at solutions to be approved by MoW.
- Seismic Design Checks – the Consultant has concerns over the initial seismic design and has recommended that this be rechecked as it could well influence the works being carried out in the 'value engineering'. The Contractor has noted that these checks may be carried out as part of the 'value engineering' works.
- Cash Flow – the Contractor seems to have cash flow issues which is of concern at such an early stage in the project when 20% has been paid in the form of an advance.
- Inexperienced Contractor – the Contractor is not used to the requirements of an internationally funded project and must be guided so that submittals are made correctly and on time.

4. CONSTRUCTION CONTRACT SECTION II (LOT 2)

4.1 Contract Data

Section II (Lot 2) Roaring Creek to Iguana Creek Junction George Price Highway Rehabilitation Project	
Km 0+485 to 15+870km	Contract No.380 of 17/18
Contractor	Teichroeb & Sons Limited ¼ Mile Burrel Boom Road, Ladyville, Belize District.
Managing Director	Mr. Peter Teichroeb
Date of Contract Signing	24 th January 2018
Letter of Acceptance	24 th January 2018
Site Possession Date	February 2018
Start Date	February 2018
Completion Date	August 2019
Construction Period	18 months
Contract Price	BZ\$20,540,823.19
Defects Liability Period	12 months
End of Defects Liability Period	August 2020

4.2 Physical Progress

The Contractor has not submitted the Monthly Progress Report or updated IPC by the end of the reporting period so the progress to date and financial summaries for the month are based upon the Consultant's estimate. The main construction activities this month for Lot 2 were at the Culvert C217, the roadworks between Ch11+000 and 12+000, the BWSL pipe relocation and the continued rock excavation on S-Curve.

The estimated Progress for Lot 2 to date is 6% of which the majority (4.5%) is from the preliminary and general items with of Contract amount in the establishment of quarries, detours, camps, general site clearance and mobilization. The physical work on site for the month of May 2018 was 1.3% which was made up of the topsoil stripping, excavation and filling between Ch 11+000 to CH 12+000, excavation in rock along the 'S' curve section of work between Ch 9+540 to CH 9+860, installation of the BWSL pipeline from CH 0+485 to Ch 3+180 RHS, and the excavation, filling and blinding at Culvert C217. The survey crew continued ground surveys and the redesign team worked on the horizontal and vertical realignment and modifying the cross-sections for the 'S' curve cross-sections.

The quarry located at Ch13+000 RHS Ontario Village along the road continues to produce base course, sub base and road fill quality material and there is already a sizeable stockpile in place. The contractor has also produced Road fill at the S curve.

LOT 2 PROGRESS TO DATE					
Bill No.	Description	Contract Amounts [BZ]	% of Contract Amount	Estimate May 2018 (%)	Estimated Total Disbursement to May 2018 (%)
1	General Items	\$2,254,110.00	11.0%	<0.1%	4.5%
2	Demolition and Site Clearance	\$12,500.00	0.1%		<0.1%
3	Earthworks and Roadworks	\$11,286,495.25	54.9%	0.3%	0.4%
4	Drainage	\$4,306,733.50	21.0%	-	-
5	Culvert C213	\$859,180.00	4.2%	-	-
6	Culvert C217	\$843,670.00	4.1%	0.2%	0.2%
	Contingency Allowance	\$978,134.44	4.8%		
	VO-002 'S' Curve Rock Excavation			0.8%	0.8%
	VO-003 Lighting Detour to 'S' curve			0.1%	0.1%
A	WORK ITEMS - BILL 2,3,4,5,6,	\$17,308,578.75	84.3%	0.4%	0.6%
B	WORK ITEMS - BILL 2,3,4,5,6 + Prov.Sums + Contingencies	\$19,315,153.19	94.0%	1.3%	1.5%
C	Total Contract Sum	\$20,540,823.19	100.0%	1.4%	6.0%

4.2.1 Construction Works May 2018

The Construction work carried out for the month of April is summarized below:

Bill Item No.1 – General Items and Preliminaries

- Bill Item No 1.3.05 -Provide security for the site offices and compound. – 1 month
- Bill Item No 1.5 - Testing of Materials (as described in the Specification) – 6.6%
- Bill Item No 1.10.01 - Liaison with Utility Authorities on location and diversion of utilities – 1 Month
- Bill Item No 1.10.02 - Allow for rerouting of water and sewerage mains by BWSL.– 22%

Bill Item No.3 – Earthworks and Roadworks

- Bill Item No 3.1.01 - General excavation topsoil; max. depth < 0.25m from CH 11+000 to 12+000 – 7%
- Bill Item No 3.1.03 - General Excavation of Rock Material – 100%
- Bill Item No 3.1.03V - VO-002 General Excavation of Rock Material at the 'S' Curve between CH.9+520 to 9+880 – 32%

Bill Item No.6 – Culvert C217

- Bill Item No 6 - CULVERT C217 – 5%

Variation Orders

- VO-003 Lighting for Detour to S' Curve – 59%

4.2.2 Construction works Undertaken to date

Bill Item No.1 – GENERAL ITEMS AND PRELIMINARIES

- Bill Item No 1.1.02 - Insurance of works -100%
- Bill Item No 1.1.03 - Third party insurance – 100%
- Bill Item No 1.3.01 - Erection of site offices and provision of office furniture and equipment for the Engineer until completion of the Contract. - 100%
- Bill Item No 1.3.03 - Establishment, maintenance and removal of site offices, facilities, stores, plant, equipment, workshops and site compound for the Contractor until completion of the Contract. -90%
- Bill Item No 1.3.05 -Provide security for the site offices and compound. – 3months
- Bill Item No 1.4.01 – 4WD Crew Cab Pick Up vehicle for the Engineer for period of the Contract. – 80%
- Bill Item No 1.5 - Testing of Materials (as described in the Specification) – 6.6%
- Bill Item No 1.9.01 - Temporary works to allow traffic diversions – 60%
- Bill Item No 1.10.01 - Allow for liaison with Utility Authorities on location and diversion of utilities affected by the Works – 4 Month
- Bill Item No 1.10.02 - Allow for rerouting of water and sewerage mains by BWSL. Refer to Clause 18 of the Preamble – 22%

Bill Item No. 2 - DEMOLITION AND SITE CLEARANCE

- Bill Item No 2.1.01 - General Site Clearance: S-Curve CH 9+560 to Ch9+880 and CH10+800 to 12+300 RHS and LHS

Bill Item No.3 – EARTHWORKS AND ROADWORKS

- Bill Item No 3.1.01 - General excavation topsoil; max. depth <0.25m CH 11+000 to CH12+000 – 7%
- Bill Item No 3.1.03 - General Excavation of Rock Material – 100%
- Bill Item No 3.1.03V - VO-002 Excavation Rock Material at the 'S' Curve between CH.9+520 to 9+880 – 32%

Bill Item No.6 – CULVERT C217

- Bill Item No 6 - CULVERT C217 – 5%

Variation Orders

- VO-003 Lighting for Detour to S' Curve – 59%

4.2.3 Utility Relocation works Undertaken to date

- BWSL - Contractor has commenced with the relocation of BWS pipes this has been completed on the RHS 0+485 to 3+180 RHS. Compaction has been performed on the fill material in the trench on a regular basis with use of a densometer.
- BEL – The Contractor is awaiting BEL to submit quote for relocation of poles identified on site at Ch8+660 an Ch 10+740 of works.
- BTL – Works are still on going to identify all the overhead and underground cables.

4.3 Mobilisation Status

The Contract was signed on 24th January 2018 with the Start Date given as February 2018. The Contractor is 98% mobilised has provided the following submittals as part of their requirements under the Contract.

SUBMITTALS REQUIRED FROM CONDITIONS OF CONTRACT				
No.	Clause	Description	Required Date	Status
13	Insurances	Policies and Certificates for insurance	Jan. 2018	Delivered 5 th Feb. 2018
27	Program	Submit 14days from acceptance letter	07/02/18	Delivered 6 th Feb. 2018.
41	Cash Flow	Should be submitted with the program	07/02/18	Delivered 6 th Feb. 2018.
52	Securities	Performance Security	14/02/18	Delivered 4 th April 2018

SUBMITTALS REQUIRED FROM SECTION VII TECHNICAL SPECIFICATION				
No.	Clause	Description	Required Date	Status
104(5-6)	Existing Services	Ascertain location of existing services.	Initial Survey	Outstanding
105(2)	Levels / Ref. Points	Obtain DOS current values and locations.	Initial Survey	On-going
112	Project Signboard	To be erected in 1 month	24/02/18	Installed 26/04/18
202(3)	Material Inspection	Copies of orders to allow for inspection		On-going
206(2)	Diversion of traffic	Traffic Diversion work to be submitted	In advance wk	On-going
216	Fences	Temporary fencing requirements	In advance wk	On-going
217(1) and (3)	Contractors Accommodation	Written approval to erect Contractors buildings on site	Mobilization	Complete
225	Engineer's Office and Appendix 2/2	Provide specified office, equipment and Consumables	Mobilization	On-going
226(1) GCC 18	Method Statements	Submit detailed method statements	28 days prior	Ongoing see section 4.4
227	Engineers Vehicles	Two vehicles to be supplied	Mobilization	06/02/18 and 02/03/18
230	QC Testing	Site lab set up within one month	24/02/18	21/03/18 and Certs April
610	Quarries / BP's	Verify Quality and Quantity	Mobilization	On-going
1705	Cement Testing	Submit compliance certificates	Before orders	01/02/18 and on-going
1708	Coarse Aggregate	testing for fine and coarse aggregate	Prior to supply	Testing On-going
1714	Concrete Mix Design	Submit for approval	Prior to supply	Needs revision trials are being carried out.
1736	Formwork Concr.	Methods and materials for formwork	Prior to site	Outstanding
1743(2)	Precast Concrete	methodology and shop drawings		Outstanding

4.4 Method Statements

The Contractor has submitted the following Method Statements for the works in accordance with Clause 226(1) of the Specifications and GCC 18.

METHOD STATEMENTS SUBMITTAL LIST				
No.	Letter Ref. #	Description	Date Submitted	Status
MS-1	-10	General Method Statement	6/2/2018	Approved in Weekly Minutes #6
MS02-02		General Site Clearance	MAR.,2018	Approved
MS03-01	-39	Relocation BWSL water lines CH0+485 to 9+700. BoQ 1.10.02	18/03/18	Approved in Weekly Minutes #6
MS04A-02	-37	Site Clearance at 'S' Curve	18/03/18	Approved in Weekly Minutes #6
MS05-01	-38	General Excavation Rock at 'S' Curve	18/03/18	Approved in Weekly Minutes #6
MS06-1	-40	General excavation Topsoil	18/03/18	Approved in Weekly Minutes #6
MS07-01	-55	Concrete Mix Design	18/04/18	Submitted for Review
MS08-01	-54	Common Fill Placement (Draft)	18/04/18	Submitted for Review
MS09-01		900mm Pre-cast Concrete Culvert	APR.2018	Submitted for Review
MS10-01	-56	In-site R.C. Box Culver Construction	19/04/18	To be revised and resubmitted
MS11-01	-57	Hardcore Soils Lab– Testing Manual	18/04/18	Approved
MS12-01	-76	Placement of Sub Base- Draft	24/5/18	NOT APPROVED REF: 316/T&S/111
MS13-01	-77	Placement of Base-Draft	25/5/18	NOT APPROVED REF:316/T&S/114
MS14-01	-85	Scarification of existing pavement	25/5/19	NOT APPROVED REF:316/T&S/112
MS15-01	-90	Prime method statement	25/5/20	NOT APPROVED REF:316/T&S/114

4.5 Contractors Resources Deployed

4.5.1 Equipment

The Contractor has mobilised the following machinery and equipment for the month of May 2018. The equipment and resources were mainly concentrated on the BWSL relocation, Ontario quarry and the 'S' bend widening.

Lot 2 - Equipment Utilization Schedule for May 2018						
Equipment	Number	Down Time (Days)	Standby Time (Days)	Working Time (Days)	Offsite (Days)	Remarks
Hitachi 450	1	0	0	24	0	1,2,E
Excavator 330	2	0	0	24	0	1,2,E
Excavator 210	1	0	0	22	0	2,E
Excavator 200	2	0	0	22	0	2,E

D5 Bulldozer	1	0	17	15	0	2,E,D,S
D6 Bulldozer	1	0	17	15	0	2,E,D,S
Front Loader	2	0	0	24	0	1,2,E
Rock Trucks	2	0	0	24	0	1,2,E
Stone Crusher	1	0	0	24	0	1,2,F,SB,B
Grader	1	0	14	10	0	2,D
Dump Trucks	8	0	0	24	0	1,2,F
Roller	1	0	17	15	0	2,F,SB,B

Key: - SC – Surface Course; 1 - Base; SB - Subbase, F - Fill; E - Excavation; D - Drains; S- structure (1) weekends and holidays (2) Weekdays (Monday to Friday).

4.5.2 Contractor's Staff

The Contractor has the following staff mobilised to site. The Construction Manager and junior staff tend to be permanently on site with the remaining key staff part time between the head office in Belize District and the site office.

Lot 2 - Site Attendance of Contractor's Personnel for May 2018				
Personnel	No.	Onsite (Days)	Offsite (Days)	Remarks
<u>Key Staff</u>				
General Manager	1	11	11	Part of the redesign team
Construction Manager	1	22	0	
Contractor's Representative	1	22	0	Part of the redesign team
Licensed Surveyor	1	22	0	Part of the redesign team
Quantity Surveyor	1	22	0	Part of the redesign team
<u>Supplemental Site Staff</u>				
Administrative assistant	2	22	1	
Surveyor	2	22	0	Part of the redesign team
Health & Safety Officer	1	22	0	
Foreman	1	22	0	
Lead Draftsman	1	2	20	Part of the redesign team
<u>Skilled Labourer</u>				
Skilled Labourer	29	22	0	6 with Redesign Team
<u>Unskilled Labourer</u>				
Unskilled Labourer	48	22	0	

4.6 Quality Control

4.6.1 Laboratories

The Contractor's has relocated the independent laboratory to the site office at Mile 47 George Price Highway which is being used for all their quality control testing. The contractor calibrated their CBR, compression machine and schmidt hammer, which means that the laboratory has updated all pending equipment certificates.

4.6.2 Testing

The total number of quality control site testing carried out for May was 4 number DCP's, 66 concrete cubes, 88 field densities for BWSL works and 27 field densities at the C217 culvert.

Samples of the base and Road fill material being produced at the Ontario Quarry and Road fill from S curve were tested. The summary of laboratory tests is attached in the appendices. Seven samples were collected this month from the S-Curve tested for compliance to the Road Fill specification, and one site sample for road fill between Ch 11+000 and Ch 11+500 roadworks, testing have not been completed yet. One site sample was also collected to test got the Procter of the Subgrade material found onsite.

Trial mixes for C30 and C35 Concrete with a water reducing agent were performed on April 18th, 2018 which yielded marginal results. The contractor was required to perform another trial which was done on May 3rd, 2018 still pending 28-day results.

4.6.3 Certificates

Certificates for Cement and Steel have been submitted in April and approved but require updates during project.

4.7 Environmental and Social Issues

4.7.1 Environmental and Social Compliance Report

The IMC Environmental and Social Specialist (ESS) has been monitoring compliance with the use of checklist and reviewing on a weekly basis during site visits. Site inspections have been ongoing, and some minor concerns were noted. A compliance report carried out in April is included in the appendices.

Concerns pointed out by the Specialist:

- Until further guidance is obtained from the DOE, the Contractor is being advised to store drums, portable fuel tanks, and smaller containers with fuel, oils and lubricants over portable totes and containment pallets (see examples below).
- Put measures in place to control siltation and to prevent soil from entering stream or obtain guidance from the DOE.
- Put measures in place to control rock falls and to ensure that rocks do not damage vegetation and disrupt nearby riverine ecosystem or obtain guidance from the DOE.
- No perimeter

Contractor agreed to mitigate these as soon as possible.

4.7.2 Health and Safety

The Contractor has submitted Health and Safety documents for review and comment. To date there have been three reported incidents which have occurred in May 2018 but from the three there were no injuries recorded.

- 9th May 2018 three motor vehicles including BWSL vehicle were in a collision along the diversion at Ch 1+280;
- 11th May 2018 one orange flashing light was stolen thieves who also fired three shots in the air at CH10+100 detour;
- 31st May 2018 report of stolen lights in the S curve diversion.

4.8 Design Modifications

The Consultant's design review was submitted in February 2018 which identified a considerable number of issues with the current design that will require some major modifications. The MoW has met with the Contractor and agreed that the Contractor will carry out the redesign. The Consultant has submitted a draft TOR for the PEU to issue to the Contractor so that the work can be formalised under a variation order. The Contractor has commenced survey work and some preliminary redesign work. The following issues will need to be addressed:

4.8.1 Horizontal Alignment

The main issue is the horizontal alignment which has not been designed in all areas with the surveyed property boundaries. The Contractor has surveyed the actual boundary lines and the cadastral concrete posts (CP) for most of the road section so that these can be compared to the design. Visually there are many areas where the road will interfere with properties boundaries and some redesign will be necessary. The Consultant is recommending mobilising additional staff to carry out this redesign. The contractor has started working on the redesign. The Contractor submitted a draft non-official AutoCAD drawing with was reviewed by the consultant and some comments and recommendations were made that may better centered the road between existing boundaries and to allow for services on either side of the road

4.8.2 Vertical Alignment

The vertical alignment does not seem to have taken into consideration the pavement design, so the project becomes reconstruction rather than rehabilitation. To improve buildability, reduce costs and increase the strength of the road there may be a requirement to modify the vertical alignment so that the existing road is built up rather than cut. The Consultant is recommending mobilising additional staff to carry out this redesign. The contractor has started working on the redesign. The Contractor submitted a revised draft non-official AutoCAD drawing for horizontal and vertical alignment on 14 May 2018 which was reviewed by the consultant and some comments and recommendations were made to improve sight distance and passing on vertical curves

4.8.3 Topsoil

The typical cross-section shows topsoil to be placed in a 0.5m wide strip at the shoulder breakpoint. This would effectively block the proper drainage of the pavement layers and is not a practical construction. The recommendation is to construct pavement layers the full width and eliminate the topsoil to reduce the cost for the additional pavement material. A revised typical cross-section was prepared by the contractor which includes full width pavement layers.

4.8.4 Culverts C213 and C217

The main 3 cell concrete culverts C213 and C217 are being reviewed by the Consultant's hydrologist and may require modification to the alignment and the reduction in the number of cells. The revised drawings were prepared by the Consultant and submitted these under VO-001 and VO-005.

4.8.5 Fill Specification

The Contractor has requested a modification of the Fill Specification to allow a greater percentage passing the 0.075mm sieve. The Consultant noted in the Design review that the percentage passing for fill was stricter than for subbase and even base material. A recommendation to amend the Specification was forwarded to the PEU. The recommendation is to increase the percentage passing the 0.075mm to <25% but to add a PI limit of 10%. The Contractor has now submitted testing results of the fill stockpiles to prove that the material produced will meet the revised Specification.

4.9 Site instructions

To date no site instructions have been issued.

4.10 Variation Orders

The status of the Variation Orders prepared to date is shown below: -

VARIATION ORDERS STATUS TO DATE				
Date	No.	Description	Cost (BZ\$)	Status
13/04/18	001	Culvert C217 modification from 3 cells to 2 cells	- \$193,720.90	Approval 3 rd May 2018
23/04/18	002	Revised X-Sections 'S' Curve Rock excavation	\$502,615.80	Approval 3 rd May 2018
30/04/18	003	Provision of lighting for the detour to the 'S' curve section of work	\$39,750.00	Submitted to PEU
02/05/18	004	BWSL Relocation Works (allocated from Provisional Sums)	\$512,640	Submitted to PEU 2 nd May 2018
31/05/18	005	Culvert C213 Modification alignment from skewed to perpendicular to the road.	-	Submitted to PEU

Variation Orders 001 and 002 were approved and signed on 3rd May 2018.

The Variation Order 003 to 005 have been submitted to PEU who have forwarded to IDB for no objection. The date of approval for the VO's may well be critical when assessing the extension of time, although the Contractor Lot 2 tends to carry out the work irrespective of a signed order.

4.11 Financial Status

The initial 20% advance payment is split into two instalments, both of which have been approved. The Contractor has not yet applied for an Interim Payment Certificate (IPC) #5, so the Consultant included an estimate of \$286,165.10 which is still to be finalized. The financial status compared to the cash flow requirements are tabulated below and shown graphically in the appendices. At this stage the Contractor had a projected cashflow of \$1,044,639.73 compared to the estimated actual cashflow from IPC's of \$868,730.77 which is 83% of the projected.

Lot 2 – FINANCIAL STATUS					
Month	Contractors Projected Cash Flow (BZ\$)		IPC No.	Interim payment Certificates - Actual Cash Flow (BZ\$)	
	Monthly	Cumulative (excluding Advance Payment)		Monthly	Cumulative (excluding Advance Payment)
1	1,875.00	1,875.00		0	0
Advance Payment No.1			001 Ad	2,054,082.32	2,054,082.32
2	347,796.58	349,046.58	002	524,486.81	524,486.81
Advance Payment No.2			003Ad2	2,054,082.32	4,632,651.45
3	347,796.58	696,843.15	004	58,078.86	582,565.67
4	347,796.58	1,044,639.73	005Est	286,165.10	868,730.77
5	580,228.20	1,624,867.92			
6	865,803.94	2,490,671.86			
7	1,445,032.14	3,935,704.00			
8	1,670,762.04	5,606,466.04			
9	1,670,137.04	7,276,603.08			
10	1,616,992.92	8,893,596.00			
11	1,616,742.92	10,510,338.92			
12	1,436,455.42	11,946,794.34			
13	1,436,455.42	13,383,249.76			
14	1,376,359.58	14,759,609.34			
15	1,150,629.68	15,910,239.02			
16	586,304.92	16,496,543.93			
17	586,304.92	17,082,848.85			
18	225,729.91	17,308,578.75			

4.12 Claims

To date the Contractor has not submitted any notice of claim for Compensation events in accordance with Clause 44 of the GCC.

4.13 Difficulties Affecting Section 2

The main difficulties affecting the Lot 2 section of work can be summarised as follows:

- Horizontal and vertical design issues need to be resolved as early as possible. The Contractor is carrying out the initial redesign works but requires a ToR to properly define the scope of works to be completed. To date no formal ToR has been given to the Contractor which will lead to confusion as to the full requirements of the redesign. A clear Variation Order should be formalized for this redesign work in a similar way as has been carried out in Lot 1.
- BWSL Design – the final design for the new lines has not been confirmed. At present the main 8-inch line is on the RHS but the connections to the LHS need to be agreed and whether a new 4-inch line will be used. The payment for the service relocation also needs to be clarified and formalized in a variation order so that payments can be made under the Contract. There is an existing BoQ from BWSL which the Contractor has priced and signed which exceeds the present provisional item for this work. Additional funds will need to be sourced for this work above the allocation in the Contract.
- 'S' Curve Excavation – the Contractor has had to revise the cross-sections in this area to prevent the cut slopes affecting the property boundaries. However, this necessitated the reduction of the benches from 3.5m to 2.5m and making the cut slopes higher. The material around the CH.9+720 area consists of a bouldery limestone in a matrix of loose sand and clay. There is a risk of poor slope stability in this area and the Consultant is recommending in agreement with PEU that the benches be returned to 3.5 m and hence more land would need to be acquired. Surveys are being prepared to see how much additional land can be obtained. The lack of proper design cross-sections for the cut slopes and no geotechnical boreholes carried out at the design stage in this area has again caused problems in the constructability of the works.
- Setting out information from Contractor's surveyors needs to be done properly and checked for errors as the workmen onsite seem to not have all adequate and correct information to carry out works for invert onsite. Contractor needs to have Proper level and locational controls set at Culverts to perform random checks by Consultant, the way this has been to date done requires a total station and level each time a check must be done.

5. APPENDICES

5.1 Photographs

5.1.1 Section I (Lot 1)



Photo 1. Lot 1 Prefab Yard Pier Piles being checked for concrete cover to strands prior to casting on 9/05/18.



Photo 2. Lot 1 M&M Prefab Yard casting of 14m (450 x 450mm) abutment pile.



Photo 3. Lot 1 Site Excavation of the Eastern Pier pile cap and eastern abutment 23/05/18.



Photo 4. Lot 1 Site visit the first piles arriving on site from the pre-cast yard 29/05/18.

5.1.2 Section II (Lot 2)



Photo 1 – Lot 2 Placing road fill layer for the widening at CH.11+200 on 25/05/18.



Photo 2. Lot 2 C217 Culvert placing blinding concrete 18/05/18.



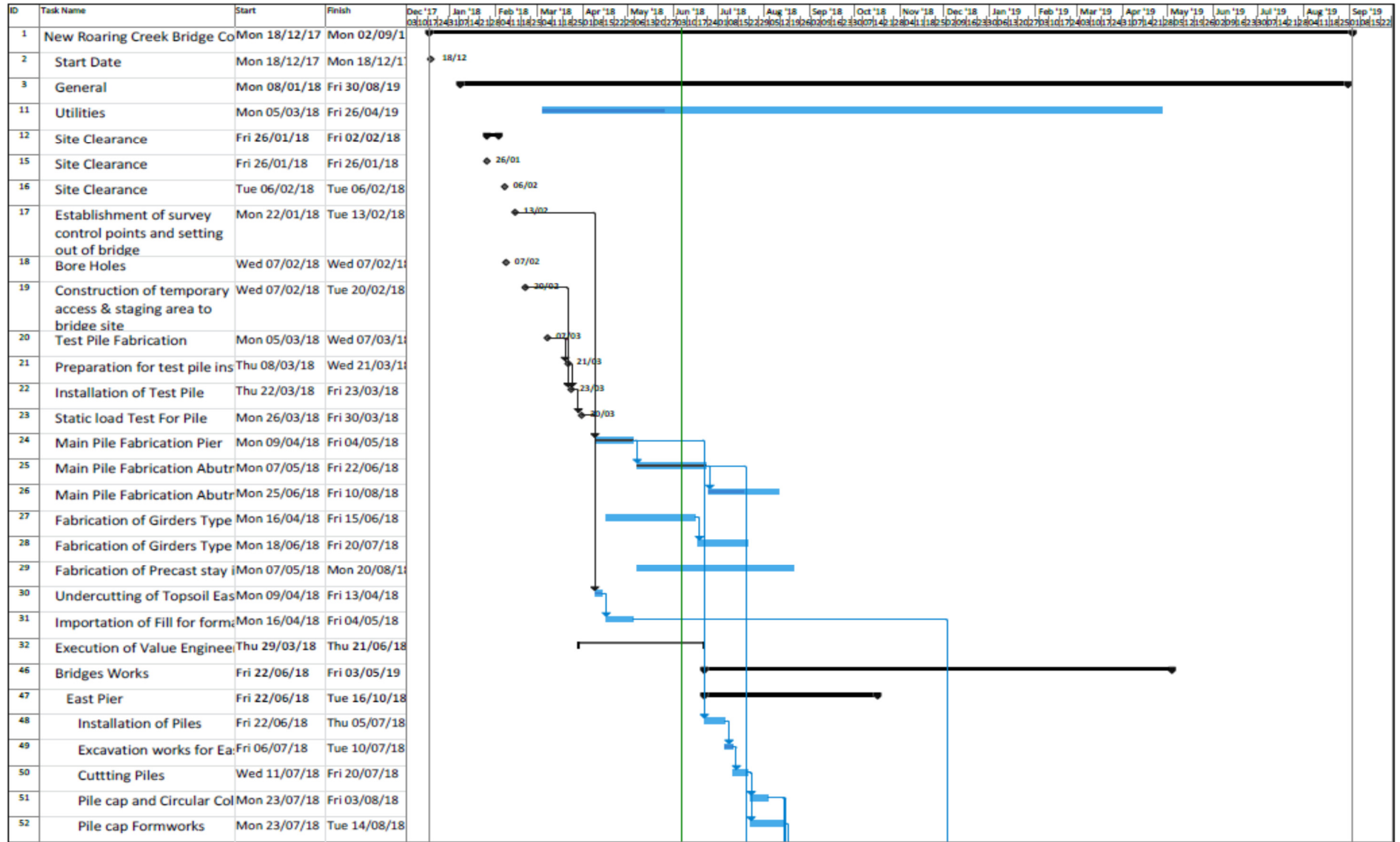
Photo 3. Lot 2 Culvert C217 steel fixing ongoing for the two-cell culvert 31/05/18.

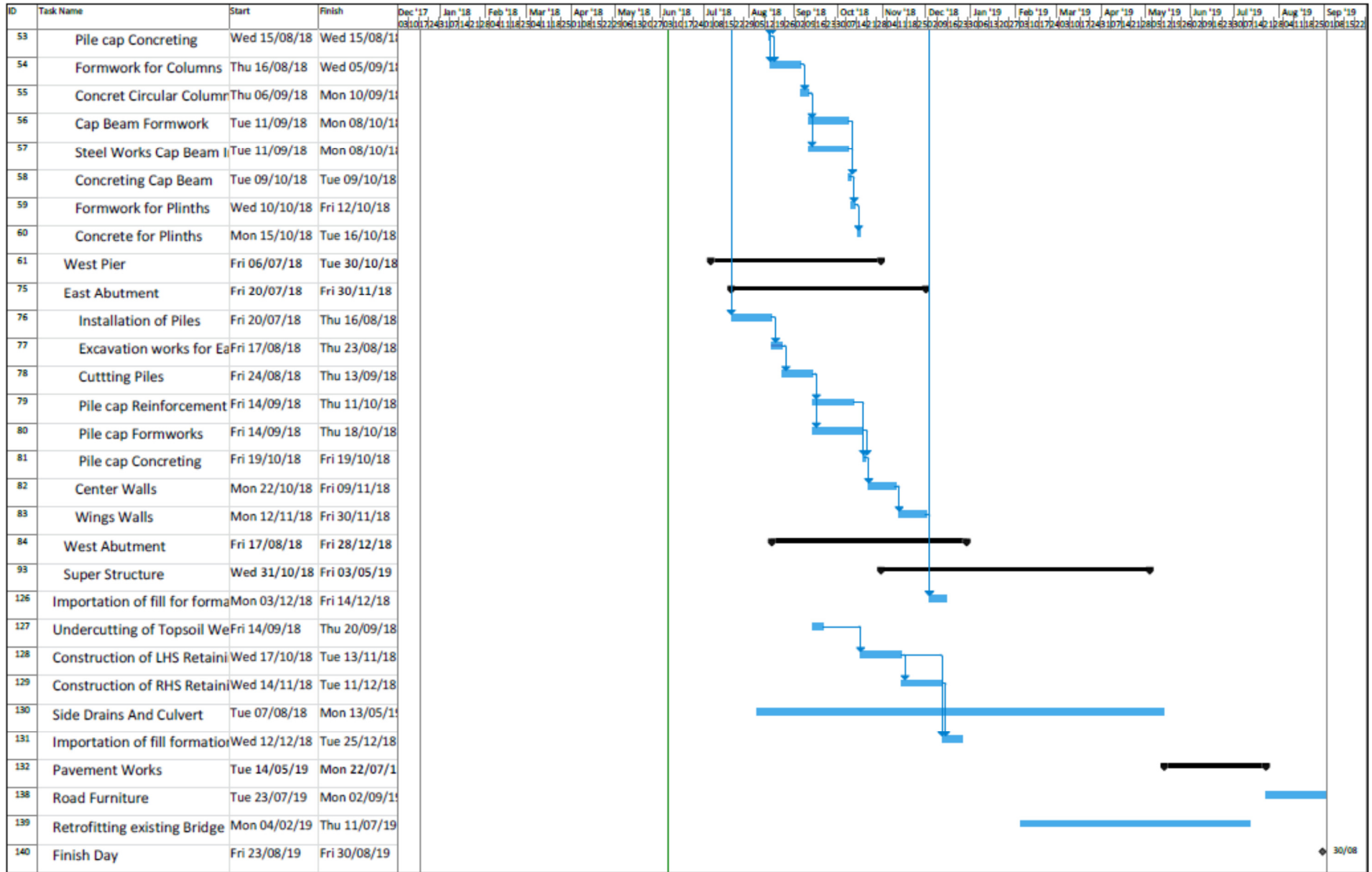


Photo 4. Lot 2 Excavation of the benches at the 'S' Curve 29/05/18.

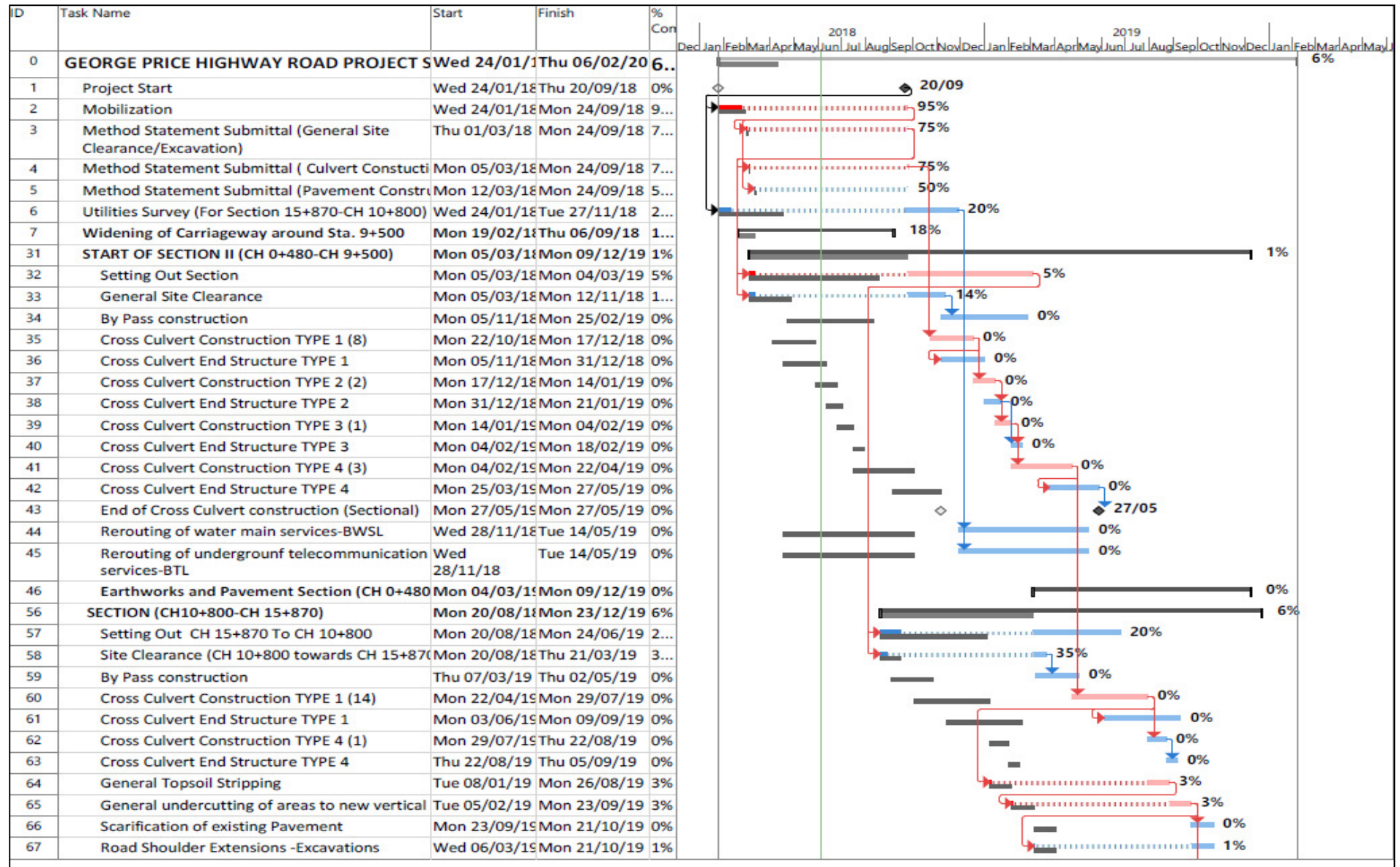
5.2 Programmes

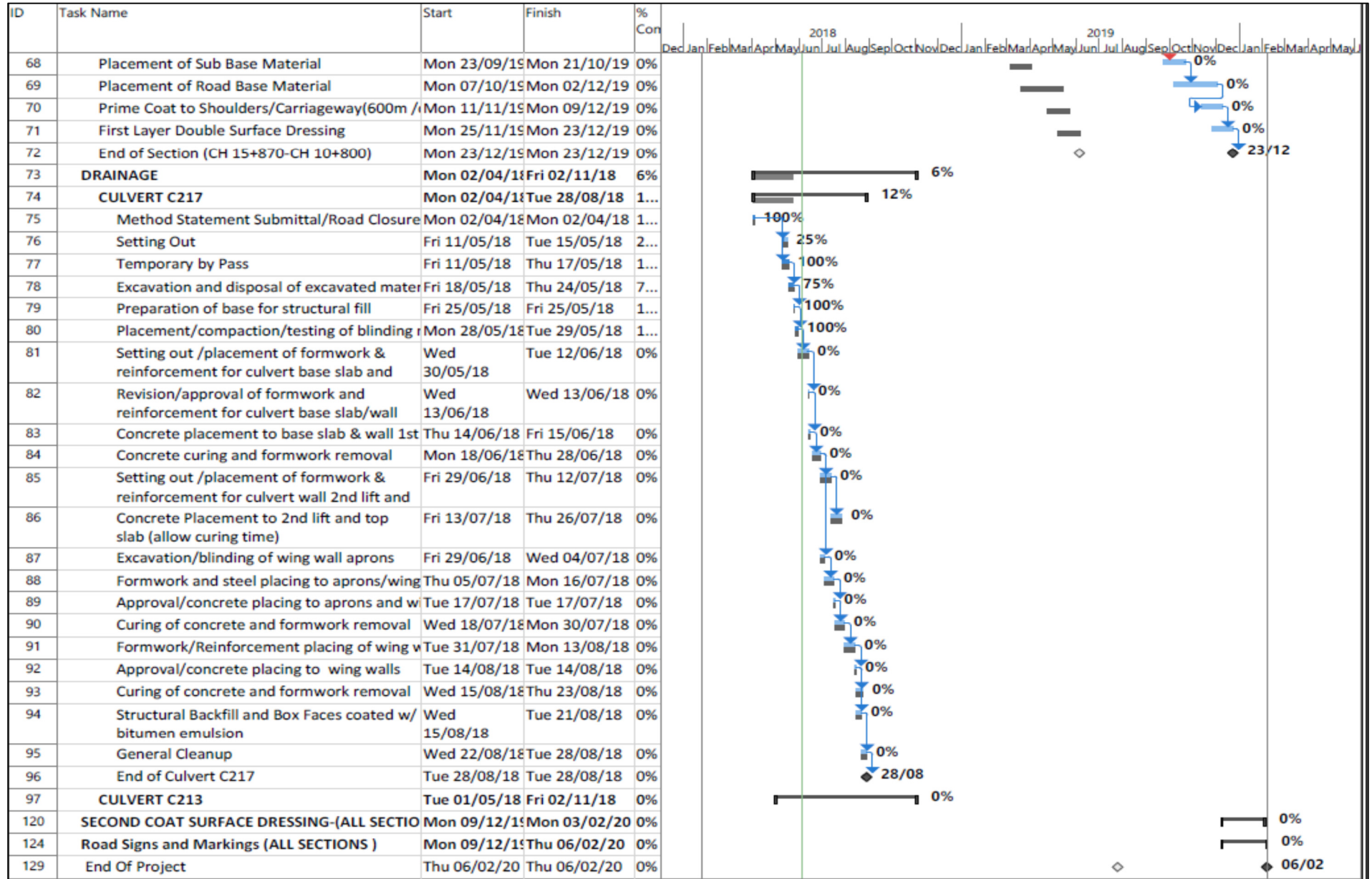
5.2.1 Section I (Lot 1)





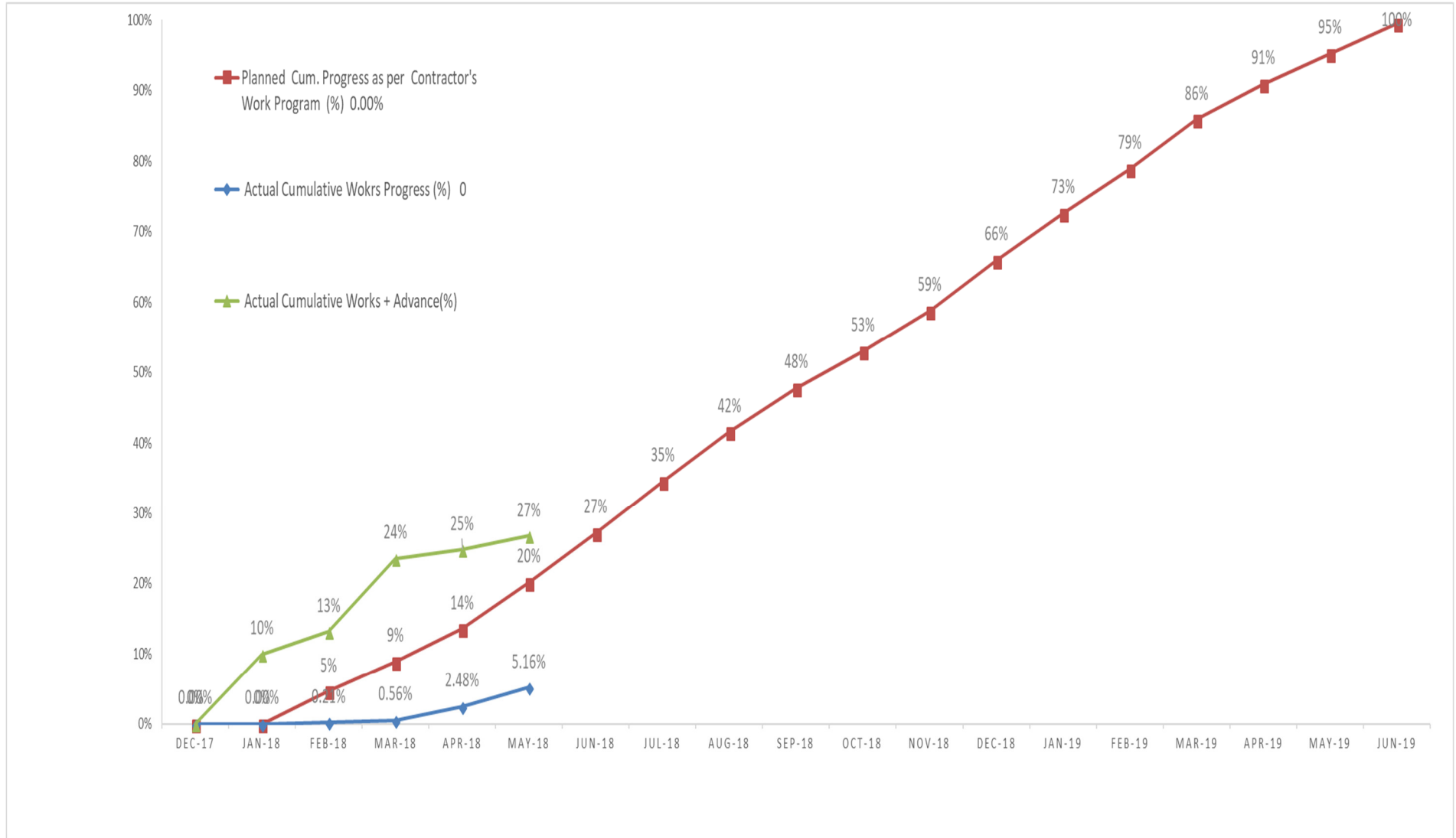
5.2.2 Section II (Lot 2)



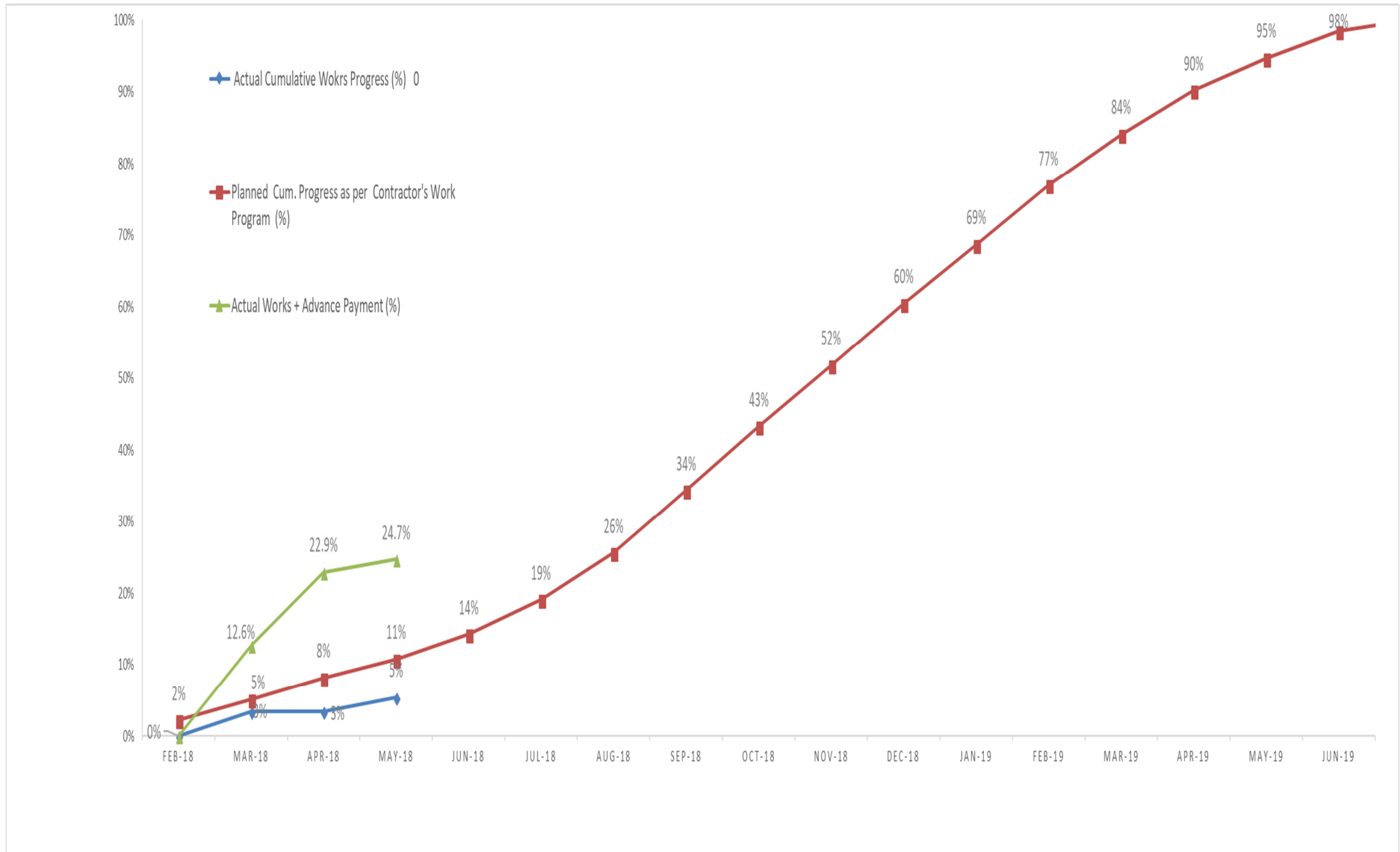


5.3 Financial Status Charts

5.3.1 Section I (Lot1)

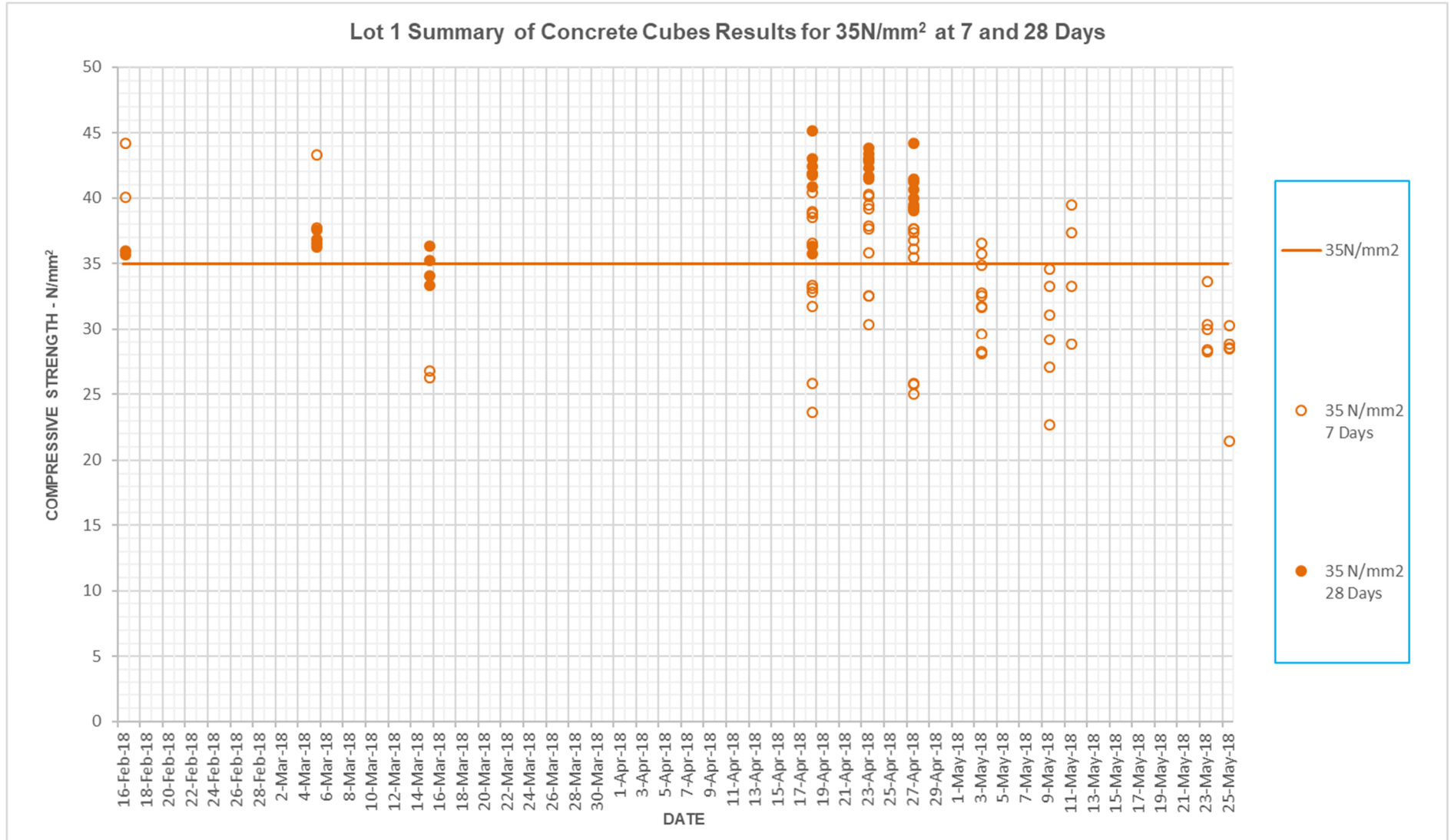


5.3.2 Section II (Lot 2)

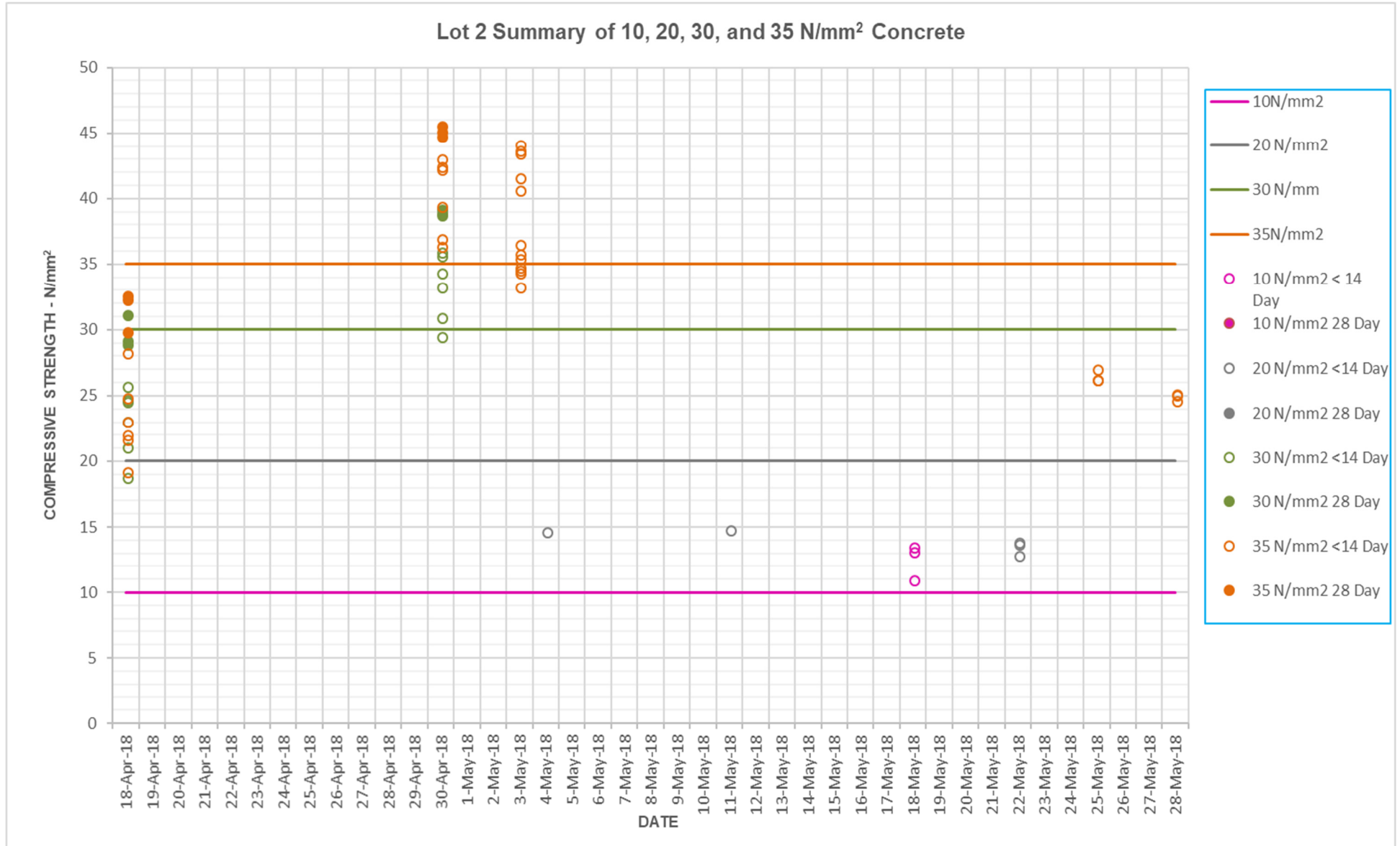


5.4 Quality Control

5.4.1 Lot 1 Concrete Test Result Summary



5.4.2 Lot 2 Concrete Test Result Summary



5.4.3 Lot 1 Concrete Aggregate Testing Summary

Concrete Course Aggregates																									
Sample ID	Date Collected	Location	Description	BS 1377 Part 2 1990												BS 812 -105.1: 1989					BS 812: PART 2		BS 812 PART 3		Remarks/Comments
				Sieve Analysis - Spec.												Date Tested	Flakiness	Date Tested	Sieve Used	Elongation (Shape Test)	Date Tested	Water Absorption	10% FINES		
				Date Tested	25	20	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075										
	9-Apr-18	M&M	3/4" down	12-Apr			100	99.80	97.20	89.90	73.30	38.70	11.80	5.80	4.60	12-Apr	14.50	12-Apr		21.80%	12-Apr	1.92	160kN		
	11-May-18	M&M	3/4" down																				Pending Results		

Concrete Fine Aggregates

Sample ID	Date Collected	Location	Description	BS 1377 Part 2 1990												AASHTO T84 91:2000		Reamrks/Comments
				Sieve Analysis - Spec.												Date Tested	Specific Gravity	
				Date Tested	25	20	12.5	10	5	2.36	1.18	0.600	0.300	0.150	0.075			
	9-Apr-18	M&M	Pine Ridge	12-Apr	100	100	100	100.00	100.00	100.00	94.40	78.80	48.00	17.20	6.70	12-Apr	2.5	
	9-Apr-18	M&M	River Sand	12-Apr	98.6	71	17	2.30	0.50	0.50	0.50	0.50	0.50	0.40	0.40	12-Apr	2.64	
	8-May-18	M&M	Quarry Sand	8-May	100	100.00	99.60	98.40	65.80	42.40	27.80	17.90	9.90	5.10	3.80	8-May	2.64	
	11-May-18	M&M	Pine Ridge	8-May														Pending results
	11-May-18	M&M stock pile ladyville	River Sand	8-May														Pending results

5.4.4 Lot 2 Summary of Laboratory Materials Testing

ROAD FILL MATERIAL																									
Sample ID	Date Collected	Location	BS 1377 Part 2 1990											BS 1377 Part 4 1990			BS 1377 Part 2 1990			BS 1377 Part 4 1990					
			Sieve Analysis - Spec. (BS 1377 Part 2)											Proctor Test			Date Tested	Liquid Limits Spec.	Plasticity Index Spec.	Date Tested	CBR				
			Date Tested	75	63	20	10	5	0.075					Date Tested	MDD (Mg/m3)	OMC (%)									
					100				25																
CF 10	18-Apr-18	Ontario Pit																	7-May	55.7					
CF 11	18-Apr-18	Ontario Pit																	7-May	66.3					
CF 12	18-Apr-18	Ontario Pit																	7-May	65.8					
CF 13	3-May-18	S_Curve	9-May	100	100	61	48	41	13				8-May	1975	7.7	10-May	NP	NP	15-May	59.7					
CF 14	3-May-18	S_Curve	9-May	100	100	68	53	43	15				9-May	1983	7.7	10-May	NP	NP	15-May	57.8					
CF 15	3-May-18	S_Curve	9-May	100	100	74	59	50	16				10-May	1988	7.3	10-May	NP	NP	15-May	62.5					
CF 16	10-May-18	S_Curve	23-May	100	100	73	57	47	16				25-May	1992	7.4	15-May	NP	NP	29-May	73.4					
CF 17	14-May-18	S_Curve	23-May	100	100	66	52	44	16				24-May	1997	7.2	28-May	NP	NP	29-May	74.3					
CF 18	14-May-18	S_Curve	30-May	100	100	65	52	44	14				25-May	1996	7.6	28-May	NP	NP	29-May	74.1					
CF 19	14-May-18	S_Curve	23-May	100	100	74	60	51	19				24-May	1980	7.5	28-May	NP	NP	29-May	80.5					
SUB-BASE COURSE MATERIAL																									
Sample ID	Date Collected	Location	BS 1377 Part 2 1990											BS 1377 Part 4 1990			BS 1377 Part 2 1990			BS 1377 Part 4 1990		BS 812 Part 110 1990			
			Sieve Analysis - Spec.											Proctor Test			Date Tested	Liquid Limits Spec.	Plasticity Index Spec.	Date Tested	CBR	Date Tested	Aggregate Crushing Value		
			Date Tested	37.5	20	10	5	2.36	0.6	0.075				Date Tested	MDD (Mg/m3)	OMC (%)									
				100	90-100	-	30-60	-	35-0	20-0															
BASE COURSE MATERIAL																									
Sample ID	Date Collected	Location	BS 1377 Part 2 1990											BS 1377 Part 4 1990			BS 1377 Part 2 1990			BS 1377 Part 4 1990		BS 812 Part 110 1990		ASTM D5820-01	
			Sieve Analysis - Spec.											Proctor Test			Date Tested	Liquid Limits Spec.	Plasticity Index Spec.	Date Tested	CBR	Date Tested	Aggregate Crushing Value	Date Tested	Broken Faces
			Date Tested	37.5	20	10	5	2.36	0.6	0.425	0.075			Date Tested	MDD (Mg/m3)	OMC (%)									
				100	60-80	40-60	25-40	15-30	8-22	10%	5-12														
B-07	18-Apr-18	Ontario Pit											2-May	2177	7.7	30-Apr	NP	NP	7-May	115.9	3-May	27	4-May	100	

5.4.5 Lot 2 Summary of Density Tests for May 2018

Field Density Result (Nuclear Densometer)

Date	Sample ID	Type of Material	MDD (Kg/m ³)	OMC %	Station	Position	Layer	DD (Kg/m ³)	WD (Kg/m ³)	%M	%PR	Depth (mm)
BACKFILL TRENCH RIGHT HAND SIDE BWSL PIPELINE (SIDE ENTRANCE)												
4-May	CF09	C Fill	1985	8.1	02+390	RHS	1st	2023	2191	8.3	101.9	150
4-May	CF09	C Fill	1985	8.1	02+390	RHS	2nd	2005	2175	8.5	101.0	150
4-May	CF09	C Fill	1985	8.1	02+390	RHS	2nd	2035	2200	8.1	102.5	300
4-May	CF09	C Fill	1985	8.1	02+390	RHS	3rd	2029	2204	8.6	102.2	150
4-May	CF09	C Fill	1985	8.1	02+390	RHS	3rd	2012	2187	8.7	101.4	300
14-May	CF12	C Fill	1970	8.5	02+507	RHS	1st	1996	2152	7.8	101.3	150
14-May	CF12	C Fill	1970	8.5	02+507	RHS	2nd	2010	2183	8.6	102.0	150
14-May	CF12	C Fill	1970	8.5	02+507	RHS	2nd	2002	2140	6.9	101.6	300
14-May	CF12	C Fill	1970	8.5	02+507	RHS	3rd	2017	2160	7.1	102.4	150
14-May	CF12	C Fill	1970	8.5	02+507	RHS	3rd	1954	2110	8.0	99.2	300
14-May	CF12	C Fill	1970	8.5	02+507	RHS	4th	2004	2150	7.3	101.7	150
14-May	CF12	C Fill	1970	8.5	02+507	RHS	4th	1944	2094	7.7	98.7	300

BACKFILL TRENCH CROSS ROAD BWSL PIPELINE

7-May	SB03	S-BASE	2111	7.6	00+618	RHS	1st	2043	2213	8.3	96.8	150
7-May	SB03	S-BASE	2111	7.6	00+618	LHS	1st	2123	2284	7.6	100.6	150
7-May	SB03	S-BASE	2111	7.6	00+618	LHS	2nd	2086	2253	8.0	98.8	150
7-May	SB03	S-BASE	2111	7.6	00+618	LHS	2nd	2137	2287	7.0	101.2	300
7-May	SB03	S-BASE	2111	7.6	00+618	RHS	2nd	2060	2219	7.7	97.6	150
7-May	SB03	S-BASE	2111	7.6	00+618	RHS	2nd	2112	2253	6.7	100.0	300
7-May	SB03	S-BASE	2111	7.6	00+618	RHS	3rd	2086	2230	6.9	98.8	150
7-May	SB03	S-BASE	2111	7.6	00+618	RHS	3rd	2066	2211	7.0	97.9	300
7-May	SB03	S-BASE	2111	7.6	00+618	LHS	3rd	2125	2293	7.9	100.7	150
7-May	SB03	S-BASE	2111	7.6	00+618	LHS	3rd	2105	2259	7.3	99.7	300
8-May	B07	BASE	2177	7.7	00+839	RHS	1st	2117	2250	6.3	97.2	150
8-May	B07	BASE	2177	7.7	00+839	LHS	1st	2145	2293	6.9	98.5	150
8-May	B07	BASE	2177	7.7	00+839	RHS	2nd	2191	2347	7.1	100.7	150
8-May	B07	BASE	2177	7.7	00+839	RHS	2nd	2120	2266	6.9	97.4	300
8-May	B07	BASE	2177	7.7	00+839	LHS	2nd	2200	2356	7.1	101.0	150
8-May	B07	BASE	2177	7.7	00+839	LHS	2nd	2157	2317	7.4	99.1	300
8-May	B07	BASE	2177	7.7	00+839	RHS	3rd	2229	2376	6.6	102.4	150
8-May	B07	BASE	2177	7.7	00+839	RHS	3rd	2163	2314	7.0	99.3	300
8-May	B07	BASE	2177	7.7	00+839	LHS	3rd	2156	2298	6.6	99.0	150
8-May	B07	BASE	2177	7.7	00+839	LHS	3rd	2173	2329	7.2	99.8	300
9-May	B07	BASE	2177	7.7	00+958	RHS	1st	2178	2346	7.7	100.1	150
9-May	B07	BASE	2177	7.7	00+958	RHS	2nd	2187	2331	6.6	100.4	150
9-May	B07	BASE	2177	7.7	00+958	RHS	2nd	2152	2281	6.0	98.8	300
9-May	B07	BASE	2177	7.7	00+958	RHS	3rd	2212	2354	6.4	101.6	150
9-May	B07	BASE	2177	7.7	00+958	RHS	3rd	2154	2318	7.6	99.0	300
9-May	B07	BASE	2177	7.7	00+958	LHS	1st	2117	2280	7.7	97.2	150
9-May	B07	BASE	2177	7.7	00+958	LHS	2nd	2134	2288	7.2	98.0	150
9-May	B07	BASE	2177	7.7	00+958	LHS	2nd	2164	2322	7.3	99.4	300
9-May	B07	BASE	2177	7.7	00+958	LHS	3rd	2189	2340	6.9	100.5	150
9-May	B07	BASE	2177	7.7	00+958	LHS	3rd	2155	2310	7.2	99.0	300
10-May	B07	BASE	2177	7.7	01+069	RHS	1st	2206	2341	6.1	101.4	150
10-May	B07	BASE	2177	7.7	01+069	RHS	2nd	2152	2296	6.7	98.8	150
10-May	B07	BASE	2177	7.7	01+069	RHS	2nd	2163	2327	7.6	99.3	300
10-May	B07	BASE	2177	7.7	01+069	RHS	3rd	2145	2291	6.8	98.5	150
10-May	B07	BASE	2177	7.7	01+069	RHS	3rd	2177	2329	7.0	100.0	300
10-May	B07	BASE	2177	7.7	01+069	RHS	4th	2146	2311	7.7	98.6	150
10-May	B07	BASE	2177	7.7	01+069	RHS	4th	2227	2369	6.4	102.3	300
10-May	B07	BASE	2177	7.7	01+069	LHS	1st	2160	2318	7.3	99.2	150
10-May	B07	BASE	2177	7.7	01+069	LHS	2nd	2105	2269	7.8	96.7	150
10-May	B07	BASE	2177	7.7	01+069	LHS	2nd	2198	2356	7.2	101.0	300
10-May	B07	BASE	2177	7.7	01+069	LHS	3rd	2144	2315	8.0	98.5	150
10-May	B07	BASE	2177	7.7	01+069	LHS	3rd	2216	2382	7.5	101.8	300
11-May	B07	BASE	2177	7.7	01+724	RHS	1st	2223	2374	6.8	102.1	150
11-May	B07	BASE	2177	7.7	01+724	RHS	2nd	2216	2358	6.4	101.8	150
11-May	B07	BASE	2177	7.7	01+724	RHS	2nd	2154	2294	6.5	98.9	300
11-May	B07	BASE	2177	7.7	01+724	RHS	3rd	2198	2358	7.3	100.9	150
11-May	B07	BASE	2177	7.7	01+724	RHS	3rd	2155	2308	7.1	99.0	300

Field Denisty Result (Nuclear Densometer)

Date	Sample ID	Type of Material	MDD (Kg/m ³)	OMC %	Station	Position	Layer	DD (Kg/m ³)	WD (Kg/m ³)	%M	%PR	Depth (mm)
11-May	B07	BASE	2177	7.7	01+724	LHS	1st	2159	2304	6.7	99.2	150
11-May	B07	BASE	2177	7.7	01+724	LHS	2nd	2199	2346	6.7	101.0	150
11-May	B07	BASE	2177	7.7	01+724	LHS	2nd	2157	2323	7.7	99.1	300
11-May	B07	BASE	2177	7.7	01+724	LHS	3rd	2227	2394	7.5	102.3	150
11-May	B07	BASE	2177	7.7	01+724	LHS	3rd	2198	2369	7.8	100.9	300
23-May	B07	BASE	2177	7.7	02+800	RHS	1st	2165	2323	7.3	99.4	150
23-May	B07	BASE	2177	7.7	02+800	RHS	2nd	2133	2270	6.4	98.0	150
23-May	B07	BASE	2177	7.7	02+800	RHS	2nd	2216	2347	5.9	101.8	300
23-May	B07	BASE	2177	7.7	02+800	RHS	3rd	2234	2375	6.3	102.6	150
23-May	B07	BASE	2177	7.7	02+800	RHS	3rd	2207	2353	6.6	101.4	300
23-May	B07	BASE	2177	7.7	02+800	LHS	1st	2154	2335	8.4	98.9	150
23-May	B07	BASE	2177	7.7	02+800	LHS	2nd	2150	2277	5.9	98.8	150
23-May	B07	BASE	2177	7.7	02+800	LHS	2nd	2144	2307	7.6	98.5	300
23-May	B07	BASE	2177	7.7	02+800	LHS	3rd	2181	2347	7.6	100.2	150
23-May	B07	BASE	2177	7.7	02+800	LHS	3rd	2169	2340	7.9	99.6	300
24-May	B07	BASE	2177	7.7	02+700	RHS	1st	2234	2384	6.7	102.6	150
24-May	B07	BASE	2177	7.7	02+700	RHS	2nd	2263	2444	8.0	103.9	150
24-May	B07	BASE	2177	7.7	02+700	RHS	2nd	2169	2316	6.8	99.6	300
24-May	B07	BASE	2177	7.7	02+700	RHS	3rd	2238	2370	5.9	102.8	150
24-May	B07	BASE	2177	7.7	02+700	RHS	3rd	2177	2327	6.9	100.0	300
24-May	B07	BASE	2177	7.7	02+700	RHS	4th	2225	2392	7.5	102.2	150
24-May	B07	BASE	2177	7.7	02+700	RHS	4th	2247	2393	6.5	103.2	300
24-May	B07	BASE	2177	7.7	02+700	LHS	1st	2151	2295	6.7	98.8	150
24-May	B07	BASE	2177	7.7	02+700	LHS	2nd	2156	2333	8.2	99.0	150
24-May	B07	BASE	2177	7.7	02+700	LHS	2nd	2204	2389	8.4	101.2	300
24-May	B07	BASE	2177	7.7	02+700	LHS	3rd	2185	2340	7.1	100.4	150
24-May	B07	BASE	2177	7.7	02+700	LHS	3rd	2257	2410	6.8	103.7	300
24-May	B07	BASE	2177	7.7	02+700	LHS	4th	2134	2318	8.6	98.0	150
24-May	B07	BASE	2177	7.7	02+700	LHS	4th	2226	2386	7.2	102.2	300

BACKFILL BEDDING CULVERT C-217

16-May	B07	BASE	2177	7.7	10+780	LHS	1st	2158	2287	6.0	99.1	150
16-May	B07	BASE	2177	7.7	10+780	RHS	1st	2138	2286	6.9	98.2	150
17-May	B07	BASE	2177	7.7	10+780	LHS	1st	2231	2396	7.4	102.5	150
17-May	B07	BASE	2177	7.7	10+780	CL	1st	2143	2329	8.7	98.4	150
17-May	B07	BASE	2177	7.7	10+780	RHS	1st	2189	2368	8.2	100.5	150
17-May	B07	BASE	2177	7.7	10+780	CL	1st	2226	2388	7.3	102.2	150
17-May	B07	BASE	2177	7.7	10+780	CL	2nd	2181	2325	6.6	100.2	150
17-May	B07	BASE	2177	7.7	10+780	LHS	2nd	2246	2428	8.1	103.2	150
17-May	B07	BASE	2177	7.7	10+780	RHS	2nd	2171	2332	7.4	99.7	150
17-May	B07	BASE	2177	7.7	10+780	LHS	2nd	2198	2378	8.2	101.0	300
17-May	B07	BASE	2177	7.7	10+780	CL	2nd	2245	2398	6.8	103.1	300
17-May	B07	BASE	2177	7.7	10+780	RHS	2nd	2212	2382	7.7	101.6	300
25-May	B07	BASE	2177	7.7	10+780	Inlet Apron LHS	1st	2207	2362	7.0	101.4	150
25-May	B07	BASE	2177	7.7	10+780	Inlet H/W Front	1st	2163	2312	6.9	99.3	150
25-May	B07	BASE	2177	7.7	10+780	Inlet H/W Back	1st	2142	2298	7.3	98.4	150
28-May	B07	BASE	2177	7.7	10+780	Inlet Apron LHS	2nd	2156	2311	7.2	99.0	150
28-May	B07	BASE	2177	7.7	10+780	Inlet Apron LHS	2nd	2198	2347	6.8	100.9	300
28-May	B07	BASE	2177	7.7	10+780	Inlet H/W Front	2nd	2151	2314	7.6	98.8	150
28-May	B07	BASE	2177	7.7	10+780	Inlet H/W Front	2nd	2180	2352	7.9	100.1	300
28-May	B07	BASE	2177	7.7	10+780	Inlet H/W Back	2nd	2190	2363	7.9	100.6	150
28-May	B07	BASE	2177	7.7	10+780	Inlet H/W Back	2nd	2181	2345	7.5	100.2	300
29-May	B07	BASE	2177	7.7	10+780	Inlet Apron LHS	3rd	2218	2355	6.2	101.9	150
29-May	B07	BASE	2177	7.7	10+780	Inlet Apron LHS	3rd	2167	2327	7.4	99.5	300
29-May	B07	BASE	2177	7.7	10+780	Inlet H/W Front	3rd	2237	2389	6.8	102.8	150
29-May	B07	BASE	2177	7.7	10+780	Inlet H/W Front	3rd	2194	2365	7.8	100.8	300
29-May	B07	BASE	2177	7.7	10+780	Inlet H/W Back	3rd	2221	2374	6.9	102.0	150
29-May	B07	BASE	2177	7.7	10+780	Inlet H/W Back	3rd	2213	2381	7.6	101.6	300