

**6. Environment and Socail Consideration  
(1) Environmental Permit**

PERMIT NUMBER: EPA/EC/ESIA/RAP/003-0916

ISSUED DATE: 11/10/16

EXPIRATION DATE: 10/10/18

**E N V I R O N M E N T A L P E R M I T**

- 1.0 **CONTACT** : Claude E. Langley  
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- 2.0 **PROPONENT** : Ministry of Public Works  
Lynch Street  
Monrovia Liberia
- 3.0 **PROJECT SITE** : Somalia Drive (Phase II).  
Montserrado County, Liberia
- 4.0 **TYPE OF WORK** : **ASPHALT ROAD CONSTRUCTION  
(Reconstruction of the Somalia  
Drive Road - Phase II)**

In pursuance of the Environment Protection & Management Law of Liberia, 2003 Part III Sections 8 (1), 11 (1) 13 and on the basis of the submitted "Environmental and Social Impact Assessment (ESIA)" and Abbreviated Resettlement Action Plan (RAP), this Environmental permit is **issued** for Ministry of Public Works (MPW) to carry on the reconstruction of the Somalia Drive Road (Phase II) Montserrado County, Liberia.

**CONDITION OF PERMIT**

**5.0 COMPLY WITH THE FOLLOWING GENERAL MEASURES:**

**5.1 Resettlement Action Plan-** Ensure that all affected parties identified in the submitted Abbreviated Resettlement Action Plan are settled before demolition exercises.

**5.2 Land Disturbance**

The following measures should be taken to minimize erosion:

- a. Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage.
- b. Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum
- c. Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes.

- d. Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses.
- e. Keep vehicles to well-defined haul roads.
- f. Rehabilitate cleared areas promptly.

### 5.3 Management of Contaminated Storm Water

The following measures should be taken to minimize the generation of contaminated storm water:

- a. Minimize the quantity of uncontaminated storm water entering cleared areas.
- b. Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations.
- c. Reduce water velocities.

### 5.4 Sediment Control

The following measures should be taken to minimize the impact of contaminated storm water on receiving waters:

- a. Install erosion and sediment control measures, if possible before construction commences.
- b. Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the mini-catchment.
- c. Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures.
- d. Ensure that contingency plans are in place for unusual storm events.
- e. Continually assess the effectiveness of sediment control measures and make necessary improvements.

### 5.5 De-Watering Work Sites

The following measures should be taken to ensure that de-watering operations do not result in turbid water entering natural Waterways:

- a. Treat contaminated water pumped into the storm water system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU.
- b. Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard.
- c. De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices.
- d. Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized.
- e. Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. *AV*

**5.6 Dust Control**

The following measures should be taken to ensure there is no health risk or loss of amenity due to emission of dust to the environment:

- a. Implement a dust prevention strategy, developed at the project planning stage.
- b. Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed.
- c. Install wind fences wherever appropriate

**5.7 Management Of Stockpile Sand Batters**

The following measures should be taken to manage soil stockpiles so that dust and sediment in run-off are minimized:

- a. Minimize the number of stockpiles, and the area and the time stockpiles are exposed.
- b. Keep topsoil and under burden stockpiles separate.
- c. Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion.
- d. Ensure that stockpiles and batters are designed with slopes no greater than 2:1 (horizontal/vertical).
- e. Stabilize stockpiles and batters that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass.
- f. Establish sediment controls around unsterilized stockpiles and batters.
- g. Suppress dust on stockpiles and batters, as circumstances demand.

**5.8 Noise and Vibration**

The following measures should be taken to ensure nuisance from noise and vibration does not occur:

- a. Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site.
- b. Enclose noisy equipment.
- c. Provide noise attenuation screens, where appropriate.
- d. Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays, except where, for practical reasons, the activity is unavoidable.
- e. Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am.
- f. Advise local residents when unavoidable out-of-hours work will occur.
- g. Schedule deliveries to the site so that disruption to local amenity and traffic are minimized.
- h. Minimize air vibrations.

### 5.9 Contaminated Material And Wastes

The following measures should be taken to ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner:

- a. Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyses leachate and landfill gases.
- b. Excavate material in a manner which avoids off-site environmental problems.
- c. Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future.
- d. Transport odorous wastes in covered vehicles.
- e. Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered.

### 6.0 Spraying Bituminous Materials

It is important when spraying bituminous material to ensure that the work practices are consistent with minimizing the risk of the material entering the drainage system and causing an environmental hazard or pollution. This should include:

- a. Ensuring that the surface to be sprayed is adequately compacted and swept and at the appropriate moisture content prior to spraying.
- b. For cutback primers, the surface should be dry but for cutback primerbinders and emulsions the surface should be damp. The retention of windrows of material swept from the pavement along the edges of the pavement can assist in minimizing wash-off.
- c. Positioning of the sprayer to avoid spraying beyond the area to be primed or primersealed, where the bituminous material could be more readily washed into drainage systems.
- d. Ensuring that the sprayer is well-maintained, operated by a trained crew and that spray nozzles are operating correctly so that the bituminous material is applied at the design rate of application uniformly across the surface (two light applications may provide a lower risk than a single heavy application).
- e. Avoiding windy conditions when there is the potential for spray drift into areas adjacent to the pavement.
- f. Establishing appropriate traffic control measures in the event of damage due to wet weather – for primerseals reducing the speed and intensity of traffic can reduce the severity of wash-off.
- g. Clean all equipment in areas that will not impact on the environment or result in wash-off into the stormwater or open waterways. AV

- h. Site supervisors, senior staff and foreman on site should be trained in areas such as inspection procedures, spill prevention and response, correct handling, storage and cleaning procedures, management of waste materials and environmental impacts of primer or primerbinder wash off. Site supervisors and senior staff must ensure all staff follow proper procedures to prevent primer and primer binder wash-off and all staff should be aware of the environmental impacts that may

#### **7.0 HEALTH AND SAFETY**

Implement a comprehensive Health and Safety Policy to cover employees, contractors, sub-contractors and suppliers at the construction site during the construction phase:

- a. Ensure the provision of Personal Protective Equipment (PPE) for the entire workforce;
- b. All measures should be taken to avoid air pollution emanating from vehicular emission and Earth Equipment that would impact workers health in the project area;
- c. Ensure the reduction of employee exposure to any other issues arising from projects activities through a routine monitoring of workers' health condition.

#### **8.0 MONITORING REPORT:**

The company shall monitor its operations and make an audit report to the Agency biannually.

#### **9.0 REGULATORY MONITORING:**

The EPAL reserves itself the right to conduct documentary and field monitoring of the company's operations at any time. The company must facilitate such monitoring by making all documents available, granting Access to sites and facilitating Access to all working areas.

#### **10.0 FINES AND PENALTIES:**

All non-compliance with this permit shall be considered a fine as established by the EPA. All fines shall be served with written notification-terms and conditions stipulated therein, based on the level of non-compliance, the EPA reserves the right to hire a third party certified environmental evaluator to assess and remediate said contamination with the permittee undertaking the full cost of the clean-up; however-the permittee also reserves the right to hire a third-party certified environmental evaluator to perform such task with the approval of the EPA.

Should the EPA provide this service, i.e., assessment and remediation of potential environmental degradation, the permittee shall then be liable to pay the EPA a total of three times the cost market value for services performed.

AV



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**11.0 NOTIFICATION OF CHANGES**

- a. Notify the EPA of any major changes in the planned development other than the information provided in communication and Assessment Form.
- b. Notify the Agency within 72 hours of any environmental emergency onsite, including all measures taken to remedy the situation.

**12.0 NOTWITHSTANDING THIS PERMIT**, the construction work is subject to other relevant regulations and permits pertaining to the sector and must be observed.

**13.0 TRANSFERABILITY:** this permit is not transferable, except authorized and approved by the Environmental Protection Agency of Liberia.

**14.0 VALIDITY PERIOD**, this permit is valid for two (2) years commencing 11<sup>th</sup> October 2016 to 10<sup>th</sup> October 2018; renewable under new terms and conditions.

**15.0 NOTIFICATION FOR RENEWAL**

The company should submit application for renewal of this permit fifteen (15) days prior to its expiration date.

*FAILURE TO COMPLY WITH OR OBSERVE ALL THE PERMIT CONDITIONS ABOVE MAY WARRANT FINES AND/OR REVOCATION.*

*Anyaa Vohiri*

Anyaa Vohiri  
**EXECUTIVE DIRECTOR/CEO**

*13/10/16*

**DATE**



<b>JICA</b>	<b>RECONSTRUCTION OF THE SOMALIA DRIVE – PHASE 2</b>
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**CONSULTATION MEETING MINUTES**

**Stakeholder visited :** PAPS in 50 ft. from median

**Date :** 06/03/2016

**Time (start – end):** 2:30 PM-4:00 PM

**Attendees:** 13 Persons

Name	Issues Discussed	Response
<b>Attendee No. 1</b>	We understand that there is a two-lane road presently undergoing construction on the left side of the Somalia drive, will there be another two-lane constructed on the right side as well?	Yes, the right side will also be constructed to a two-lane road to have (4) four lanes, should the Japanese Government agree to the request of the Government of Liberia. But before that, the Japanese's Government through, JICA, has commissioned studies to ascertain the impact the project will have. Hence, our firm, Earth Environmental Consultancy, w was contracted to do an environmental impact assessment and a resettlement action plan to ascertain the environmental impact and actual number of Liberian citizens that might be affected by the project, and to make recommendation to the Liberian Government and JICA.
<b>Attendee No. 2</b>	If the Liberian Government will be making some compensation to all project affected persons (PAPs), with in the 50ft measurement of the right-off way, will that entirely be based on your studies report?	Absolutely. Should there be any compensation of any kind, that has to be implemented based on the reports presented by Earth Environmental Consultancy (EEC), the local firm that was hired.
<b>Attendee No. 3</b>	During your presentation, you spoke of a study conducted, where your consultancy firm captured structures along the right-off –way in 50ft, 60ft and 75ft. What is it, this meeting only concentrates on structures in 50ft?	Our terms of reference indicated that we conduct our studies within 50 ft., 60 ft. and 75 ft. However so as to reduce the impact of the project, JICA has decided to undertake the construction within 50 ft. from the median of the new road. Within this area, there will be limited impact as only 26 structures might be affected, according to our report.
<b>Attendee No. 4</b>	You mentioned that the Japanese agency JICA said that they are able to do the road construction with in 50ft. So, why structures within 60ft and 75ft marked?	According to Liberian laws, all roads in Liberia should have a side walls or a path along the road for pedestrians. This area is called the right-of-way (ROW) in some areas, it is 75 ft. from the median. In other areas, it is 150 ft. However, since people have moved into major portion of the RW and to

**JICA**

**RECONSTRUCTION OF THE SOMALIA DRIVE – PHASE 2**

		reduce the project impact, JICA has proposed to work in 50 ft. of the median.
<b>Attendee No. 5</b>	Is the (EEC) a private entity or a governmental entity?	Earth Environmental Consultancy or (EEC) is a private entity. It does not work for the Government of Liberia. It was hired by the Japanese company Katahira & Engineers International to conduct the study for JICA.
<b>Attendee No. 6</b>	What is the actual distance required for right off ways in Liberia?	According to the Liberian Government laws, the right off ways should be 75 ft. or 150ft, on both left and right sides of the road, from the median.
<b>Attendee No. 7</b>	You spoke of 50ft in your presentation, that the government owns a right-of-way of 75 ft. or 150ft, while the studies was one for 50ft, 60ft, and 75ft. If so, why didn't EEC restrict the exercise to 50ft, knowing that the project can be undertaken in 50ft?	It is obvious that JICA is able to work within 50ft. of the median, but the Japanese government is also interested to know the likely impact the project would have if the project is undertaken within 60 ft. or 75 ft. of the median. The Japanese government does not want the project to affect many persons, that is why the studies were done to ascertain information across the three distances and the 50ft distance impact is less.
<b>Attendee No. 8</b>	You said that your company EEC was hired to conduct the social economic survey, and you were to make recommendations as an independent entity. Is demolition exercise going to be one of EEC's recommendations?	Development comes with pain. The essence of undertaking the studies is to ascertain if the project can be undertaken without anyone being displaced. If people are to be displaced, the studies also wish to ascertain how the least number of persons can be affected. The last resort is that if structures are to be demolished, there should be no other better alternatives, and the owners of structures to be affected must be compensated and provided other assistance so that their livelihood is not adversely affected.
<b>Attendee No. 9</b>	Is it compulsory that all project affected persons (PAPs) within the 50 ft. measurement be compensated?	Yes, all of those identified within the 50 ft. will be compensated.
<b>Attendee No. 10</b>	We understand that every country around the world needs development though it comes along with a lot of pains. We also know that people should be able to care for themselves before they can make use of whatever development. So, we want you to please convey to the government of Liberia that we need a compensation for the damage to restart our lives.	Thanks for your comment and rest assure it will be conveyed.



## 7. Design Data

### 7.1 Geological Survey Result

#### (1) DCP, CBR, Caspol Survey Result



Laboratory test of soil sample : 26 places

Caspol test : 23 places

0+025 AC  
1 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						24.4	on walkway surface
0.10 - 0.20	0.10							Max 26.0
0.20 - 0.30	0.10							Mini 21.8
0.30 - 0.40	0.10	5						Black overburden
0.40 - 0.50	0.10	5						
0.50 - 0.60	0.10	5						
0.60 - 0.70	0.10	5						
0.70 - 0.80	0.10	9						
0.80 - 0.90	0.10	25						
0.90 - 1.00	0.10	17						
1.00 - 1.10	0.10	22						
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							


0+250 AC  
2 Aggregate


Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10	45					PaveGL-0.1	Gray overburden
0.10 - 0.20	0.10	100					57.6	Max 60.1
0.20 - 0.30	0.10	43						Mini 53.8
0.30 - 0.40	0.10	51						
0.40 - 0.50	0.10	100						
0.50 - 0.60	0.10	100						spreading thin sand on surface
0.60 - 0.70	0.10	59						
0.70 - 0.80	0.10	48						
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							


0+500 AC 75 mm  
3 Aggregate 200 mm


Depth (m)	Thickness (m)	DCP		Soil SAMPLING		
		CBR	Remark	CBR	Class	Remark
0.00 - 0.10	0.10			soaked CBR test	AASHTO classification of soil	(Dark Brown soil)
0.10 - 0.20	0.10			①、②、③		
0.20 - 0.30	0.10			20.05	A-2-6	P index 13
0.30 - 0.40	0.10			16.31	SC	LL 34
0.40 - 0.50	0.10			12.57		PL 21
0.50 - 0.60	0.10					Consistency Index 0.62
0.60 - 0.70	0.10			ave. 16.3	Clayey Sand	Natural Moisture Content 26%
0.70 - 0.80	0.10			設計 CBR 12.0	Dark Brown	Particle Density 2.69
0.80 - 0.90	0.10					OMC 6.2%
0.90 - 1.00	0.10					MDD 1122kg/CuM
1.00 - 1.10	0.10					
1.10 - 1.20	0.10					
1.20 - 1.30	0.10					



0+750 AC  
4 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.10 - 0.20	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10	70						
0.40 - 0.50	0.10	45						
0.50 - 0.60	0.10	20						
0.60 - 0.70	0.10	28						
0.70 - 0.80	0.10	36						
0.80 - 0.90	0.10	35						
0.90 - 1.00	0.10	37						
1.00 - 1.10	0.10	44						
1.10 - 1.20	0.10	48						
1.20 - 1.30	0.10							

1+000		AC 50 mm		Soil SAMPLING			
5		Aggregate 315 mm					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			Remark
		CBR	Remark	CBR	Class	Remark	
0.00 - 0.10	0.10			soaked CBR test	AASHTO classification of soil		( Dark Gray soil )
0.10 - 0.20	0.10			①、②、③	A-2-6		P index 11
0.20 - 0.30	0.10				SC		LL 35
0.30 - 0.40	0.10			16.84			PL 24
0.40 - 0.50	0.10			14.17			Consistency Index 0.36
0.50 - 0.60	0.10			11.50			Natural Moisture Content 31%
0.60 - 0.70	0.10			ave.			Particle Density 2.71
0.70 - 0.80	0.10			14.2			
0.80 - 0.90	0.10			設計 CBR	Clayey Sand		
0.90 - 1.00	0.10			12.0	Dark Gray		
1.00 - 1.10	0.10						OMC 7.2%
1.10 - 1.20	0.10						MDD 1198kg/CuM
1.20 - 1.30	0.10						

1+250		AC 6		Soil SAMPLING				CASPOL	
6		Aggregate							
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10								
0.50 - 0.60	0.10								
0.60 - 0.70	0.10	17							
0.70 - 0.80	0.10	35							
0.80 - 0.90	0.10	17							
0.90 - 1.00	0.10	13							
1.00 - 1.10	0.10	10							
1.10 - 1.20	0.10	5							
1.20 - 1.30	0.10	5							

1+750		AC 70 mm		Soil SAMPLING			
7		Aggregate 140 mm					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			Remark
		CBR	Remark	CBR	Class	Remark	
0.00 - 0.10	0.10			soaked CBR test	AASHTO classification of soil		( Dark Gray soil )
0.20 - 0.30	0.10			①、②、③	A-2-6		P index 13
0.30 - 0.40	0.10				SC		LL 35
0.40 - 0.50	0.10			19.25			PL 22
0.50 - 0.60	0.10			17.11			Consistency Index 0.54
0.60 - 0.70	0.10			12.03			Natural Moisture Content 28%
0.70 - 0.80	0.10			ave.	Clayey Sand		
0.80 - 0.90	0.10			16.1			Particle Density 2.73
0.90 - 1.00	0.10			設計 CBR	Green Gray		
1.00 - 1.10	0.10			12.0			
1.10 - 1.20	0.10						OMC 9.0%
1.20 - 1.30	0.10						MDD 1064kg/CuM

1+780		AC 50		Soil SAMPLING			
8		Aggregate 120					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			Remark
		CBR	Remark	CBR	Class	Remark	
0.00 - 0.10	0.10			soaked CBR test	AASHTO classification of soil		( Brown soil )
0.20 - 0.30	0.10			①、②、③	A-2-6		P index 12
0.30 - 0.40	0.10				SC		LL 32
0.40 - 0.50	0.10	6		22.19			PL 20
0.50 - 0.60	0.10	7		19.12	Clayey Sand		Consistency Index 0.75
0.60 - 0.70	0.10	9		16.04	Brown		Natural Moisture Content 23%
0.70 - 0.80	0.10	12		ave.			Particle Density 2.71
0.80 - 0.90	0.10	15					
0.90 - 1.00	0.10	16					
1.00 - 1.10	0.10	16					
1.10 - 1.20	0.10	14					
1.20 - 1.30	0.10	13					

2+000 AC  
9 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10			soaked CBR test				
0.20 - 0.30	0.10			①、②、③				
0.30 - 0.40	0.10			14.97				
0.40 - 0.50	0.10			12.83				
0.50 - 0.60	0.10			10.70				
0.60 - 0.70	0.10							
0.70 - 0.80	0.10			ave.				
0.80 - 0.90	0.10			12.8	Light green			
0.90 - 1.00	0.10			設計 CBR				
1.00 - 1.10	0.10			12.0				
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							

2+250 AC  
10 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							at road side of Phase I
0.20 - 0.30	0.10							Green Yellow soil
0.30 - 0.40	0.10							Max 33.0
0.40 - 0.50	0.10							Mini 23.3
0.50 - 0.60	0.10							
0.60 - 0.70	0.10	3					PaveGL-0.5	
0.70 - 0.80	0.10	4					29.1	
0.80 - 0.90	0.10	7						
0.90 - 1.00	0.10	9						
1.00 - 1.10	0.10	11						
1.10 - 1.20	0.10	13						
1.20 - 1.30	0.10	13						


2+500 AC  
11 Aggregate


60  
130



Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10			soaked CBR test				
0.20 - 0.30	0.10			①、②、③				
0.30 - 0.40	0.10			18.18				at 0.8m below
0.40 - 0.50	0.10			16.71				from road shoulder
0.50 - 0.60	0.10			15.24				Brown soil
0.60 - 0.70	0.10							
0.70 - 0.80	0.10			ave.				
0.80 - 0.90	0.10			16.7				
0.90 - 1.00	0.10			設計 CBR	Gray			
1.00 - 1.10	0.10			12.0				
1.10 - 1.20	0.10							
1.20 - 1.30	0.10						PaveGL-1.2	
							30.3	Max 34.4
								Mini 28.6



2+750 AC  
12 Aggregate


Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							at 1.1m below
0.20 - 0.30	0.10							from road shoulder
0.30 - 0.40	0.10							Brown soil
0.40 - 0.50	0.10	59						
0.50 - 0.60	0.10	79						
0.60 - 0.70	0.10	82						
0.70 - 0.80	0.10	59						
0.80 - 0.90	0.10	79						
0.90 - 1.00	0.10	93						
1.00 - 1.10	0.10	68						
1.10 - 1.20	0.10	55						
1.20 - 1.30	0.10						PaveGL-1.4	
							21.1	Max 26.8
								Mini 15.3

3+000 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 20.32 17.51 14.71 ave. 17.5 設計 CBR 12.0	Green			
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10							
0.70 - 0.80	0.10							
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							


3+250 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10	22						
0.50 - 0.60	0.10	21						
0.60 - 0.70	0.10	17						
0.70 - 0.80	0.10	41						
0.80 - 0.90	0.10	81						
0.90 - 1.00	0.10	83						
1.00 - 1.10	0.10	43						
1.10 - 1.20	0.10	17						
1.20 - 1.30	0.10							
								PaveGL-1.0 45

3+500 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 17.91 16.31 13.90 ave. 16.0 設計 CBR 12.0	Yellow			
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10							
0.70 - 0.80	0.10							
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							
							PaveGL-1.4 31.7	at 1.2m below from road shoulder Brownish Black soil  Max 42.3 Mini 25.5

3+750 AC		Aggregate		Soil SAMPLING			CASPOL		
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark	
		CBR	Remark						
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10								
0.50 - 0.60	0.10	37							
0.60 - 0.70	0.10	40							
0.70 - 0.80	0.10	51							
0.80 - 0.90	0.10	45							
0.90 - 1.00	0.10	40							
1.00 - 1.10	0.10	25							
1.10 - 1.20	0.10	14							
1.20 - 1.30	0.10								
								PaveGL-0.5 61.9	at road side of Phase I Yellow Brown soil Max 66.2 Mini 54.3 



3+950		AC							
17		Aggregate							
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10							at 1m below from road shoulder	
0.30 - 0.40	0.10							Brown soil	
0.40 - 0.50	0.10			soaked CBR test ①、②、③					
0.50 - 0.60	0.10			19.25					
0.60 - 0.70	0.10			16.58					
0.70 - 0.80	0.10			13.90					
0.80 - 0.90	0.10								
0.90 - 1.00	0.10			ave.			PaveGL-1.1	Max 48.5	
1.00 - 1.10	0.10			16.6			39.8	Mini 32.5	
1.10 - 1.20	0.10			設計 CBR	Green				
1.20 - 1.30	0.10			12.0					

4+000		AC							
18		Aggregate							
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10			soaked CBR test ①、②、③					
0.40 - 0.50	0.10								
0.50 - 0.60	0.10			21.12					
0.60 - 0.70	0.10			17.91					
0.70 - 0.80	0.10			15.51					
0.80 - 0.90	0.10								
0.90 - 1.00	0.10			ave.					
1.00 - 1.10	0.10			18.2					
1.10 - 1.20	0.10			設計 CBR	Dark green gray				
1.20 - 1.30	0.10			12.0					



4+250		AC							
19		Aggregate							
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10							at road shoulder	
0.30 - 0.40	0.10	35						Gray soil	
0.40 - 0.50	0.10	43						Max 27.1	
0.50 - 0.60	0.10	47						Mini 21.2	
0.60 - 0.70	0.10	37							
0.70 - 0.80	0.10	32							
0.80 - 0.90	0.10	28							
0.90 - 1.00	0.10	21							
1.00 - 1.10	0.10	19							
1.10 - 1.20	0.10	22							
1.20 - 1.30	0.10								

4+500		AC		50					
20		Aggregate		230					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10			soaked CBR test ①、②、③					
0.30 - 0.40	0.10			17.65					
0.40 - 0.50	0.10			16.84					
0.50 - 0.60	0.10			16.04					
0.60 - 0.70	0.10								
0.70 - 0.80	0.10			ave.					
0.80 - 0.90	0.10			16.8					
0.90 - 1.00	0.10			設計 CBR	Yellow Brown				
1.00 - 1.10	0.10			12.0					
1.10 - 1.20	0.10								
1.20 - 1.30	0.10								


4+750 AC  
21 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						at 0.6m below from road shoulder	
0.20 - 0.30	0.10						Brown soil	
0.20 - 0.30	0.10						Max 34.4	
0.30 - 0.40	0.10	37					Mini 28.1	
0.40 - 0.50	0.10	46						
0.50 - 0.60	0.10	56						
0.60 - 0.70	0.10	44						
0.70 - 0.80	0.10	24						
0.80 - 0.90	0.10	13						
0.90 - 1.00	0.10	8						
1.00 - 1.10	0.10	6						
1.10 - 1.20	0.10	6						
1.20 - 1.30	0.10							
							PaveGL-0.8 30.8	


5+000 AC 100  
22 Aggregate 200

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10			soaked CBR test ①、②、③			at 1.0m below from road shoulder		
0.50 - 0.60	0.10			17.91			Yellow Brown soil		
0.60 - 0.70	0.10			14.30			Max 35.1		
0.70 - 0.80	0.10			10.70			Mini 18.3		
0.80 - 0.90	0.10								
0.90 - 1.00	0.10			ave.					
1.00 - 1.10	0.10			14.3					
1.10 - 1.20	0.10			設計 CBR					
1.20 - 1.30	0.10			12.0	Dark Yellow Green				
									PaveGL-1.3 26.5

5+250 AC  
23 Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10	22						
0.50 - 0.60	0.10	39						
0.60 - 0.70	0.10	57						
0.70 - 0.80	0.10	47						
0.80 - 0.90	0.10	27						
0.90 - 1.00	0.10	21						
1.00 - 1.10	0.10	17						
1.10 - 1.20	0.10	13						
1.20 - 1.30	0.10							

5+500 AC 68  
24 Aggregate 180

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10			soaked CBR test ①、②、③				
0.50 - 0.60	0.10			21.39				
0.60 - 0.70	0.10			19.25				
0.70 - 0.80	0.10			13.37				
0.80 - 0.90	0.10							
0.90 - 1.00	0.10			ave.				
1.00 - 1.10	0.10			18.0				
1.10 - 1.20	0.10			設計 CBR				
1.20 - 1.30	0.10			12.0	Yellow Gray			

5+750 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10							at road side of Phase I Yellow soil Max 21.8 Mini 17.8
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10	8						
0.70 - 0.80	0.10	3						
0.80 - 0.90	0.10	5						
0.90 - 1.00	0.10	8						
1.00 - 1.10	0.10	8						
1.10 - 1.20	0.10	6						
1.20 - 1.30	0.10	6						



6+000 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10							
0.70 - 0.80	0.10							
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							

soaked CBR test  
①、②、③

13.10  
12.03  
10.16

ave.

11.8

設計 CBR

8.0

Yellow Brown

6+300 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10	37						
0.70 - 0.80	0.10	27						
0.80 - 0.90	0.10	22						
0.90 - 1.00	0.10	20						
1.00 - 1.10	0.10	15						
1.10 - 1.20	0.10	15						
1.20 - 1.30	0.10	22						



6+500 AC		Aggregate		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	DCP		CBR	Class	Remark	CBR	Remark
		CBR	Remark					
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10							
0.70 - 0.80	0.10							
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							

soaked CBR test  
①、②、③

18.18  
15.24  
12.30

ave.

15.2

設計 CBR


12.0

Grayish Black



6+750 AC  
29 Aggregate



Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10	35						
0.70 - 0.80	0.10	33						
0.80 - 0.90	0.10	40						
0.90 - 1.00	0.10	67						
1.00 - 1.10	0.10	85						
1.10 - 1.20	0.10	87						
1.20 - 1.30	0.10	90						



7+000 AC  
30 Aggregate



65  
230

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						PaveGL-0.1	Light brown overburden at road shoulder
0.20 - 0.30	0.10						48.7	
0.20 - 0.30	0.10			soaked CBR test				Max 52.7
0.30 - 0.40	0.10			①、②、③				Mini 43.5
0.40 - 0.50	0.10			20.32				
0.50 - 0.60	0.10			18.85				
0.60 - 0.70	0.10			17.38				
0.70 - 0.80	0.10							
0.80 - 0.90	0.10			ave.				
0.90 - 1.00	0.10			18.9				
1.00 - 1.10	0.10			設計 CBR	Light Gray			
1.10 - 1.20	0.10			12.0				
1.20 - 1.30	0.10							

7+250 AC  
31 Aggregate



Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							at 0.9m below from road shoulder
0.20 - 0.30	0.10							Yellow White soil
0.20 - 0.30	0.10							Max 37.3
0.30 - 0.40	0.10							Mini 19.9
0.40 - 0.50	0.10	54						
0.50 - 0.60	0.10	66						
0.60 - 0.70	0.10	100						
0.70 - 0.80	0.10	100						
0.80 - 0.90	0.10	100						
0.90 - 1.00	0.10	100						
1.00 - 1.10	0.10	100						
1.10 - 1.20	0.10	100					PaveGL-1.1	
1.20 - 1.30	0.10	74					27.9	


7+500 AC  
32 Aggregate


60  
200


Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							Brown soil
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10			soaked CBR test				
0.40 - 0.50	0.10			①、②、③				
0.50 - 0.60	0.10			19.25				
0.60 - 0.70	0.10			16.04				
0.70 - 0.80	0.10			12.83				
0.80 - 0.90	0.10							
0.90 - 1.00	0.10			ave.				
1.00 - 1.10	0.10			16.0				
1.10 - 1.20	0.10			設計 CBR	Yellow Gray			at 1.0m below from road shoulder
1.20 - 1.30	0.10			12.0			PaveGL-1.3	Max 28.1
							20.4	Mini 14.9










7+750 AC 33 Aggregate		DCP		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						at 1.0m below from road shoulder  Dark Brown soil Max 26.7 Mini 18.9    PaveGL-0.9 23.4	at 1.0m below from road shoulder  Dark Brown soil Max 26.7 Mini 18.9
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10	32						
0.70 - 0.80	0.10	49						
0.80 - 0.90	0.10	60						
0.90 - 1.00	0.10	51						
1.00 - 1.10	0.10	45						
1.10 - 1.20	0.10	54						
1.20 - 1.30	0.10	67						


8+000 AC 34 Aggregate		DCP		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						at 1.3m below from road shoulder  Yellow soil PaveGL-1.5 23.4  	at 1.3m below from road shoulder  Yellow soil Max 25.4 Mini 20.4
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10	56						
0.60 - 0.70	0.10	87						
0.70 - 0.80	0.10	70						
0.80 - 0.90	0.10	79						
0.90 - 1.00	0.10	76						
1.00 - 1.10	0.10	48						
1.10 - 1.20	0.10	27						
1.20 - 1.30	0.10	22						


9+000 AC 35 Aggregate		DCP		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10						St.9+010 at road side of Phase I on compacted subgrade Light Brown soil Max 63.8 Mini 51.8  	St.9+010 at road side of Phase I on compacted subgrade Light Brown soil Max 63.8 Mini 51.8
0.20 - 0.30	0.10			soaked CBR test				
0.20 - 0.30	0.10			①、②、③				
0.30 - 0.40	0.10			17.91				
0.40 - 0.50	0.10			15.24				
0.50 - 0.60	0.10			12.83				
0.60 - 0.70	0.10			ave.				
0.80 - 0.90	0.10			15.3				
0.90 - 1.00	0.10			設計 CBR	Light Brown			
1.00 - 1.10	0.10			12.0				
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							

9+250 AC 36 Aggregate		DCP		Soil SAMPLING			CASPOL	
Depth (m)	Thickness (m)	CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10	79						
0.60 - 0.70	0.10	97						
0.70 - 0.80	0.10	100						
0.80 - 0.90	0.10	88						
0.90 - 1.00	0.10	77						
1.00 - 1.10	0.10	62						
1.10 - 1.20	0.10	48						
1.20 - 1.30	0.10	43						


9+500		AC		55					
37		Aggregate		170					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 18.72 16.58 13.64  ave. 16.3 設計 CBR 12.0	Yellow Brown				
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10								
0.50 - 0.60	0.10								
0.60 - 0.70	0.10								
0.70 - 0.80	0.10								
0.80 - 0.90	0.10								
0.90 - 1.00	0.10								
1.00 - 1.10	0.10								
1.10 - 1.20	0.10								
1.20 - 1.30	0.10								

9+750		AC		70					
38		Aggregate		120					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10							at 0.5m below from road shoulder	
0.20 - 0.30	0.10							White soil	
0.20 - 0.30	0.10							Max 41.5	
0.30 - 0.40	0.10							Mini 27.3	
0.40 - 0.50	0.10	48							
0.50 - 0.60	0.10	51							
0.60 - 0.70	0.10	69							
0.70 - 0.80	0.10	100							
0.80 - 0.90	0.10	100							
0.90 - 1.00	0.10	100							
1.00 - 1.10	0.10	100							
1.10 - 1.20	0.10	100							
1.20 - 1.30	0.10	100							
							PaveGL-0.7 35.5		


10+000		AC		70					
39		Aggregate		120					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 17.38 14.44 11.50  ave. 14.4 設計 CBR 12.0	Brown				
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10								
0.50 - 0.60	0.10								
0.60 - 0.70	0.10								
0.70 - 0.80	0.10								
0.80 - 0.90	0.10								
0.90 - 1.00	0.10								
1.00 - 1.10	0.10								
1.10 - 1.20	0.10								
1.20 - 1.30	0.10								

10+250		AC		70					
40		Aggregate		120					
Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL		
		CBR	Remark	CBR	Class	Remark	CBR	Remark	
0.00 - 0.10	0.10								
0.20 - 0.30	0.10								
0.20 - 0.30	0.10								
0.30 - 0.40	0.10								
0.40 - 0.50	0.10	27							
0.50 - 0.60	0.10	80							
0.60 - 0.70	0.10	100							
0.70 - 0.80	0.10	64							
0.80 - 0.90	0.10	26							
0.90 - 1.00	0.10	16							
1.00 - 1.10	0.10	12							
1.10 - 1.20	0.10	14							
1.20 - 1.30	0.10								


10+500 AC 45  
41 Aggregate 150

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 16.58 15.78 14.97 ave. 15.8 設計 CBR 12.0	Light Brown			
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10							
0.60 - 0.70	0.10							
0.70 - 0.80	0.10							
0.80 - 0.90	0.10							
0.90 - 1.00	0.10							
1.00 - 1.10	0.10							
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							


10+750 AC 42  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							Light Brown soil
0.20 - 0.30	0.10							 at 1.3m below from road shoulder PaveGL-1.5 Max 58.3 49.7 Mini 44.9
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10	40						
0.50 - 0.60	0.10	32						
0.60 - 0.70	0.10	59						
0.70 - 0.80	0.10	43						
0.80 - 0.90	0.10	37						
0.90 - 1.00	0.10	54						
1.00 - 1.10	0.10	35						
1.10 - 1.20	0.10	22						
1.20 - 1.30	0.10							


11+000 AC 65  
43 Aggregate 140

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10			soaked CBR test ①、②、③ 18.18 16.84 15.51 ave. 16.8 設計 CBR 12.0	Green Gray			
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10	40						
0.60 - 0.70	0.10	45						
0.70 - 0.80	0.10	35						
0.80 - 0.90	0.10	30						
0.90 - 1.00	0.10	27						
1.00 - 1.10	0.10	37						
1.10 - 1.20	0.10	20						
1.20 - 1.30	0.10							

11+250 AC 44  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							Yellow Brown soil
0.20 - 0.30	0.10							 at excavated DCPT point Max 33.0 Mini 11.5
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10	7						
0.50 - 0.60	0.10	8						
0.60 - 0.70	0.10	8						
0.70 - 0.80	0.10	6						
0.80 - 0.90	0.10	7						
0.90 - 1.00	0.10	8						
1.00 - 1.10	0.10	8						
1.10 - 1.20	0.10	8						
1.20 - 1.30	0.10							

11+500 AC 50  
45 Aggregate 140

Depth (m)	Thickness (m)	DCP		Soil SAMPLING		
		CBR	Remark	CBR	Class	Remark
0.00 - 0.10	0.10					( Brown soil )
0.20 - 0.30	0.10			soaked CBR test ①、②、③	AASHTO classification of soil	 <p>P index 11 LL 31 PL 20 Consistency Index 0.64 Natural Moisture Content 24% Particle Density 2.73 OMC 6.5% MDD 1130kg/CuM</p>
0.20 - 0.30	0.10					
0.30 - 0.40	0.10			14.97		
0.40 - 0.5 0	0.10	37		12.57		
0.50 - 0.60	0.10	40		11.23		
0.60 - 0.70	0.10	48			A-2-6	
0.70 - 0.80	0.10	42		ave.	SC	
0.80 - 0.90	0.10	26		12.9		
0.90 - 1.00	0.10	28		設計 CBR	Clayey Sand	
1.00 - 1.10	0.10	31		12.0	Brown	
1.10 - 1.20	0.10	27				
1.20 - 1.30	0.10					

11+750 AC 46  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.5 0	0.10	22						
0.50 - 0.60	0.10	35						
0.60 - 0.70	0.10	30						
0.70 - 0.80	0.10	27						
0.80 - 0.90	0.10	25						
0.90 - 1.00	0.10	22						
1.00 - 1.10	0.10	20						
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							


12+000 AC 48  
Aggregate 187

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10			soaked CBR test ①、②、③				
0.30 - 0.40	0.10							
0.40 - 0.5 0	0.10			17.91				
0.50 - 0.60	0.10			16.31				
0.60 - 0.70	0.10			14.71				
0.70 - 0.80	0.10							
0.80 - 0.90	0.10			ave.				
0.90 - 1.00	0.10			16.3				
1.00 - 1.10	0.10			設計 CBR	Green Brown			
1.10 - 1.20	0.10			12.0				
1.20 - 1.30	0.10							


12+250 AC 48  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.5 0	0.10	30						
0.50 - 0.60	0.10	23						
0.60 - 0.70	0.10	15						
0.70 - 0.80	0.10	11						
0.80 - 0.90	0.10	11						
0.90 - 1.00	0.10	11						
1.00 - 1.10	0.10	9						
1.10 - 1.20	0.10	8						
1.20 - 1.30	0.10							

12+500 AC 55  
49 Aggregate 180

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10			soaked CBR test				
0.40 - 0.50	0.10			①、②、③				
0.50 - 0.60	0.10			17.11				
0.60 - 0.70	0.10			15.51				
0.70 - 0.80	0.10			13.90				
0.80 - 0.90	0.10			ave.				
0.90 - 1.00	0.10			15.5				
1.00 - 1.10	0.10			設計 CBR	Yellow Brown			
1.10 - 1.20	0.10			12.0				
1.20 - 1.30	0.10							

12+750 AC 50  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10	15						
0.50 - 0.60	0.10	18						
0.60 - 0.70	0.10	27						
0.70 - 0.80	0.10	36						
0.80 - 0.90	0.10	44						
0.90 - 1.00	0.10	39						
1.00 - 1.10	0.10	30						
1.10 - 1.20	0.10	30						
1.20 - 1.30	0.10							



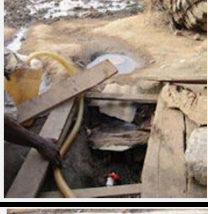





13+000 AC 51  
Aggregate










Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10			soaked CBR test				
0.20 - 0.30	0.10			①、②、③				
0.30 - 0.40	0.10			17.91				
0.40 - 0.50	0.10			17.51				
0.50 - 0.60	0.10			17.11				
0.60 - 0.70	0.10							
0.70 - 0.80	0.10			ave.				
0.80 - 0.90	0.10			17.5				
0.90 - 1.00	0.10			設計 CBR				
1.00 - 1.10	0.10			12.0				
1.10 - 1.20	0.10							
1.20 - 1.30	0.10							








13+230 AC 52  
Aggregate

Depth (m)	Thickness (m)	DCP		Soil SAMPLING			CASPOL	
		CBR	Remark	CBR	Class	Remark	CBR	Remark
0.00 - 0.10	0.10							
0.20 - 0.30	0.10							
0.20 - 0.30	0.10							
0.30 - 0.40	0.10							
0.40 - 0.50	0.10							
0.50 - 0.60	0.10	25						
0.60 - 0.70	0.10	38						
0.70 - 0.80	0.10	55						
0.80 - 0.90	0.10	43						
0.90 - 1.00	0.10	27						
1.00 - 1.10	0.10	28						
1.10 - 1.20	0.10	30						
1.20 - 1.30	0.10	30						

**(2) Utility Investigation Result**

Station Nr/ Chainage	Location Description	Service type	Coordinates		Depth of Utility  (m)	Old/New	Type, Diameter Size	Rating	Run Dist. from Pavement edge (m)	Remarks
			Eastings	Northings						
0+700	Doe Community Junction	Water pipe	302296	700994	1.27	Old	PVC, 4"	Major	8	
1+230	Jamaica Junction	W.P	302631	700972	2.65	Old	PVC, 4"	Major	5.3	
2+175		W.P	303723	700967	0.62	Old	PVC, 2"	Minor	1.5	
2+200	200m from station 2+000	W.P	303773	700965	0.74	Old	PVC, 2"	Minor	5	
2+650	Topo village junction	W.P	304200	700912	1.9	Old	PVC, 4"	Major	13.5	
2+800	Opp old filling station Topo village	W.P	304351	700903	1.88	Old	Galv. 4"	Major	2.6	
3+400	Iron factory, opp Dukuly F.S	W.P	304951	700813	1.68	Old	Galv. 4"	Major	3.3	
4+325	By Total F.S, new georgia	W.P	305795	700708	1.75	New	PVC, 4"	Major	Nil	

4+550	New Georgia junction	W.P	305869	700704	1.93	New	PVC, 6"	Major	Nil	
4+632	Life water premises	W.P	306172	700658	2.6	Old	PVC, 2"	Minor	3	
4+870		W.P	306412	700621	1.27	Old	PVC, 2"	Minor	4.5	
6+230	Barnerville junction	W.P	307602	700025	2.31	New	PVC, 6"	Major	Nil	
6+850	LPRC junction	W.P	308148	699673	2.11	New	PVC, 4"	Major	Nil	
7+230	NTA junction	W.P	308362	699374	1.34	Old	PVC, 2"	Minor	2.1	
8+140	Double bridge, Boboh town community	W.P	308457	698566	2.18	New	PVC, 6"	Major	Nil	
8+736	486m from double bridge	W.P	308774	698456	1.84	Old	PVC, 4"	Major	3	
9+320	New Hope junction	W.P	309165	697245	1.73	New	PVC, 4"	Major	Nil	

9+930	St. Francis junction	W.P	310118	697465	2.6	Old	Galv. 4"	Major	5.7	
10+480	Jay's unique restaurant	W.P	310503	697207	2.36	Old	PVC, 2"	Minor	7	
10+950	10m to station 11+000	W.P	310631	697110	1.89	New	PVC, 4"	Major	Nil	
11+450	In culvert	W.P	311420	696915	1.65	Old	PVC, 4"	Major	Nil	
11+820	10m from 72 <sup>nd</sup> junction to R/L	W.P	311590	696938	2.1	New	PVC, 4"	Major	Nil	
12+200	Close to Redlight park	W.P	312145	696261	1.95	New	PVC, 4"	Major	Nil	
12+680	Close to shopping mall	W.P	312565	696025	1.85	New	PVC, 4"	Major	Nil	

Note ) New : New placed pipe crossing under Phase I and extending under Phase II in near future  
Old : Pipe crossing under Phase I and Phase II already at present



## 7.2 Road Pavement Investigation Result

### (1) Existing Road Condition

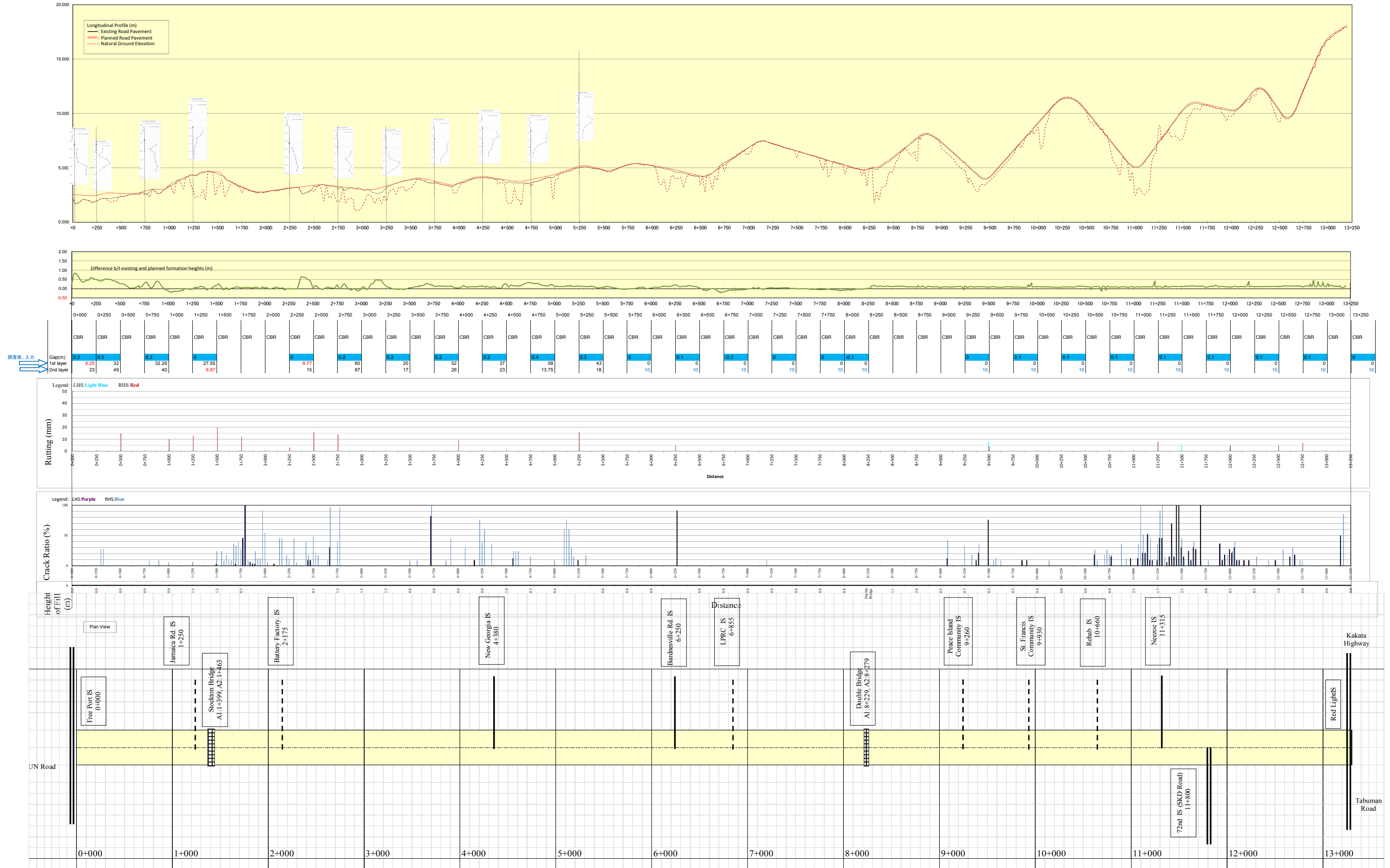
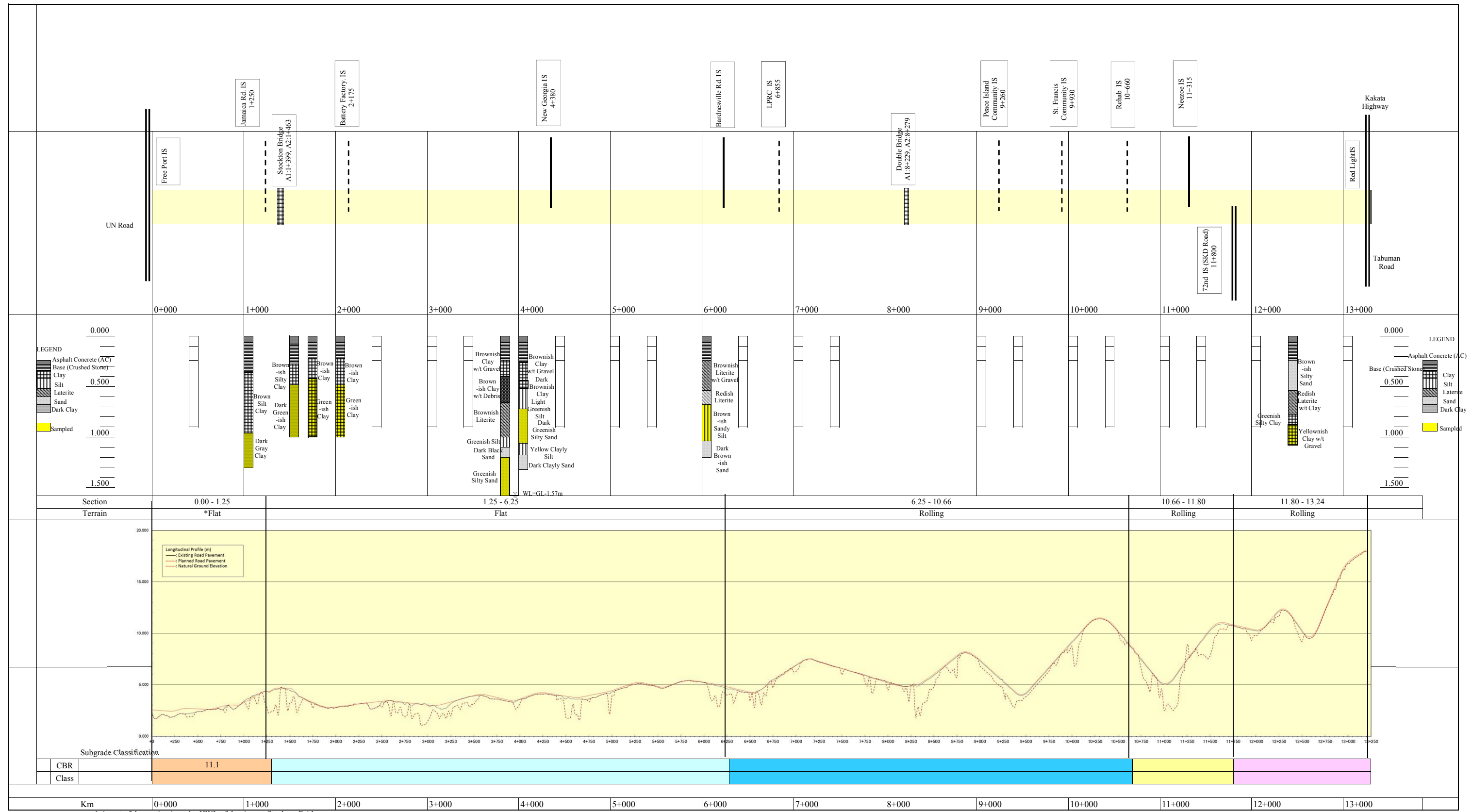


Figure 7.2-1 Existing Road Condition

**(2) Investigation Result of exploratory excavation on the Existing Road**



\* A part of the section is under HWL of the river at Stockton Bridge.





**Figure 7.2-2 Result of exploratory excavation**







(3) Investigation Result of Existing Road damage







Table- Outline of present major damaged location on Somalia Drive



No.	Station	Height of Fill(m)	LHS				RHS				Remarks		
			Width of damaged (m)	Length of damaged (m)	Area of damaged (m)	Sorts of damaged	Width of damaged (m)	Length of damaged (m)	Area of damaged (m)	Sorts of damaged			
	0+000	0.0											
D1	0+280	0.0						1.0	30.0	30.0	Major depression	Free Port IS.	
D2	0+320	0.0						1.0	7.0	7.0	Major depression		
D3	0+800	0.0						1.0	20.0	20.0	Major depression		
D4	0+900	0.0						1.0	20.0	20.0	Major depression		
D5-1	1+780	0.5	3.3	15.0	49.5	Surface is severely corrupted						320m from Stockton Bridge	
D5-2	1+780	0.5						3.3	15.0	49.5	Surface is severely corrupted	320m from Stockton Bridge	
D6	4+250	0.0	0.0	0.0	0.0			1.0	10.0	10.0	Major depression	130m from New Goergia IS. towards BP	
D7	5+140	0.0	0.0	0.0	0.0			2.0	15.0	30.0	Major depression		
D8	5+200	0.0	0.0	0.0	0.0			1.0	15.0	15.0	Major depression		
D9	5+350	0.0	0.0	0.0	0.0			2.0	6.0	12.0	Major depression		
D10	5+950	0.0	0.0	0.0	0.0			1.0	1.0	1.0	Major pothole		
D11	5+955	0.0	0.0	0.0	0.0			1.0	10.0	10.0	Major depression		
D12	9+380	1.5	0.0	0.0	0.0			1.0	7.0	7.0	Major pothole	120m from Peace Island IS. towards EP	
D13	9+495	0.3	0.0	0.0	0.0			1.6	2.0	3.2	Major pothole		
D14	9+810	0.0	0.0	0.0	0.0			1.5	6.0	9.0	Major pothole	120m from St.Francis IS. towards BP	
D15	11+020	2.0	0.0	0.0	0.0			1.5	22.0	33.0	Major pothole		
D16	11+100	3.0	0.0	0.0	0.0			3.0	3.0	9.0	Surface is severely corrupted		
D17	11+245	-1.4	0.0	0.0	0.0			1.5	1.0	1.5	Major pothole		
D18	11+280	0.0	0.0	0.0	0.0			1.5	30.0	45.0	Surface is severely corrupted	In Neezoe IS.	
D19	11+700	0.0	3.3	7.0	23.1	Major pothole						From 72nd IS. towards BP	
Total					72.6	m2				312.2	m2		
								Grand total		384.8	m2		
								Total Pavement Area		87,384.0	m2		
								Major damaged ratio		0.44%			


Feb. 2016



Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D19	11 + 700	0.0	6.60	From 72nd IS. Towards BP	
			11.70 km from Free Port IS		1.54 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Left hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Major pot-hole					Type of Defects	Major pot-hole
	The width of Defects (m)	3.3					The length of Defects (m)	7.0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D18	11 + 280	0.0	6.60	Neezoe IS.	
			11.28 km from Free Port IS		1.96 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Surface is severely					Type of Defects	Surface is severely
	The width of Defects (m)	1.5					The length of Defects (m)	30.0
								






Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D17	11 + 245	-1.4	6.60	
			11.25 km from Free Port IS		2 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	Major pot-hole
	Type of Defects	Major pot-hole			Type of Defects	Major pot-hole	
	The width of Defects (m)	1.5			The length of Defects (m)	1.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D16	11 + 100	3.0	6.60	
			11.10 km from Free Port IS		2.14 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	Surface is severely
	Type of Defects	Surface is severely			Type of Defects	Surface is severely	
	The width of Defects (m)	3.0			The length of Defects (m)	3.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D15	11 + 20	2.0	6.60	
			11.02 km from Free Port IS		2.22 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	Major pot-hole
	Type of Defects	Major pot-hole			Type of Defects	Major pot-hole	
	The width of Defects (m)	1.5			The length of Defects (m)	22.0	
							

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D14	9 + 810	0.0	6.60	120m from St.Francis IS. towards BP	
			9.81 km from Free Port IS		3.43 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Major pot-hole					Type of Defects	Major pot-hole
	The width of Defects (m)	1.5					The length of Defects (m)	6.0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D13	9 + 495	0.3	6.60		
			9.50 km from Free Port IS		3.75 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Major pot-hole					Type of Defects	Major pot-hole
	The width of Defects (m)	1.6					The length of Defects (m)	2.0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D12	9 + 380	1.5	6.60	120m from Peace Island IS. towards EP	
			9.38 km from Free Port IS		3.86 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Major pot-hole					Type of Defects	Major pot-hole
	The width of Defects (m)	1.0					The length of Defects (m)	7.0
								



Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D11	5 + 955	0.0	6.60	
			5.96 km from Free Port IS		7.29 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	10.0	
							







Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D10	5 + 950	0.0	6.60	
			5.95 km from Free Port IS		7.29 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major pot-hole			Type of Defects	Major pot-hole	
	The width of Defects (m)	1.0			The length of Defects (m)	1.0	
							

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D9	5 + 350	0.0	6.60	
			5.35 km from Free Port IS		7.89 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	2.0			The length of Defects (m)	6.0	
							

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D8	5 + 200	0.0	6.60	
			5.20 km from Free Port IS		8.04 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	15.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D7	5 + 140	0.0	6.60	
			5.14 km from Free Port IS		8.1 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	2.0			The length of Defects (m)	15.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D6	4 + 250	0.0	6.60	130m from New Goergia IS. towards BP
			4.25 km from Free Port IS		8.99 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	10.0	
							



Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D5-2	1 + 780	0.5	6.60	320m from Stockton Bridge	
			1.78 km from Free Port IS		11.46 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Surface is severely distressed					Type of Defects	Surface is severely distressed
	The width of Defects (m)	3.3					The length of Defects (m)	15.0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D5-1	1 + 780	0.5	6.60	320m from Stockton Bridge	
			1.78 km from Free Port IS		11.46 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Left hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Surface is severely distressed					Type of Defects	Surface is severely distressed
	The width of Defects (m)	3.3					The length of Defects (m)	15.0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			D4	0 + 900	0.0	6.60		
			0.90 km from Free Port IS		12.34 km from Red Light IS			
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Type of Defects	Major depression					Type of Defects	Major depression
	The width of Defects (m)	1.0					The length of Defects (m)	20.0
								

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D3	0 + 800	0.0	6.60	
			0.80 km from Free Port IS		12.44 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	20.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D2	0 + 320	0.0	6.60	
			0.32 km from Free Port IS		12.92 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	7.0	
							
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks
Date: February 2016			D1	0 + 280	0.0	6.60	
			0.28 km from Free Port IS		12.96 km from Red Light IS		
Right hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS		Existing Lane width (m)	3.30	
	Type of Defects	Major depression			Type of Defects	Major depression	
	The width of Defects (m)	1.0			The length of Defects (m)	30.0	
							

#### (4) Survey Result of rutting







Table- Outline of rutting condition on behalf of present 250m interval road surface survey on Somalia Drive based on existing road surface condition survey

Feb. 2016

No.	Station	Height of Fill(m)	LHS			RHS		Remarks
			Depth of rutting (mm)	Width of affected (m)	Crack ratio (%)	Depth of rutting (mm)	Width of affected (m)	
	0+000	0.0	-	-		-	-	Free Port IS.
1	0+250	0.0	0	4.0		0	4.0	
2	0+500	0.0	0	3.6		15	3.6	
3	0+750	0.0	0	3.4		0	3.4	
4	1+000	0.0	0	3.4		10	3.4	
5	1+250	1.5	0	5.5		13	3.4	Jamaica Road IS
6	1+500	1.2	0	3.3		20	3.3	
7	1+750	0.5	0	3.3		12	3.3	
8	2+000	0.0	0	3.3		0	3.3	
9	2+250	0.0	0	3.3		3	3.3	
10	2+500	0.5	0	3.3		16	3.3	
11	2+750	1.2	0	3.4		14	3.4	
12	4+000	0.4	0	3.3		9	3.3	
13	4+250	0.0	0	3.3		50	3.3	Pothole
14	5+250	0.0	0	3.3		16	3.3	
15	6+250	0.6	0	3.3		5	3.3	
16	9+500	0.3	8	3.3		4	3.3	
17	11+250	-1.4	0	3.2		8	3.2	
18	11+500	2.5	5	3.3		0	3.3	
19	12+000	0.5	3	3.3		5	3.3	
20	12+500	1.0	0	3.3		5	3.3	
21	12+750	0.0	0	3.3		7	3.3	
	Total				0.0			
						Grand total		
						Total Pavement Area		
						Major damaged ratio		

Note: Measurement with 1m ruler in principal which is used on locations where are on behalf of typical conditions in Somalia Drive based on existing road survey.

Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				21	12 + 750	0.0	6.60		
				12.75 km from Free Port IS			0.49 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30				
	Rutting	No Rutting		Rutting	A Few				
	The Rutting (mm)	0		The Rutting (mm)	7				
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				20	12 + 500	1.0	6.60		
				12.50 km from Free Port IS			0.74 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30				
	Rutting	No Rutting		Rutting	A Few				
	The Rutting (mm)	0		The Rutting (mm)	5				
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				19	12 + 0	0.5	6.60		
				12.00 km from Free Port IS			1.24 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30				
	Rutting	A Few		Rutting	A Few				
	The Rutting (mm)	3		The Rutting (mm)	5				
									

Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				18	11 + 500	2.5	6.60		
				11.50 km from Free Port IS			1.74 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30				
	Rutting	A Few		Rutting	No Rutting				
	The Rutting (mm)	5		The Rutting (mm)	0				
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				17	11 + 250	-1.4	6.40		
				11.25 km from Free Port IS			1.99 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.20	Right hand side towards Red Light IS	Existing Lane width (m)	3.20				
	Rutting	No Rutting		Rutting	A Few				
	The Rutting (mm)	0		The Rutting (mm)	8				
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				16	9 + 500	0.3	6.60		
				9.50 km from Free Port IS			3.74 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30				
	Rutting	A Few		Rutting	A Few				
	The Rutting (mm)	8		The Rutting (mm)	4				
									

Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks		
Date: February 2016				15	6 + 250	0.6	6.60			
				6.25 km from Free Port IS			6.99 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30					
	Rutting	No Rutting		Rutting	A Few					
	The Rutting (mm)	0		The Rutting (mm)	5					
										
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks		
Date: February 2016				14	5 + 250	0.0	6.60			
				5.25 km from Free Port IS			7.99 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30					
	Rutting	No Rutting		Rutting	Moderate					
	The Rutting (mm)	0		The Rutting (mm)	16					
										
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks		
Date: February 2016				13	4 + 250	0.0	6.60			
				4.25 km from Free Port IS			8.99 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS	Existing Lane width (m)	3.30					
	Rutting	No Rutting		Defects	Pothole					
	The Rutting (mm)	0		The Rutting (mm)	50					
										

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			12	4 + 0	0.4	6.60		
			4.00 km from Free Port IS			9.24 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting					Rutting	A Few
	The Rutting (mm)	0					The Rutting (mm)	9
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			11	2 + 750	1.2	6.80		
			2.75 km from Free Port IS			10.49 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.40	Right hand side towards Red Light IS				Existing Lane width (m)	3.40
	Rutting	No Rutting					Rutting	Moderate
	The Rutting (mm)	0					The Rutting (mm)	14
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			10	2 + 500	0.5	6.60		
			2.50 km from Free Port IS			10.74 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting					Rutting	Moderate
	The Rutting (mm)	0					The Rutting (mm)	16
								

Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				9	2 + 250	0.0	6.60		
				2.25 km from Free Port IS			10.99 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30		Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting						Rutting	A Few
	The Rutting (mm)	0						The Rutting (mm)	3
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				8	2 + 0	0.0	6.60	There was crocodile cracks.	
				2.00 km from Free Port IS			11.24 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30		Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting						Rutting	No Rutting
	The Rutting (mm)	0						The Rutting (mm)	0
									
Existing Road Surface Condition on the Road				No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016				7	1 + 750	0.5	6.60		
				1.75 km from Free Port IS			11.49 km from Red Light IS		
Left hand side towards Red Light IS	Existing Lane width (m)	3.30		Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting						Rutting	Moderate
	The Rutting (mm)	0						The Rutting (mm)	12
									



Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			6	1 + 500	1.2	6.60		
			1.50 km from Free Port IS		11.74 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	3.30
	Rutting	No Rutting					Rutting	Moderate
	The Rutting (mm)	0					The Rutting (mm)	20
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			5	1 + 250	1.5	8.90	Jamaica IS.	
			1.25 km from Free Port IS		11.99 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	5.50	Right hand side towards Red Light IS				Existing Lane width (m)	3.40
	Rutting	No Rutting					Rutting	Moderate
	The Rutting (mm)	0					The Rutting (mm)	13
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			4	1 + 0	0.5	6.80		
			1.00 km from Free Port IS		12.24 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.40	Right hand side towards Red Light IS				Existing Lane width (m)	3.40
	Rutting	No Rutting					Rutting	A Few
	The Rutting (mm)	0					The Rutting (mm)	10
								

Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			3	0 + 750	0.0	6.80		
			0.75 km from Free Port IS		12.49 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.40	Right hand side towards Red Light IS				Existing Lane width (m)	3.40
	Rutting	No Rutting					Rutting	No Rutting
	The Rutting (mm)	0					The Rutting (mm)	0
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			2	0 + 500	0.0	7.20		
			0.50 km from Free Port IS		12.74 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.60	Right hand side towards Red Light IS				Existing Lane width (m)	3.60
	Rutting	No Rutting					Rutting	Moderate
	The Rutting (mm)	0					The Rutting (mm)	15
								
Existing Road Surface Condition on the Road			No	Station	Height of Embankment (m)	Total Carriage Width (m)	Remarks	
Date: February 2016			1	0 + 250	0.0	8.00		
			0.25 km from Free Port IS		12.99 km from Red Light IS			
Left hand side towards Red Light IS	Existing Lane width (m)	3.30	Right hand side towards Red Light IS				Existing Lane width (m)	4.00
	Rutting	No Rutting					Rutting	No Rutting
	The Rutting (mm)	0					The Rutting (mm)	0
								

### 7.3 Traffic Counts Survey Result

#### (1) 24 Hours Traffic Counts

#### The Preparatory Survey on the Project for Reconstruction of Somalia Drive in Monrovia

#### (Road Side Traffic Counts Phase II)

Road												Key Map
Name: <u>Somalia Drive</u>		Date: <u>2016/3/29</u>										
Location / <u>Waste Station</u>		Surveyed by: <u>M.Davies, G.Freeman, R.Blanyen</u>										
Direction / <u>From: Freeport To: Redlight</u>		Supervised by: <u>Windell Johnson</u>										
No.	1	2	3	4	5	6	7	8	9	10		
Category	Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailor (Articulated Truck)	Motorbike	Bicycle	Pedestrian		
Hours												
6:00	~	6:15	28	57	37	23	16	9	4	14	0	17
6:15	~	6:30	30	49	44	23	0	16	0	15	0	17
6:30	~	6:45	18	28	22	14	2	4	1	16	0	16
6:45	~	7:00	14	14	15	9	5	1	14	0	14	0
7:00	~	7:15	16	21	14	11	0	1	0	16	0	18
7:15	~	7:30	3	21	14	0	0	0	0	11	0	11
7:30	~	7:45	14	35	25	13	4	2	1	12	0	21
7:45	~	8:00	24	42	35	10	7	3	0	12	0	24
8:00	~	8:15	16	35	29	10	0	2	1	22	0	27
8:15	~	8:30	15	35	21	13	4	3	0	7	0	21
8:30	~	8:45	21	49	23	7	2	3	1	12	0	21
8:45	~	9:00	11	35	22	8	3	3	1	21	0	30
9:00	~	9:15	24	56	30	8	2	3	1	10	0	14
9:15	~	9:30	22	28	24	8	7	7	1	8	0	15
9:30	~	9:45	21	70	29	3	1	3	2	18	1	21
9:45	~	10:00	21	44	31	5	7	9	1	7	1	14
10:00	~	10:15	15	56	23	2	7	7	0	7	0	25
10:15	~	10:30	28	50	28	3	9	9	4	9	0	25
10:30	~	10:45	21	39	24	8	5	4	1	14	0	22
10:45	~	11:00	21	35	21	0	3	5	0	23	0	21
11:00	~	11:15	29	42	28	3	4	10	3	9	0	23
11:15	~	11:30	24	48	37	9	5	10	4	19	0	28
11:30	~	11:45	21	56	18	0	7	11	1	9	0	23
11:45	~	12:00	45	49	31	2	2	10	1	11	1	25
12:00	~	12:15	47	42	35	3	7	14	4	15	0	23
12:15	~	12:30	30	56	28	4	5	11	2	16	2	30
12:30	~	12:45	30	63	39	1	8	10	4	11	2	22
12:45	~	13:00	42	84	38	4	3	10	1	21	0	36
13:00	~	13:15	30	58	23	1	5	14	2	16	0	26
13:15	~	13:30	40	49	36	1	3	7	2	14	0	32
13:30	~	13:45	39	49	22	7	3	9	2	17	2	16
13:45	~	14:00	36	77	24	7	14	9	2	21	0	26
14:00	~	14:15	70	42	21	10	16	10	7	4	3	17
14:15	~	14:30	35	15	9	3	1	1	0	5	0	0
14:30	~	14:45	52	25	12	5	4	4	2	2	0	0
14:45	~	15:00	77	22	14	5	21	5	1	6	0	7
15:00	~	15:15	95	22	12	2	14	8	5	10	2	4
15:15	~	15:30	49	28	14	9	9	7	6	4	2	17
15:30	~	15:45	49	21	5	14	7	22	8	6	1	25
15:45	~	16:00	77	21	14	9	14	0	8	5	0	24
16:00	~	16:15	42	28	15	11	10	15	7	5	0	15
16:15	~	16:30	49	14	14	14	9	7	4	9	2	12
16:30	~	16:45	80	35	13	7	16	5	8	4	0	25
16:45	~	17:00	56	28	14	7	14	10	9	6	0	10
17:00	~	17:15	57	33	21	9	13	11	7	3	1	21
17:15	~	17:30	77	35	8	7	6	8	4	7	0	5
17:30	~	17:45	56	38	16	7	8	10	4	7	0	5
17:45	~	18:00	105	28	28	7	15	14	5	2	2	7
18:00	~	18:15	106	49	31	23	11	35	16	29	0	42
18:15	~	18:30	87	35	19	5	9	4	7	12	0	30
18:30	~	18:45	84	45	19	7	8	5	5	16	0	28
18:45	~	19:00	109	60	16	13	21	9	8	22	2	34
19:00	~	19:15	110	40	25	5	3	0	6	23	0	28
19:15	~	19:30	110	49	30	14	9	6	5	33	0	40

19:30	~	19:45	112	51	20	8	10	3	3	25	0	9
19:45	~	20:00	112	24	15	7	8	0	0	18	0	10
20:00	~	20:15	70	42	18	12	5	9	7	14	0	5
20:15	~	20:30	77	35	16	21	9	11	7	28	0	0
20:30	~	20:45	64	32	15	7	9	5	5	18	0	8
20:45	~	21:00	46	27	20	10	8	5	4	24	0	2
21:00	~	21:15	35	16	8	8	5	5	4	10	0	7
21:15	~	21:30	28	14	10	3	2	0	5	4	0	0
21:30	~	21:45	39	21	2	3	6	4	0	14	0	0
21:45	~	22:00	55	29	5	6	5	3	2	6	0	6
22:00	~	22:15	54	12	3	0	5	3	0	7	1	15
22:15	~	22:30	40	12	0	2	0	0	0	5	0	3
22:30	~	22:45	38	5	3	2	1	0	0	6	0	4
22:45	~	23:00	31	6	1	0	0	0	0	7	0	2
23:00	~	23:15	27	5	1	0	1	0	0	0	0	0
23:15	~	23:30	17	5	1	0	2	1	0	3	0	0
23:30	~	23:45	11	1	0	0	0	1	0	1	0	3
23:45	~	0:00	19	1	0	0	0	0	0	1	0	0
0:00	~	0:15	8	8	5	0	4	0	2	0	0	0
0:15	~	0:30	10	4	2	2	0	2	2	0	0	0
0:30	~	0:45	4	6	0	0	2	1	3	0	0	0
0:45	~	1:00	6	4	0	1	3	1	3	0	0	0
1:00	~	1:15	0	0	0	0	0	1	3	0	0	0
1:15	~	1:30	0	0	0	0	0	2	1	0	0	0
1:30	~	1:45	0	0	0	0	0	0	0	0	0	0
1:45	~	2:00	2	0	0	1	0	0	1	0	0	0
2:00	~	2:15	0	0	0	0	0	0	0	0	0	0
2:15	~	2:30	0	0	0	0	0	0	0	0	0	0
2:30	~	2:45	6	3	0	0	0	0	0	0	0	0
2:45	~	3:00	2	0	0	0	2	1	2	0	0	0
3:00	~	3:15	5	0	0	0	2	0	0	0	0	0
3:15	~	3:30	0	0	0	0	0	0	0	0	0	0
3:30	~	3:45	0	0	0	0	0	0	1	0	0	0
3:45	~	4:00	13	4	0	0	0	4	3	0	0	0
4:00	~	4:15	42	14	21	6	2	8	2	12	0	3
4:15	~	4:30	49	16	3	4	1	4	6	17	0	2
4:30	~	4:45	56	23	3	9	5	7	5	11	0	28
4:45	~	5:00	56	29	8	5	5	3	1	21	0	25
5:00	~	5:15	70	34	13	8	4	4	5	12	0	14
5:15	~	5:30	48	25	22	4	6	5	3	15	0	20
5:30	~	5:45	70	35	21	9	5	7	3	13	0	16
5:45	~	6:00	56	30	14	8	8	4	4	5	0	20
Total Traffic			3806	2758	1490	559	513	519	280	950	39	1288

**The Preparatory Survey on the Project for Reconstruction of Somalia Drive in Monrovia**

**(Road Side Traffic Counts Phase II)**

Road											Key Map	
Location /		Name: <u>Somalia Drive</u>					Date: <u>2016/3/29</u>					
Direction /		<u>Waste Station</u>			Surveyed by: <u>Freeman, Ajavon, M.Davies</u>							
		From: <u>Redlight</u>		To: <u>Freeport</u>		Supervised by: <u>Windell Johnson</u>						
No.	Hours		1	2	3	4	5	6	7	8	9	10
Category			Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailor (Articulated Truck)	Motorbike	Bicycle	Pedestrian
6:00	~	6:15	63	33	25	19	21	12	7	14	0	9
6:15	~	6:30	77	18	42	22	11	4	3	13	0	4
6:30	~	6:45	77	19	23	21	11	14	9	19	9	17
6:45	~	7:00	106	32	35	21	5	10	8	25	0	31
7:00	~	7:15	119	66	70	57	17	19	13	42	9	80
7:15	~	7:30	91	28	21	19	2	5	2	17	0	40
7:30	~	7:45	126	35	33	30	13	16	9	23	11	49
7:45	~	8:00	63	11	10	8	4	5	5	21	0	18
8:00	~	8:15	95	24	23	10	13	18	9	29	8	24
8:15	~	8:30	60	18	10	9	2	2	2	19	0	22
8:30	~	8:45	35	35	35	35	35	35	0	35	5	19
8:45	~	9:00	35	21	7	11	3	3	2	7	0	4
9:00	~	9:15	93	26	19	4	7	5	1	18	0	11
9:15	~	9:30	54	4	13	4	3	3	0	9	0	15
9:30	~	9:45	45	27	17	5	10	5	3	16	0	17
9:45	~	10:00	61	15	13	5	4	1	2	5	0	9
10:00	~	10:15	49	23	18	5	5	1	1	11	1	10
10:15	~	10:30	14	14	14	7	8	10	0	11	0	14
10:30	~	10:45	24	11	16	0	0	0	0	17	0	14
10:45	~	11:00	59	28	21	10	10	2	2	8	0	18
11:00	~	11:15	70	28	14	12	7	6	5	15	0	2
11:15	~	11:30	49	16	9	13	7	7	3	12	0	18
11:30	~	11:45	66	20	18	3	0	7	3	21	0	12
11:45	~	12:00	60	14	17	4	3	6	3	14	0	0
12:00	~	12:15	20	15	10	3	7	3	2	9	0	11
12:15	~	12:30	48	8	8	1	1	0	1	12	1	1
12:30	~	12:45	33	9	4	5	9	0	0	9	0	7
12:45	~	13:00	45	20	23	4	5	0	1	26	1	1
13:00	~	13:15	56	9	15	1	2	0	1	16	0	0
13:15	~	13:30	69	19	11	1	8	2	4	25	1	0
13:30	~	13:45	57	18	17	2	7	6	0	7	0	11
13:45	~	14:00	28	15	11	7	6	8	5	28	3	9
14:00	~	14:15	66	40	17	9	15	8	9	19	0	20
14:15	~	14:30	36	15	14	3	7	2	1	6	0	0
14:30	~	14:45	63	22	21	10	0	3	1	0	0	0
14:45	~	15:00	49	25	16	0	7	10	5	4	0	9
15:00	~	15:15	109	49	18	6	10	12	3	14	2	6
15:15	~	15:30	70	35	10	6	14	9	7	9	0	14
15:30	~	15:45	56	35	21	14	9	10	5	3	0	16
15:45	~	16:00	31	15	9	5	6	8	8	5	0	13
16:00	~	16:15	35	14	10	14	8	7	6	3	0	14
16:15	~	16:30	50	29	7	15	6	4	5	21	0	14
16:30	~	16:45	63	35	15	11	15	8	7	10	0	13
16:45	~	17:00	35	22	15	7	9	4	2	9	0	3
17:00	~	17:15	28	15	13	20	9	8	6	3	0	49
17:15	~	17:30	66	35	7	10	11	13	7	14	0	35
17:30	~	17:45	42	23	17	13	7	14	6	10	0	52
17:45	~	18:00	57	32	9	6	5	8	3	35	0	35
18:00	~	18:15	35	21	5	13	5	7	9	14	2	27
18:15	~	18:30	94	56	17	11	4	10	5	28	0	13
18:30	~	18:45	68	42	28	7	6	8	9	7	0	26
18:45	~	19:00	78	44	27	2	2	0	3	14	0	15
19:00	~	19:15	53	31	10	25	13	7	1	22	0	6
19:15	~	19:30	59	35	12	7	7	2	3	18	0	0

19:30	~	19:45	64	24	12	12	10	3	0	15	0	0
19:45	~	20:00	91	13	8	6	4	4	0	12	0	0
20:00	~	20:15	35	21	8	7	3	6	5	21	0	5
20:15	~	20:30	60	26	5	3	7	2	2	8	0	0
20:30	~	20:45	49	21	7	6	9	7	5	25	0	2
20:45	~	21:00	31	16	5	4	7	4	2	21	0	0
21:00	~	21:15	36	20	7	5	3	6	4	5	0	4
21:15	~	21:30	42	14	7	4	4	7	3	5	0	0
21:30	~	21:45	32	16	3	4	4	2	4	2	0	0
21:45	~	22:00	51	23	0	3	1	4	2	15	0	4
22:00	~	22:15	35	7	5	1	1	0	2	2	0	3
22:15	~	22:30	27	11	0	0	1	0	0	4	0	0
22:30	~	22:45	34	6	4	2	1	0	4	3	0	0
22:45	~	23:00	17	3	1	0	0	0	3	7	0	0
23:00	~	23:15	31	3	1	0	1	1	1	0	0	0
23:15	~	23:30	14	0	0	0	0	0	1	2	0	0
23:30	~	23:45	7	2	0	0	0	0	0	2	0	1
23:45	~	0:00	10	2	1	0	0	0	0	0	0	0
0:00	~	0:15	3	4	0	0	0	2	1	0	0	0
0:15	~	0:30	20	12	7	2	6	2	1	0	0	0
0:30	~	0:45	15	7	3	0	3	0	3	0	0	0
0:45	~	1:00	7	4	1	0	0	2	0	0	0	0
1:00	~	1:15	2	0	0	2	0	4	4	0	0	0
1:15	~	1:30	4	0	0	0	2	2	2	0	0	0
1:30	~	1:45	5	0	0	0	2	0	3	0	0	0
1:45	~	2:00	0	0	0	0	3	1	2	0	0	0
2:00	~	2:15	16	8	0	0	0	0	0	4	0	0
2:15	~	2:30	7	3	0	0	0	0	0	0	0	0
2:30	~	2:45	4	0	0	0	0	0	0	0	0	0
2:45	~	3:00	0	0	0	0	0	0	0	0	0	0
3:00	~	3:15	4	2	0	0	0	0	0	0	0	0
3:15	~	3:30	0	0	0	0	0	0	0	0	0	0
3:30	~	3:45	6	0	0	0	0	0	0	0	0	0
3:45	~	4:00	7	4	0	0	0	0	0	0	0	0
4:00	~	4:15	10	7	4	0	0	0	0	7	0	0
4:15	~	4:30	8	6	0	0	0	0	0	4	0	0
4:30	~	4:45	14	7	5	0	0	0	0	8	0	0
4:45	~	5:00	12	13	3	4	2	1	0	6	0	0
5:00	~	5:15	20	9	5	2	5	4	0	3	0	0
5:15	~	5:30	8	12	0	6	6	0	0	8	0	0
5:30	~	5:45	29	15	10	6	5	3	4	10	0	0
5:45	~	6:00	22	9	6	5	8	5	3	7	0	4
Total Traffic			4079	1699	1058	656	519	449	278	1027	53	900

**The Preparatory Survey on the Project for Reconstruction of Somalia Drive in Monrovia**

**(Road Side Traffic Counts Phase II)**

Road											Key Map	
Location /		Name: <u>Somalia Drive</u>					Date: <u>2016/3/30</u>					
Direction /		From: <u>Waste Station</u> To: <u>Freeport Redlight</u>					Surveyed by: <u>Y. Kaba, A. Ajavon, W.Jensen</u>					
		Supervised by: <u>windell Johnson</u>										
No.	1	2	3	4	5	6	7	8	9	10		
Category	Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailer (Artuculated Truck)	Motorbike	Bicycle	Pedestrian		
Hours												
6:00	~	6:15	80	17	33	7	6	5	3	7	1	1
6:15	~	6:30	75	15	27	9	4	7	3	5	1	1
6:30	~	6:45	77	25	27	9	5	3	1	3	0	1
6:45	~	7:00	81	21	27	8	6	7	1	12	0	6
7:00	~	7:15	154	27	38	10	4	8	2	7	0	20
7:15	~	7:30	94	12	14	5	8	4	1	13	2	17
7:30	~	7:45	82	13	22	9	10	9	3	8	1	13
7:45	~	8:00	91	17	14	6	8	3	3	2	0	13
8:00	~	8:15	70	19	17	5	7	5	0	18	0	30
8:15	~	8:30	62	19	5	3	8	2	2	18	0	10
8:30	~	8:45	56	8	10	4	3	0	1	29	1	10
8:45	~	9:00	38	15	9	4	10	3	3	16	0	7
9:00	~	9:15	78	16	11	5	6	7	2	26	0	7
9:15	~	9:30	77	23	13	5	4	4	1	7	0	4
9:30	~	9:45	72	22	16	5	10	2	0	11	0	2
9:45	~	10:00	82	19	11	7	0	2	0	14	0	15
10:00	~	10:15	47	16	12	1	1	0	0	11	0	7
10:15	~	10:30	13	30	14	6	12	3	0	18	0	8
10:30	~	10:45	52	13	10	3	4	3	1	4	0	0
10:45	~	11:00	65	13	7	0	2	3	2	3	1	1
11:00	~	11:15	23	6	3	2	3	0	0	1	0	0
11:15	~	11:30	30	9	5	4	2	1	2	5	0	2
11:30	~	11:45	36	14	9	4	5	1	0	6	0	2
11:45	~	12:00	34	12	11	2	8	4	0	14	0	0
12:00	~	12:15	62	25	14	2	7	0	1	14	0	3
12:15	~	12:30	35	11	6	1	3	2	1	3	0	7
12:30	~	12:45	57	10	12	3	4	6	3	8	1	19
12:45	~	13:00	69	20	13	5	3	1	0	9	1	14
13:00	~	13:15	56	31	17	1	3	5	1	10	0	2
13:15	~	13:30	76	16	9	3	3	8	1	14	2	7
13:30	~	13:45	48	7	9	2	4	2	1	7	0	2
13:45	~	14:00	41	23	18	3	7	7	3	4	1	7
14:00	~	14:15	42	14	13	4	6	2	1	6	0	0
14:15	~	14:30	49	17	19	2	3	2	0	5	0	1
14:30	~	14:45	59	15	21	5	4	1	1	10	1	5
14:45	~	15:00	32	18	10	4	8	1	1	7	1	2
15:00	~	15:15	35	20	13	3	4	1	1	7	1	4
15:15	~	15:30	50	10	13	2	4	1	2	8	1	5
15:30	~	15:45	52	17	18	4	8	3	2	7	1	1
15:45	~	16:00	35	5	14	1	7	1	1	5	1	5
16:00	~	16:15	64	30	24	5	7	3	3	1	1	9
16:15	~	16:30	41	14	12	3	5	1	1	9	0	11
16:30	~	16:45	38	13	17	5	5	5	2	10	0	3
16:45	~	17:00	67	12	14	5	6	7	1	7	1	5

17:00	~	17:15	54	21	12	7	7	2	1	13	1	4
17:15	~	17:30	34	16	10	7	4	3	1	9	1	4
17:30	~	17:45	40	15	10	3	4	1	2	3	2	5
17:45	~	18:00	37	12	14	4	4	1	0	12	0	4
18:00	~	18:15	72	31	24	9	6	7	5	21	2	25
18:15	~	18:30	68	24	11	13	7	5	7	35	3	40
18:30	~	18:45	79	38	24	16	6	9	9	35	0	23
18:45	~	19:00	73	35	13	7	9	5	5	28	0	28
19:00	~	19:15	59	20	6	5	8	4	3	31	0	22
19:15	~	19:30	61	18	13	8	3	9	7	28	2	16
19:30	~	19:45	42	27	12	19	15	6	8	18	0	17
19:45	~	20:00	30	12	6	7	17	5	5	28	1	22
20:00	~	20:15	35	19	7	9	6	7	4	22	0	14
20:15	~	20:30	43	10	6	3	5	2	3	12	0	21
20:30	~	20:45	35	15	8	5	4	6	3	8	0	9
20:45	~	21:00	37	15	12	6	6	4	3	14	0	15
21:00	~	21:15	30	13	6	6	10	6	7	28	0	20
21:15	~	21:30	23	9	5	2	14	7	5	23	0	19
21:30	~	21:45	30	14	4	2	4	5	2	15	0	24
21:45	~	22:00	30	14	7	4	3	3	5	14	0	4
20:00	~	22:15	22	12	2	0	8	7	2	9	0	3
22:15	~	22:30	30	10	14	0	3	1	5	6	0	3
22:30	~	22:45	21	7	4	0	7	4	7	11	0	7
22:45	~	23:00	28	8	5	2	9	3	6	8	0	2
23:00	~	23:15	19	10	2	0	8	1	4	8	0	11
23:15	~	23:30	21	7	1	0	6	4	4	12	0	3
23:30	~	23:45	18	10	2	0	8	2	3	3	0	0
23:45	~	0:00	36	9	0	0	5	6	0	0	0	0
0:00	~	0:15	21	19	4	0	4	0	3	0	0	0
0:15	~	0:30	21	14	10	0	6	0	0	0	0	0
0:30	~	0:45	14	4	0	0	6	0	2	0	0	0
0:45	~	1:00	16	6	0	1	2	4	0	0	0	0
1:00	~	1:15	10	4	0	0	5	0	3	0	0	0
1:15	~	1:30	13	3	0	0	0	0	1	0	0	0
1:30	~	1:45	7	3	0	0	2	0	1	0	0	0
1:45	~	2:00	9	2	0	0	0	0	0	0	0	0
2:00	~	2:15	14	6	0	0	5	0	2	0	0	0
2:15	~	2:30	5	0	0	0	1	0	0	0	0	0
2:30	~	2:45	7	0	0	0	3	0	0	0	0	0
2:45	~	3:00	6	0	0	0	3	0	1	0	0	0
3:00	~	3:15	3	0	0	0	0	0	3	0	0	0
3:15	~	3:30	4	0	0	0	0	0	0	0	0	0
3:30	~	3:45	0	0	0	0	5	4	2	0	0	0
3:45	~	4:00	7	2	0	0	5	4	2	0	0	0
4:00	~	4:15	9	6	7	0	6	4	6	5	0	0
4:15	~	4:30	20	8	5	0	10	5	5	2	0	0
4:30	~	4:45	15	7	3	0	6	4	4	5	0	0
4:45	~	5:00	23	9	7	0	7	9	7	10	0	0
5:00	~	5:15	39	14	11	5	7	5	8	18	0	14
5:15	~	5:30	28	15	8	3	9	6	6	21	0	16
5:30	~	5:45	20	12	4	0	4	7	3	16	0	12
5:45	~	6:00	30	15	6	6	5	5	6	10	0	12
Total Traffic			3226	998	806	291	327	202	111	670	32	499



**The Preparatory Survey on the Project for Reconstruction of Somalia Drive in Monrovia**

**(Road Side Traffic Counts Phase II)**

Road												Key Map
Location /		Name: <u>Somalia Drive</u>					Date: <u>2016/3/30</u>					
Direction /		<u>Waste Station</u>					Surveyed by: <u>R.Blanyen, T.Jensen, W.Jensen</u>					
		From: <u>Redlight</u> To: <u>Freeport</u>					Supervised by: <u>Windell Johnson</u>					
No.	Hours		1	2	3	4	5	6	7	8	9	10
Category			Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailer (Articulated Truck)	Motorbike	Bicycle	Pedestrian
6:00	~	6:15	25	5	18	9	0	3	1	3	0	1
6:15	~	6:30	14	6	21	10	1	3	1	3	0	1
6:30	~	6:45	17	5	31	4	4	2	1	6	1	0
6:45	~	7:00	23	8	21	13	0	4	1	6	0	2
7:00	~	7:15	28	10	6	5	5	0	1	11	2	0
7:15	~	7:30	28	16	12	11	2	0	0	10	0	0
7:30	~	7:45	45	18	24	10	5	3	0	13	0	0
7:45	~	8:00	35	19	18	3	0	0	0	17	1	3
8:00	~	8:15	42	15	23	5	1	0	0	12	0	1
8:15	~	8:30	48	22	17	5	8	1	0	14	0	5
8:30	~	8:45	42	19	21	7	2	0	1	17	0	3
8:45	~	9:00	70	30	16	7	0	4	1	16	2	0
9:00	~	9:15	45	16	14	8	3	0	1	1	0	0
9:15	~	9:30	21	14	18	7	14	8	0	4	0	7
9:30	~	9:45	76	45	32	8	13	2	5	8	4	0
9:45	~	10:00	44	15	20	10	7	8	3	8	0	4
10:00	~	10:15	54	36	29	4	7	2	2	9	0	2
10:15	~	10:30	51	11	20	6	7	2	0	7	1	3
10:30	~	10:45	51	23	30	4	8	1	2	8	0	2
10:45	~	11:00	79	19	18	5	10	2	5	12	0	0
11:00	~	11:15	42	21	14	1	7	5	0	3	0	0
11:15	~	11:30	60	39	23	21	7	2	4	6	0	0
11:30	~	11:45	73	51	34	23	18	11	3	1	1	0
11:45	~	12:00	31	28	20	12	15	8	1	2	0	0
12:00	~	12:15	42	12	14	6	8	4	4	2	0	0
12:15	~	12:30	91	74	66	49	26	14	8	3	0	0
12:30	~	12:45	21	13	11	6	3	0	3	2	0	0
12:45	~	13:00	66	29	17	4	10	3	2	16	0	1
13:00	~	13:15	73	24	19	3	10	3	3	9	2	1
13:15	~	13:30	64	16	11	0	16	2	1	8	0	1
13:30	~	13:45	54	21	14	3	9	4	1	11	3	41
13:45	~	14:00	45	20	19	0	7	2	0	3	2	2
14:00	~	14:15	66	19	10	2	7	2	1	17	0	21
14:15	~	14:30	50	15	7	1	1	1	1	8	2	22
14:30	~	14:45	79	20	19	3	19	0	3	8	0	31
14:45	~	15:00	40	14	14	2	2	0	1	5	0	24
15:00	~	15:15	63	23	8	4	10	3	0	8	2	21
15:15	~	15:30	56	15	10	1	7	3	9	10	1	9
15:30	~	15:45	38	17	14	11	14	3	8	15	3	7
15:45	~	16:00	51	16	9	4	2	4	1	3	0	4
16:00	~	16:15	27	14	11	5	7	3	2	7	0	8
16:15	~	16:30	17	10	9	2	6	4	0	7	2	7
16:30	~	16:45	49	9	8	2	5	5	3	7	2	7
16:45	~	17:00	37	21	17	5	5	2	1	10	3	24
17:00	~	17:15	28	5	6	3	2	4	2	7	0	11
17:15	~	17:30	32	10	7	9	2	4	2	7	4	2
17:30	~	17:45	14	8	6	4	2	1	2	3	1	10

17:45	~	18:00	60	11	10	5	5	4	1	10	0	0
18:00	~	18:15	75	21	21	15	7	12	16	35	5	26
18:15	~	18:30	105	35	13	6	8	4	12	22	2	21
18:30	~	18:45	94	22	15	7	5	5	0	21	5	16
18:45	~	19:00	93	21	16	8	7	1	7	17	0	10
19:00	~	19:15	91	24	15	8	8	2	1	31	4	23
19:15	~	19:30	91	24	13	7	3	0	0	19	1	20
19:30	~	19:45	86	26	8	7	1	1	0	18	0	28
19:45	~	20:00	141	26	12	13	2	1	1	26	1	18
20:00	~	20:15	82	10	19	4	8	2	2	19	0	8
20:15	~	20:30	55	20	6	1	0	1	0	14	1	4
20:30	~	20:45	63	28	20	11	6	12	11	28	4	21
20:45	~	21:00	68	41	28	13	10	18	5	32	5	30
21:00	~	21:15	91	32	19	12	6	9	10	27	0	15
21:15	~	21:30	65	20	11	10	5	8	4	17	0	14
21:30	~	21:45	44	17	4	11	9	3	6	7	0	18
21:45	~	22:00	33	16	6	5	12	5	7	13	0	13
22:00	~	22:15	24	12	5	6	3	2	5	12	0	3
22:15	~	22:30	18	8	3	3	3	7	2	7	0	0
22:30	~	22:45	59	15	5	4	7	5	7	4	0	4
22:45	~	23:00	24	8	2	6	1	3	1	0	0	1
23:00	~	23:15	25	13	5	5	1	7	5	2	0	2
23:15	~	23:30	22	7	7	7	3	2	2	0	0	0
23:30	~	23:45	18	6	3	2	7	6	4	4	0	2
23:45	~	0:00	23	11	3	3	0	2	2	0	0	0
0:00	~	0:15	32	12	2	0	3	3	4	1	0	0
0:15	~	0:30	16	4	0	3	1	5	1	0	0	0
0:30	~	0:45	36	10	5	2	4	7	3	3	0	2
0:45	~	1:00	23	4	1	1	5	0	2	0	0	0
1:00	~	1:15	17	7	0	0	3	4	3	0	0	0
1:15	~	1:30	15	7	3	2	0	2	0	5	0	0
1:30	~	1:45	6	0	0	0	0	0	0	0	0	0
1:45	~	2:00	4	0	0	0	0	0	0	0	0	0
2:00	~	2:15	0	0	0	0	0	0	0	0	0	0
2:15	~	2:30	4	2	0	0	0	0	0	0	0	0
2:30	~	2:45	3	0	0	0	0	0	0	0	0	0
2:45	~	3:00	7	4	0	0	0	0	0	0	0	0
3:00	~	3:15	10	4	0	0	0	0	0	0	0	0
3:15	~	3:30	7	4	0	0	0	3	2	0	0	0
3:30	~	3:45	10	7	5	3	3	4	2	3	0	0
3:45	~	4:00	11	4	5	3	5	3	3	1	0	0
4:00	~	4:15	12	5	5	4	6	4	3	6	0	0
4:15	~	4:30	18	7	7	6	4	2	1	4	0	0
4:30	~	4:45	12	6	4	6	4	4	3	8	0	0
4:45	~	5:00	14	8	10	7	4	3	2	3	0	0
5:00	~	5:15	21	10	7	5	4	2	3	7	0	0
5:15	~	5:30	23	12	10	5	3	1	1	5	0	0
5:30	~	5:45	18	11	7	6	4	7	3	5	0	0
5:45	~	6:00	21	14	7	8	4	3	6	8	0	0
Total Traffic			4037	1532	1173	567	508	321	244	817	67	587

**7.3 Traffic Counts Survey Result  
(2) 12 Hours Traffic Counts**

**The Preparatory Survey for the Reconstruction of Somalia Drive in Monrovia (Phase 2)**

**(Road Side Traffic Counts)**

Road											Key Map
Name: <u>Somalia Drive</u>						Date: <u>31/03/2016</u>					
Location / <u>N.T.A.</u>						Surveyed by: <u>George Grabo</u>					
Direction / From: <u>Freeport</u> To: <u>Redlight</u>						Supervised by: <u>Dave S. Sourie</u>					
No.	1	2	3	4	5	6	7	8	9	10	
Category	Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailer (Articulated Truck)	Motorbike	Bicycle	Pedestrian	
Hours											
6:00 ~ 6:15	42	23	21	9	6	3	0	7	0	0	
6:15 ~ 6:30	49	31	13	5	0	0	0	12	0	0	
6:30 ~ 6:45	56	28	14	7	4	0	2	16	0	0	
6:45 ~ 7:00	49	27	24	7	4	0	1	4	0	3	
7:00 ~ 7:15	78	21	25	5	2	2	1	7	0	4	
7:15 ~ 7:30	73	17	22	4	2	1	2	11	0	9	
7:30 ~ 7:45	52	21	25	4	5	0	0	14	0	7	
7:45 ~ 8:00	76	35	25	6	5	1	0	15	0	15	
8:00 ~ 8:15	74	29	21	2	6	1	0	14	0	20	
8:15 ~ 8:30	68	30	19	4	4	3	0	15	0	24	
8:30 ~ 8:45	76	40	16	2	6	2	0	14	0	16	
8:45 ~ 9:00	68	24	26	4	4	0	0	9	1	11	
9:00 ~ 9:15	84	35	13	1	11	4	1	14	0	18	
9:15 ~ 9:30	75	30	19	5	9	1	0	12	2	36	
9:30 ~ 9:45	80	33	23	1	6	3	1	17	0	37	
9:45 ~ 10:00	52	21	21	4	12	2	0	9	0	32	
10:00 ~ 10:15	54	23	11	1	2	2	0	14	0	30	
10:15 ~ 10:30	54	23	17	3	6	1	0	8	0	18	
10:30 ~ 10:45	86	21	24	4	13	1	1	8	0	28	
10:45 ~ 11:00	83	21	23	1	15	4	4	8	0	12	
11:00 ~ 11:15	56	26	14	0	12	2	0	10	1	19	
11:15 ~ 11:30	41	13	5	0	2	1	1	11	0	23	
11:30 ~ 11:45	58	24	15	3	5	1	0	9	0	52	
11:45 ~ 12:00	64	23	10	2	1	1	0	9	0	33	
12:00 ~ 12:15	54	26	9	1	7	4	0	16	1	9	
12:15 ~ 12:30	45	29	11	1	2	6	0	6	1	11	
12:30 ~ 12:45	35	23	11	0	4	3	0	13	2	19	
12:45 ~ 13:00	33	31	21	2	5	3	0	4	1	12	
13:00 ~ 13:15	50	29	27	2	9	35	0	5	3	19	
13:15 ~ 13:30	12	13	5	1	2	14	0	3	0	7	
13:30 ~ 13:45	58	52	19	2	9	21	0	8	0	19	
13:45 ~ 14:00	32	24	9	1	3	10	0	7	0	12	
14:00 ~ 14:15	32	31	6	1	4	4	0	7	1	10	
14:15 ~ 14:30	17	8	5	0	4	2	0	2	0	5	
14:30 ~ 14:45	13	8	7	1	0	3	0	5	0	8	
14:45 ~ 15:00	45	44	22	5	14	11	0	13	0	11	
15:00 ~ 15:15	46	23	20	2	9	8	0	11	0	12	
15:15 ~ 15:30	43	36	15	3	4	9	0	8	0	5	
15:30 ~ 15:45	39	34	12	3	5	3	0	7	0	9	
15:45 ~ 16:00	33	29	16	0	8	12	0	10	0	11	
16:00 ~ 16:15	40	49	19	0	6	4	0	11	0	8	
16:15 ~ 16:30	63	43	28	0	5	7	0	11	0	9	
16:30 ~ 16:45	31	23	13	1	3	5	0	7	1	9	
16:45 ~ 17:00	44	59	14	2	6	8	0	11	3	10	
17:00 ~ 17:15	60	44	13	3	2	4	0	14	0	21	
17:15 ~ 17:30	49	47	16	5	0	4	0	12	0	17	
17:30 ~ 17:45	27	40	9	0	3	2	0	6	2	9	
17:45 ~ 18:00	39	40	9	3	3	4	0	14	0	12	
<b>Total Traffic</b>	<b>2488</b>	<b>1404</b>	<b>782</b>	<b>123</b>	<b>259</b>	<b>222</b>	<b>14</b>	<b>478</b>	<b>19</b>	<b>721</b>	

**The Preparatory Survey for the Reconstruction of Somalia Drive in Monrovia (Phase 2)**

**(Road Side Traffic Counts)**

Road												
Name: <u>Somalia Drive</u>										Date: <u>31/03/2016</u>		Key Map
Location / <u>N.T.A.</u>										Surveyed by: <u>Joshua Tarpeh</u>		
Direction /										Supervised by: <u>Dave S. Sourie</u>		
From: <u>Redlight</u> To: <u>Freeport</u>												
No.			1	2	3	4	5	6	7	8	9	10
Category			Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailer (Articulated Truck)	Motorbike	Bicycle	Pedestrian
Hours												
6:00	~	6:15	24	12	11	3	1	2	0	1	0	10
6:15	~	6:30	23	11	13	2	3	1	1	6	0	14
6:30	~	6:45	42	23	15	8	4	4	2	5	0	31
6:45	~	7:00	36	11	11	1	1	4	0	13	0	26
7:00	~	7:15	43	17	9	4	2	2	1	14	1	26
7:15	~	7:30	30	24	13	4	6	4	2	8	0	30
7:30	~	7:45	52	21	11	3	3	4	2	19	0	29
7:45	~	8:00	53	27	15	2	2	5	0	17	0	62
8:00	~	8:15	63	22	13	1	6	0	1	7	0	75
8:15	~	8:30	80	19	30	1	4	3	3	18	0	104
8:30	~	8:45	52	25	14	5	7	1	0	9	0	80
8:45	~	9:00	51	25	4	0	2	2	0	10	0	38
9:00	~	9:15	44	19	20	1	1	0	1	9	0	60
9:15	~	9:30	45	24	18	4	4	2	0	4	1	46
9:30	~	9:45	49	23	12	3	5	0	0	10	0	39
9:45	~	10:00	58	21	13	4	5	3	2	11	0	41
10:00	~	10:15	59	27	18	1	5	2	1	13	0	46
10:15	~	10:30	42	24	5	3	7	2	0	8	0	46
10:30	~	10:45	39	12	16	0	3	1	1	7	0	32
10:45	~	11:00	48	43	14	3	4	1	2	6	0	29
11:00	~	11:15	46	21	11	1	4	2	3	10	0	23
11:15	~	11:30	44	22	11	2	5	1	0	7	1	41
11:30	~	11:45	38	10	7	0	1	2	0	8	0	46
11:45	~	12:00	29	16	10	1	4	2	0	5	0	30
12:00	~	12:15	92	93	80	26	23	31	0	24	0	98
12:15	~	12:30	75	80	64	0	2	23	2	8	2	82
12:30	~	12:45	94	99	40	7	28	34	17	32	12	94
12:45	~	13:00	83	86	73	16	24	6	0	33	4	89
13:00	~	13:15	107	119	110	56	36	38	18	81	0	119
13:15	~	13:30	164	146	133	94	123	135	112	100	88	150
13:30	~	13:45	84	56	98	11	21	27	5	23	0	98
13:45	~	14:00	84	75	59	51	9	36	0	31	1	84
14:00	~	14:15	89	98	71	13	22	3	11	67	3	87
14:15	~	14:30	73	92	60	7	22	3	4	24	0	80
14:30	~	14:45	63	86	79	30	7	35	2	39	16	93
14:45	~	15:00	84	105	112	42	58	35	23	56	14	112
15:00	~	15:15	66	77	50	28	10	29	19	51	16	77
15:15	~	15:30	99	98	91	49	37	56	5	10	18	98
15:30	~	15:45	91	82	70	37	17	58	35	77	0	84
15:45	~	16:00	62	91	40	6	20	31	13	21	14	31
16:00	~	16:15	102	100	98	28	31	66	35	63	4	99
16:15	~	16:30	88	73	18	4	22	19	2	18	2	79
16:30	~	16:45	70	63	59	14	4	2	1	21	1	58
16:45	~	17:00	99	112	95	38	70	30	0	59	10	59
17:00	~	17:15	97	74	89	18	29	42	17	64	0	91
17:15	~	17:30	91	72	49	31	4	9	2	23	5	91
17:30	~	17:45	79	98	73	49	25	10	0	51	10	105
17:45	~	18:00	81	60	84	0	10	0	25	42	3	84
Total Traffic			3207	2634	2109	712	743	808	370	1243	226	3146

## The Preparatory Survey for the Reconstruction of Somalia Drive in Monrovia (Phase 2)

### (Road Side Traffic Counts)

Road											Key Map	
Name: <u>Somalia Drive</u>						Date: <u>2016/4/1</u>						
Location / <u>N.T.A</u>						Surveyed by: <u>W.Jensen Y.Kaba</u>						
Direction / <u>From: Freeport To: Redlight</u>						Supervised by: <u>Windell Johnson</u>						
No.			1	2	3	4	5	6	7	8	9	10
Category			Sedan / Wagon / Pick-up	Taxi	Mini Bus	Large Bus	Light Truck (2-Axle)	Heavy Truck (> 2-Axle)	Trailer (Articulated Truck)	Motorbike	Bicycle	Pedestrian
Hours												
6:00	~	6:15	20	13	10	5	1	2	0	0	0	0
6:15	~	6:30	15	10	13	7	3	0	1	2	0	0
6:30	~	6:45	12	21	20	3	8	4	0	3	0	0
6:45	~	7:00	12	18	14	5	5	2	0	4	1	0
7:00	~	7:15	11	13	15	5	1	1	0	5	0	0
7:15	~	7:30	6	6	13	4	4	1	1	2	0	0
7:30	~	7:45	4	4	10	1	2	1	2	3	0	0
7:45	~	8:00	16	11	3	3	1	2	0	2	0	0
8:00	~	8:15	14	10	9	5	1	1	0	2	0	0
8:15	~	8:30	3	7	5	3	3	2	2	0	0	0
8:30	~	8:45	12	8	9	5	2	30	0	0	0	0
8:45	~	9:00	17	8	10	6	4	6	2	3	2	0
9:00	~	9:15	21	19	15	12	13	0	2	0	0	2
9:15	~	9:30	10	4	8	3	0	0	0	0	0	0
9:30	~	9:45	14	4	13	5	4	4	2	1	0	7
9:45	~	10:00	29	15	15	9	7	6	3	1	0	0
10:00	~	10:15	13	11	7	1	1	4	0	1	1	0
10:15	~	10:30	14	12	6	3	4	1	2	3	0	0
10:30	~	10:45	9	4	5	1	2	2	0	2	0	0
10:45	~	11:00	10	11	12	8	10	3	0	0	3	10
11:00	~	11:15	17	12	6	1	1	4	5	1	0	0
11:15	~	11:30	18	18	11	8	5	7	4	4	2	2
11:30	~	11:45	17	15	17	8	5	2	2	0	0	1
11:45	~	12:00	25	11	18	17	9	6	3	4	0	6
12:00	~	12:15	74	24	23	3	8	7	4	16	2	11
12:15	~	12:30	58	35	22	2	17	6	5	8	1	7
12:30	~	12:45	43	17	22	2	10	5	3	12	0	7
12:45	~	13:00	38	16	18	1	7	8	2	11	1	6
13:00	~	13:15	56	35	22	2	6	8	5	12	1	8
13:15	~	13:30	31	18	6	2	4	7	2	10	1	11
13:30	~	13:45	38	18	14	2	10	6	3	7	1	3
13:45	~	14:00	78	22	24	1	7	6	1	5	2	6
14:00	~	14:15	63	27	14	3	9	4	2	7	1	4
14:15	~	14:30	39	27	11	3	7	4	4	5	1	6
14:30	~	14:45	63	29	15	3	8	4	3	12	1	2
14:45	~	15:00	62	29	18	2	6	6	3	5	1	4
15:00	~	15:15	77	24	13	1	13	9	5	7	1	3
15:15	~	15:30	49	22	19	1	6	6	3	1	0	5
15:30	~	15:45	50	28	8	2	5	3	1	8	1	4
15:45	~	16:00	62	33	28	3	12	8	1	5	3	4
16:00	~	16:15	67	21	20	2	10	8	4	8	0	3
16:15	~	16:30	47	24	15	1	5	8	2	4	1	1
16:30	~	16:45	56	20	13	2	3	8	4	13	1	11
16:45	~	17:00	64	24	14	1	1	7	1	6	1	13
17:00	~	17:15	70	22	18	2	4	12	2	12	2	6
17:15	~	17:30	49	16	8	0	7	6	0	6	1	9
17:30	~	17:45	48	26	25	3	9	5	4	11	2	10
17:45	~	18:00	64	23	11	5	1	8	3	20	4	17
<b>Total Traffic</b>			1685	845	665	177	271	250	98	254	39	189

**The Preparatory Survey for the Reconstruction of Somalia Drive in Monrovia (Phase 2)**

**(Road Side Traffic Counts)**

Road										Key Map										
Name: <u>Somalia Drive</u>		Date: <u>2016/4/1</u>																		
Location /		<u>N.T.A</u>								Surveyed by: <u>L.Kerkula T.Jensen</u>										
Direction /		From: <u>Redlight</u>		To: <u>Freeport</u>		Supervised by: <u>Windell Johnson</u>														
No.	1		2		3		4		5		6		7		8		9		10	
Category	Sedan / Wagon / Pick-up		Taxi		Mini Bus		Large Bus		Light Truck (2-Axle)		Heavy Truck (> 2-Axle)		Trailer (Articulated Truck)		Motorbike		Bicycle		Pedestrian	
Hours																				
6:00	~	6:15	14	6	17	5	6	5	1	2	0	6								
6:15	~	6:30	22	14	18	4	2	5	0	5	0	9								
6:30	~	6:45	20	16	15	9	8	9	0	8	0	11								
6:45	~	7:00	25	11	17	0	0	6	4	10	0	15								
7:00	~	7:15	20	18	11	2	1	2	0	7	1	6								
7:15	~	7:30	19	19	13	3	3	6	8	11	0	14								
7:30	~	7:45	21	11	11	3	3	4	2	3	0	14								
7:45	~	8:00	18	18	17	3	3	2	0	2	0	10								
8:00	~	8:15	20	17	16	4	2	3	0	4	0	14								
8:15	~	8:30	21	17	17	2	3	3	4	5	0	17								
8:30	~	8:45	21	7	9	1	0	3	5	6	0	14								
8:45	~	9:00	14	7	8	4	3	1	0	7	2	7								
9:00	~	9:15	5	6	4	3	0	2	2	2	1	14								
9:15	~	9:30	17	10	7	8	3	3	1	1	0	7								
9:30	~	9:45	19	14	8	3	2	2	0	7	0	14								
9:45	~	10:00	19	14	15	3	1	11	3	0	0	14								
10:00	~	10:15	16	6	8	2	2	4	1	1	0	21								
10:15	~	10:30	14	14	10	3	1	7	4	0	0	7								
10:30	~	10:45	19	14	8	1	2	0	1	2	0	6								
10:45	~	11:00	21	6	9	7	1	7	1	8	0	10								
11:00	~	11:15	28	10	4	5	3	2	1	0	0	10								
11:15	~	11:30	12	14	6	3	2	2	3	2	0	7								
11:30	~	11:45	21	10	8	0	1	1	2	5	1	14								
11:45	~	12:00	19	12	18	5	6	1	0	3	0	21								
12:00	~	12:15	18	15	9	2	4	5	1	3	0	1								
12:15	~	12:30	21	7	7	1	2	7	2	7	0	6								
12:30	~	12:45	21	6	5	5	0	4	0	1	0	0								
12:45	~	13:00	21	14	14	5	1	3	2	4	1	12								
13:00	~	13:15	28	15	19	5	2	3	5	3	0	7								
13:15	~	13:30	46	32	31	7	11	5	2	14	8	22								
13:30	~	13:45	69	54	41	7	21	9	4	14	22	33								
13:45	~	14:00	35	31	22	22	14	14	2	24	7	28								
14:00	~	14:15	64	35	21	28	14	14	7	21	7	28								
14:15	~	14:30	49	28	14	14	16	7	8	35	7	28								
14:30	~	14:45	56	37	21	7	8	5	4	40	5	42								
14:45	~	15:00	59	35	29	16	24	17	9	22	17	28								
15:00	~	15:15	49	33	15	6	11	6	4	25	12	19								
15:15	~	15:30	61	26	22	16	9	8	7	30	5	24								
15:30	~	15:45	66	19	13	1	6	7	4	5	1	7								
15:45	~	16:00	50	20	18	5	9	4	0	7	0	6								
16:00	~	16:15	38	19	13	3	5	1	0	6	0	7								
16:15	~	16:30	64	31	19	0	8	8	1	7	0	4								
16:30	~	16:45	48	29	12	0	11	6	0	11	0	3								
16:45	~	17:00	50	16	18	3	13	3	0	7	2	0								
17:00	~	17:15	66	18	20	2	16	2	1	6	0	11								
17:15	~	17:30	58	18	19	3	4	5	0	13	3	4								
17:30	~	17:45	54	20	14	9	5	5	0	8	1	6								
17:45	~	18:00	53	16	18	6	18	6	0	23	0	2								
Total Traffic			1589	865	708	256	290	245	106	437	103	610								

## 7.4 Pavement Design

### (1) Calculation of Pavement thickness

#### Asphalt Pavement

#### Pavement Structure Index

Pavement Structure		Somalia Drive
Traffic ESAL	W18	42,180,000
Confidence Coefficient	R (%)	90
Standard Deviation	ZR	-1.282
Combined Standard Error	S0	0.45
Initial Serviceability Index	P0	4.2
Terminal Serviceability Index	P1	2.5
P0-P1	ΔPSI	1.7
CBR rate (%) Subgrade	CBR	12
Resilient Modulus ( =1500× CBR )	MR	18,000
Target Structural Number	SN	4.548

$$\text{Log}_{10}(W_{18})=Z_R \times S_0 + 9.36 \times \text{Log}_{10}(\text{SN}+1) - 0.20 + \{ \text{Log}_{10} [ \Delta \text{PSI} / (4.2 - 1.5) ] / [ 0.40 + 1094 / (\text{SN}+1)^{5.19} ] \} + 2.32 \times \text{Log}_{10}(\text{MR}) - 8.07$$

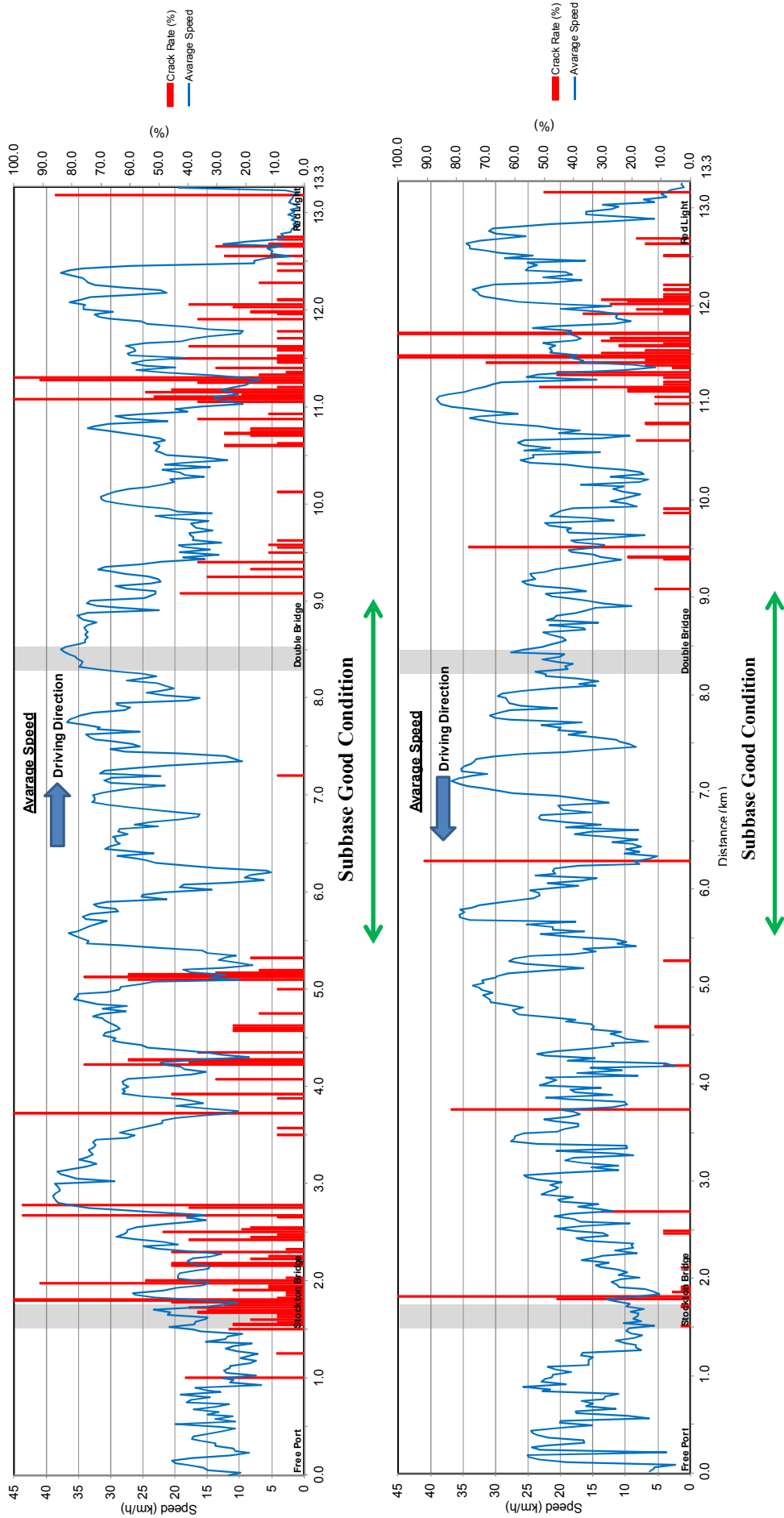
Tentative Calculation $\log_{10}(W18)=$	7.625
Calculation of right side=	7.625

#### 提案する新設舗装構造の構造指数

New Pavement Structure	Drain Coefficient (m)	Layer Index (a)	
Pavement Structure Design Section			Somalia Dreve
Asphalt Concrete (cm)	-	0.440	15.0
Base Course (cm)	1.0	0.135	20.0
Subbase Course (cm)	1.0	0.108	30.0
Prproposal Structural Number (SN)			4.94

$$\text{SN}=a1 * D1 + a2 * m2 * D2 + a3 * m3 * D3$$

## (2) Relation of Pavement Crack rate and Travel Speed





## 7.5 Intersection Traffic analysis

### FREEPORT Intersection

Hour: 18:00 - 19:00 (Evening Peak Hour)

AADT

#### 1. Inflow Traffic Volume

Approach Street	North		South		EAST	
	Through	Left	Through	Right	Left	Right
Direction	2	1	2	1	2	1
Number of lanes	2,000	1,800	2,000	1,800	1,800	1,800
Basic saturation flow rate	0.81	0.81	0.81	0.81	0.81	0.81
Safety Factor	1,620	1,458	1,620	1,458	1,458	1,474
Saturation flow rate	435	222	716	501	297	107
Traffic volume (PCU/h)	218	222	358	501	149	107
Traffic volume per lane	0.13	0.15	0.22	0.34	0.10	0.07
Normalized traffic volume	0.13	0.15	0.22	0.24	0.10	0.10
Demand factor of phase 1	****					
Demand factor of phase 2	****					
Demand factor of phase 3	****					
Green time rate of phase 1	0.27	0.27	0.43	0.43	0.18	0.18
Green time rate of phase 2	0.27					
Green time rate of phase 3	0.43					
Yellow + red time rate	0.13					
Leg Capacity by Direction	864	389	1,377	887	535	1,474
VCR (Vehicle/Capacity Ratio)	0.50	0.57	0.52	0.56	0.56	0.07
Evaluation	OK	OK	OK	OK	OK	OK

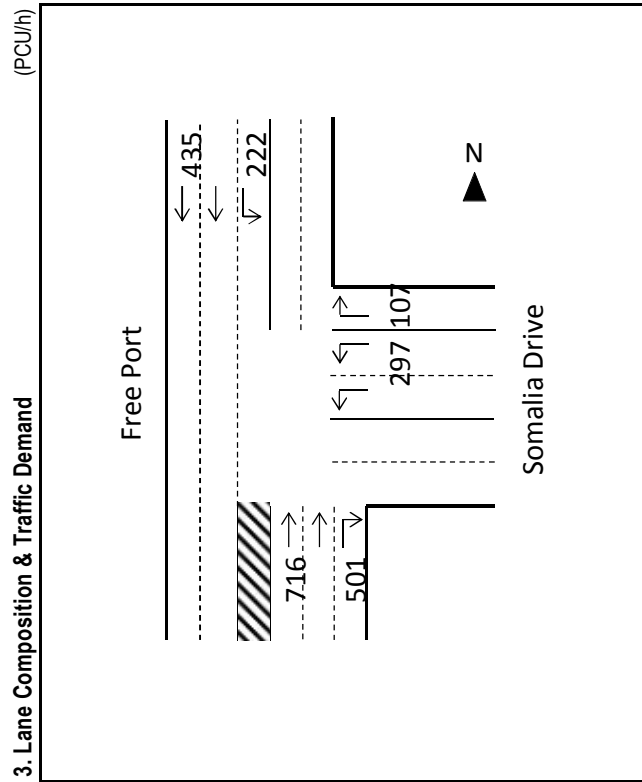
#### Saturation Degree

0.15	0.24	0.10	0.00
0.15	0.24	0.10	0.00
0.15	0.24	0.10	0.00
0.15	0.24	0.10	0.00

#### 2. Signal Phase

Signal phase	1 $\phi$	2 $\phi$	3 $\phi$
Signal phase			
Saturation degree	0.15	0.24	0.10
Demand for green	19	30	13
Green time	32	51	22
Yellow + red time	5	5	5
Cycle	120		
Saturation Degree of Intersection =	0.50		

#### 3. Lane Composition & Traffic Demand



# new georgia Intersection

AADT

Hour: 18:00 - 19:00 (Evening Peak Hour)

## 1. Inflow Traffic Volume

Approach Street	East		West		North	
	Through	Left	Through	Right	Left/Right	Left/Right
Number of lanes	2	1	1	1	1	1
Basic saturation flow rate	2,000	1,800	2,000	1,800	1,800	1,800
Safety Factor	0.81	0.81	0.81	0.81	0.81	0.81
Saturation flow rate	1,620	1,458	1,620	1,458	1,458	1,458
Traffic volume (PCU/h)	459	107	376	376	336	336
Traffic volume per lane	230	107	376	376	336	336
Normalized traffic volume	0.14	0.07	0.23	0.26	0.23	0.23
Demand factor of phase 1	0.14		0.23	0.26		
Demand factor of phase 2	0.00	0.07				
Demand factor of phase 3					0.23	
Green time rate of phase 1	0.42		0.42	0.42		
Green time rate of phase 2	0.12	0.12				
Green time rate of phase 3					0.38	
Leg Capacity by Direction	1,764	178	684	616	551	551
VCR (Vehicle/Capacity Ratio)	0.26	0.60	0.55	0.61	0.61	0.61
Evaluation	OK	OK	OK	OK	OK	OK

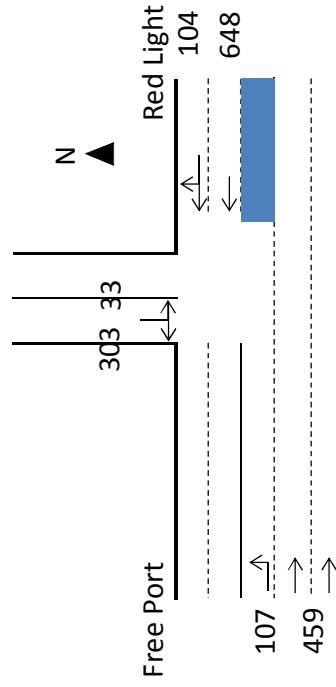
Saturation Degree

0.26	0.07	0.23	0.00	0.56	< 0.9	OK
------	------	------	------	------	-------	----

## 2. Signal Phase

Signal phase	1 $\phi$	2 $\phi$	3 $\phi$
		→ ←	↕
Saturation degree	0.26	0.07	0.23
Demand for green	47	14	42
Green time	76	22	68
Yellow + red time	5	5	5
Cycle	180		
Saturation Degree of Intersection =			<b>0.56</b>

## 3. Lane Composition & Traffic Demand (PCU/h)



### Barnersville Intersection

AADT

Hour: 18:00 - 19:00 (Evening Peak Hour)

#### 1. Inflow Traffic Volume

Approach Street	East		West		North	
	Through	Left	Through	Right	Left	Right
Number of lanes	2	1	1	1	1	1
Basic saturation flow rate	2,000	1,800	2,000	1,800	1,800	1,800
Safety Factor	0.81	0.81	0.81	0.81	0.81	0.81
Saturation flow rate	1,620	1,458	1,620	1,458	1,458	1,458
Traffic volume (PCU/h)	628	171	338	338	405	405
Traffic volume per lane	314	171	338	338	405	405
Normalized traffic volume	0.19	0.12	0.21	0.23	0.28	0.28
Demand factor of phase 1	0.19		0.21	0.23		
Demand factor of phase 2	0.00	0.12				
Demand factor of phase 3						0.28
Green time rate of phase 1	0.34		0.34	0.34		
Green time rate of phase 2	0.17	0.17				
Green time rate of phase 3						0.41
Leg Capacity by Direction	1,656	251	549	494	591	591
VCR (Vehicle/Capacity Ratio)	0.38	0.68	0.61	0.68	0.68	0.68
Evaluation	OK	OK	OK	OK	OK	OK

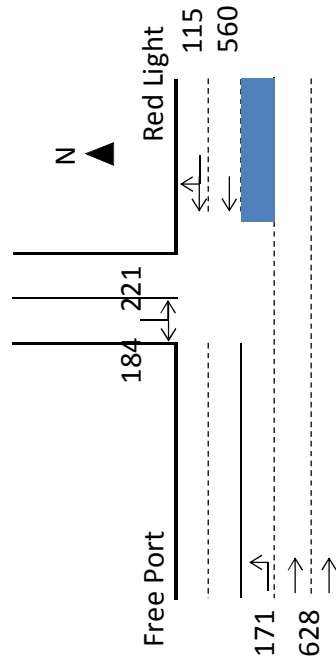
**Saturation Degree**  

0.23	0.12	0.28	0.00	<b>0.63</b>
<b>&lt; 0.9</b>				
<b>OK</b>				

#### 2. Signal Phase

Signal phase	1φ	2φ	3φ
		↔	↔
Saturation degree	0.23	0.12	0.28
Demand for green	42	22	50
Green time	61	31	73
Yellow + red time	5	5	5
Cycle	180		
Saturation Degree of Intersection = <b>0.63</b>			

#### 3. Lane Composition & Traffic Demand (PCU/h)



### Neezoe Intersection

AADT

Hour: 18:00 - 19:00 (Evening Peak Hour)

#### 1. Inflow Traffic Volume

Approach Street	East		West		North	
	Through	Right	Through	Left	Left/Right	
Number of lanes	2	1	1	1	1	
Basic saturation flow rate	2,000	1,800	2,000	1,800	1,800	
Safety Factor	0.81	0.81	0.81	0.81	0.81	
Saturation flow rate	1,620	1,458	1,620	1,458	1,458	
Traffic volume (PCU/h)	1,250	31	277	277	83	
Traffic volume per lane	625	31	277	277	83	
Normalized traffic volume	0.39	0.02	0.17	0.19	0.06	
Demand factor of phase 1	0.19		0.17	0.19		
Demand factor of phase 2	0.20	0.02				
Demand factor of phase 3					0.06	
Green time rate of phase 1	0.39		0.39	0.39		
Green time rate of phase 2	0.41	0.41				
Green time rate of phase 3					0.12	
Leg Capacity by Direction	2,592	591	639	575	170	
VCR (Vehicle/Capacity Ratio)	0.48	0.05	0.43	0.48	0.49	
Evaluation	OK	OK	OK	OK	OK	OK

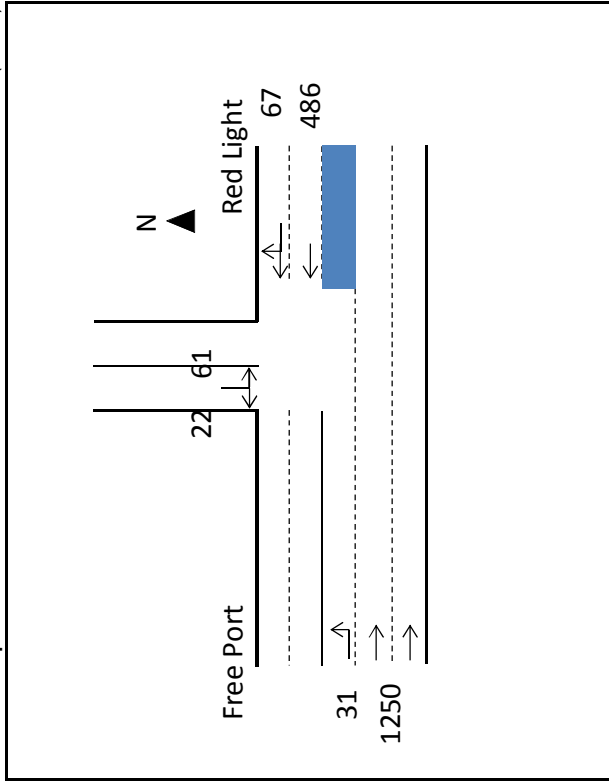
Saturation

Degree
0.19
0.20
0.06
0.00
<b>0.44</b>
< 0.9
OK

#### 2. Signal Phase

Signal phase	1φ	2φ	3φ
	→	↕	↔
Saturation degree	0.19	0.20	0.06
Demand for green	35	36	11
Green time	71	73	21
Yellow + red time	5	5	5
Cycle	180		
Saturation Degree of Intersection =			<b>0.44</b>

#### 3. Lane Composition & Traffic Demand (PCU/h)



## 72nd Intersection

AADT

Hour: 18:00 - 19:00 (Evening Peak Hour)

### 1. Inflow Traffic Volume

Approach Street	East		West		South	
	Through	Right	Through	Left	Left	Right
Direction	2	1	2	1	1	1
Number of lanes	2,000	1,800	2,000	1,800	1,800	1,800
Basic saturation flow rate	0.81	0.81	0.81	0.81	0.81	0.81
Safety Factor	1,620	1,474	1,620	1,458	1,458	1,458
Saturation flow rate	1,109	1,467	604	244	274	131
Traffic volume (PCU/h)	555	1,467	302	244	274	131
Traffic volume per lane	0.34	1.00	0.19	0.17	0.19	0.09
Normalized traffic volume	0.34	****	0.19	0.17	0.19	0.09
Demand factor of phase 1	0.34	****	0.19	0.17	0.19	0.09
Demand factor of phase 2	0.34	****	0.19	0.17	0.19	0.09
Demand factor of phase 3	0.34	****	0.19	0.17	0.19	0.09
Green time rate of phase 1	0.44	0.44	0.24	0.24	0.24	0.24
Green time rate of phase 2	0.24	0.24	0.24	0.24	0.24	0.24
Green time rate of phase 3	0.24	0.24	0.24	0.24	0.24	0.24
Yellow + red time rate	0.08					
Leg Capacity by Direction	1,422	1,474	774	348	348	348
VCR (Vehicle/Capacity Ratio)	0.78	0.99	0.78	0.70	0.79	0.38
Evaluation	OK	OK	OK	OK	OK	OK

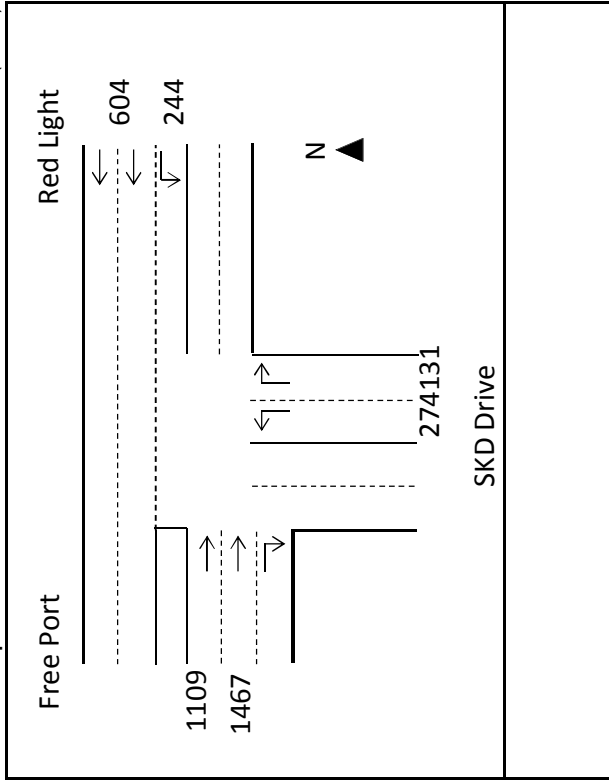
Saturation

0.34	Degree
0.19	
0.19	
0.00	
0.72	OK
< 0.9	

### 2. Signal Phase

Signal phase	1φ	2φ	3φ
Signal phase			
Saturation degree	0.34	0.19	0.19
Demand for green	62	34	34
Green time	79	43	43
Yellow + red time	5	5	5
Cycle	180		
Saturation Degree of Intersection =			<b>0.72</b>

### 3. Lane Composition & Traffic Demand (PCU/h)



## 7.6 Drainage Calculation

### Flow Calculation

$$\text{Rational: } Q = (1 / (3.6 * 10^6)) * C * I * A \quad Q = A * V$$

discharge coefficient (AC)	0.9	Manning: $V = (1/n) * R^{2/3} * i^{1/2}$
rainfall intensity (3yr return period)	100mm/h	roughness coefficient: (concrete)
catchment width	11.1m	effective depth
		0.015
		0.8

### Road edge Drain

No.	Station	Length (m)	Slope (%)	Station	Outlet	discharge (m <sup>3</sup> /s)	capacity				Velocity: V (m/s)	Capacity (m <sup>3</sup> /s)	Judge
							dipth (m)	width (m)	section area: A (m <sup>2</sup> )	Hydraulic radius: R (m)			
1	0+000 ~ 0+225	225	0.067		0+225 inner wetland	0.062	1.00	1.500	0.429	0.981	1.471	OK	
2	0+225 ~ 0+368	143	0.240		0+225 inner wetland	0.040	0.44	0.600	0.178	1.035	0.273	OK	
3	0+368 ~ 0+640	272	0.034		0+640 inner wetland	0.075	0.44	0.600	0.178	0.390	0.103	OK	
4	0+640 ~ 0+844	204	0.238		0+640 inner wetland	0.057	0.44	0.600	0.178	1.031	0.272	OK	
5	0+844 ~ 0+900	56	0.032		0+900 inner wetland	0.016	0.44	0.600	0.178	0.378	0.100	OK	
6	0+900 ~ 1+233	333	0.498		0+900 inner wetland	0.092	0.44	0.600	0.178	1.491	0.394	OK	
7	1+233 ~ 1+262	29	0.004		0+900 inner wetland	0.008	0.44	0.600	0.178	0.130	0.034	OK	
8	1+262 ~ 1+615	353			Stokton river (without project)								
9	1+615 ~ 1+900	285	0.384		1+900 inner wetland	0.079	0.44	0.600	0.178	1.309	0.346	OK	
10	1+900 ~ 2+230	330	0.123		1+900 inner wetland	0.092	0.44	0.600	0.178	0.741	0.196	OK	
11	2+230 ~ 2+575	345	0.106		2+230 inner wetland	0.096	0.44	0.600	0.178	0.688	0.182	OK	
12	2+575 ~ 3+000	425	0.111		3+000 inner wetland	0.118	0.44	0.600	0.178	0.704	0.186	OK	
13	3+000 ~ 3+125	125	0.050		3+125 inner wetland	0.035	0.34	0.600	0.204	0.438	0.089	OK	
14	3+125 ~ 3+580	455	0.246		3+125 inner wetland	0.126	0.34	0.600	0.204	0.972	0.198	OK	
15	3+580 ~ 3+925	345	0.207		3+925 inner wetland	0.096	0.34	0.600	0.204	0.892	0.182	OK	
16	3+925 ~ 4+245	320	0.330		3+925 inner wetland	0.089	0.34	0.600	0.204	1.126	0.230	OK	
17	4+245 ~ 4+632	387	0.125		4+632 inner wetland	0.107	0.34	0.600	0.204	0.693	0.141	OK	
18	4+632 ~ 4+976	344	0.177		4+632 inner wetland	0.095	0.34	0.600	0.204	0.824	0.168	OK	
19	4+976 ~ 5+297	321	0.310		4+976 inner wetland	0.089	0.34	0.600	0.204	1.091	0.223	OK	
20	5+297 ~ 5+556	259	0.221		5+556 inner wetland	0.072	0.34	0.600	0.204	0.921	0.188	OK	
21	5+556 ~ 5+851	295	0.290		5+556 inner wetland	0.082	0.34	0.600	0.204	1.055	0.215	OK	
22	5+851 ~ 6+135	284	0.147		6+135 inner wetland	0.079	0.34	0.600	0.204	0.751	0.153	OK	
23	6+135 ~ 6+562	427	0.212		6+562 inner wetland	0.118	0.34	0.600	0.204	0.902	0.184	OK	
24	6+562 ~ 7+144	582	0.617		6+562 inner wetland	0.162	0.34	0.600	0.204	1.539	0.314	OK	
25	7+144 ~ 7+902	758	0.275		7+902 inner wetland	0.210	0.44	0.600	0.264	1.108	0.292	OK	
26	7+902 ~ 8+075	173	0.275			0.048	0.34	0.600	0.204	1.028	0.210	OK	
27	8+075 ~ 8+229	154	0.160		Double Br (river)	0.043	0.34	0.600	0.204	0.784	0.160	OK	
28	8+229 ~ 8+282	53			Double Br								
29	8+282 ~ 8+460	178	0.587		Double Br (river)	0.049	0.34	0.600	0.204	1.501	0.306	OK	

