



# Technical Assistance Consultant's Report

---

Project Number: 43309-013  
December 2016

## Cambodia: Provincial Roads Improvement Project (Financed by the Technical Assistance Special Fund)

Appendix F: DCP and Laboratory Test Results (part 2)

Prepared by

Korea Consultants International, in Association with Dainichi, Sambo and Hankuk  
Engineering Consultants, in sub-Association with MECC, SBK, KACE and SAWAC  
Cambodia

For the Ministry of Public Works and Transport and the Asian Development Bank

This consultant's report does not necessarily reflect the views of ADB or the Government concerned, and ADB and the Government cannot be held liable for its contents. (For project preparatory technical assistance: All the views expressed herein may not be incorporated into the proposed project's design.

Asian Development Bank



**Ministry of Public Works  
and Transport**



**Asian Development bank**

**MINISTRY OF PUBLIC WORKS AND TRANSPORT  
KINGDOM OF CAMBODIA**

**ADB LoanNo.2839-CAM (SF) / ADB Loan No.8254-CAM**

---

**APPENDIX F**

**DCP AND LABORATORY TEST RESULTS**

---

**FEASIBILITY STUDY  
ON  
SECOND PROVINCIAL ROADS IMPROVEMENT PROJECT**

**December 2016**

**KCI** **KOREA CONSULTANTS INTERNATIONAL**

**in association with  
Dainichi, Sambo and  
Hankuk Engineering Consultant**

**in sub-consultancy with  
MECC, SBK, KACE and SAWAC**



**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magh.com  
 M/P: 017-300-436  
 Website: www.magh.com

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-contractor** : MEKONG ADVANTECH GROUP CO., LTD. (MAGH)  
**Project** : GEOTECHNICAL SURVEY AND FILLER PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK30+000, PK1534, Teak Pass, Kampong Chamang Offset : LHS 2.2 m  
**Tested date** : 30-Aug-2016 **Finished date** : 30-Aug-2016 **Coordinates** : N = 140938 E = 121964  
**TP No.** : TP-09 **TP depth (m)** : 0.70 m

Total mass of dry soil : 1500.5 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	0.0	1500.0	100.0
9.5	4.0	1496.0	99.7
4.75	6.7	1493.3	99.3
2	116.0	1373.3	91.6
0.425	508.2	965.1	57.7
0.075	495.6	419.5	28.0

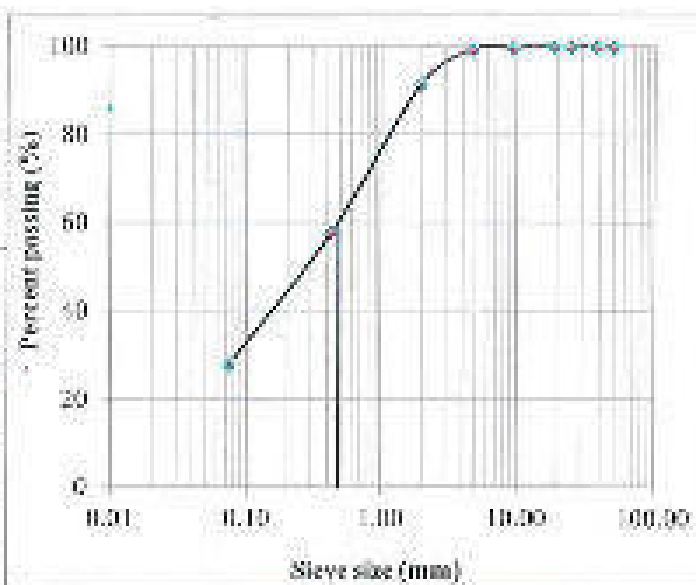


Table of percent of fine and coarse grained soil

Type	Soil	Percent (%)
Fine	Clay and silt	27.37
Coarse	Sand	63.59
	Gravel	8.45

### **Remark:**

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

2 Sep 2016

Calculated by

Tested by

Mr. Kheng Channé

Mr. Hung Min-sung



MEKONG ADVANTECH GROUP CO., LTD.  
 #225B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 MP: 017-300-435  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)  
 Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
 Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, Phase II  
 Location : PK30+300 PK33, Koh Thom, Kratie Province Offset : LHS 3.20 m  
 Tested date : 30-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N =1350634 / E =424954  
 TP No. : TP-07 TP depth (m) : 0.79 m

a	Test Number	1	2	3
b	Pycnometer Number	C229	C31	C13
c	Mass of pycnometer (g)	79.27	82.82	121.09
d	Mass of pycnometer and dry soil (g)	138.83	105.10	141.58
e	Mass of oven-dried soil (g)	46.53	22.28	20.51
f	Mass of pycnometer filled with water (g)	342.56	330.67	339.19
g	Mass of pycnometer filled with water and soil (g)	373.24	344.86	352.19
h	Specific gravity $G_s = (d - c) / e$	2.756	2.754	2.731
i	Average specific gravity	2.743		
j	Specific gravity at 20°C	2.737		

2-Sep-2016

Tested by

Calculated by

Mr. Kheng Chann

Mr. Hong Myoung



**MEKONG ADVANTECH GROUP CO., LTD.**  
4226H, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sok, Phnom Penh  
Email: info@magkh.com  
MP: 017-300-436; Website: www.magkh.com

## MOISTURE CONTENT (AASHTO T265)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)

Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVISIONAL ROAD IMPROVEMENT PROJECT, PHASE II

Location : PK254+200, PR1574, Teak Phos, Kampong Chhnang Offset : RUS 2.00 m

Tested date : 29-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N = 1353516.7 E = 420697

TP No. : TP-08 TP depth (m) : 0.70 m

No	Description		
1	Cantinnent	115	65
2	Mass of can+wet soil (g)	89.15	109.46
3	Mass of can+dry soil (g)	88.21	105.40
4	Mass of can (g)	22.58	22.60
5	Mass of water (g)	0.94	4.06
6	Mass of dry soil (g)	65.63	82.80
7	Moisture content (%)	4.62	4.87
8	Average moisture content (%)	4.74	

2-Sep-2016

Tested by

Calculated by

Mr. Khang Chann

Mr. Hong Mayseng



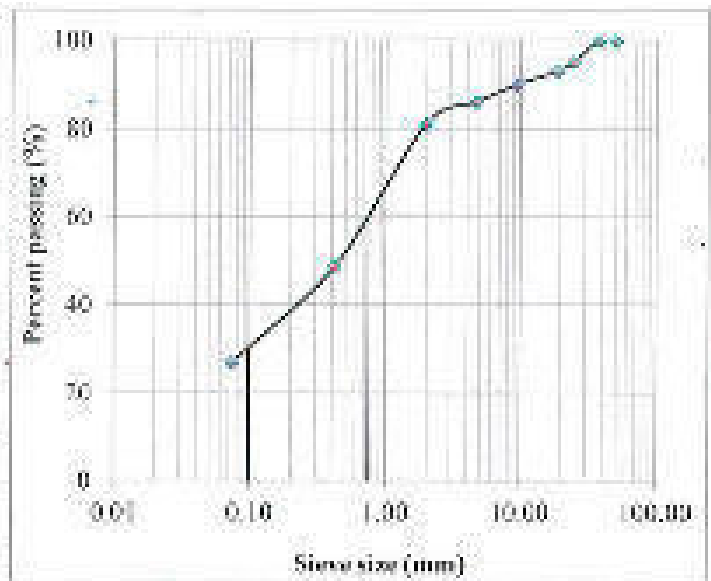
**MEKONG ADVANTECH GROUP CO., LTD.**  
 4226H, Street 42P, Sangkat Phnum Penh Thmey, Khan Sen Sok, Phnum Penh  
 Email: info@magkh.com  
 M/P: 019-300-436  
 Website: www.magkh.com

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Subcontract** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHNOM PENH  
**Location** : PK331000, PH1534, Teuk Phas, Kampong Chhnang : **Officer** : RUS 260 m  
**Tested date** : 30-Aug-2016 : **Finished date** : 30-Aug-2016 : **Coordinates** : N = 1353516 / E = 400907  
**TP No.** : TP-08 : **TP depth (m)** : 0.70 m

*Total mass of dry soil* : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	71.7	1428.3	95.2
19	126	1374.3	91.6
9.5	47.1	1452.9	97.9
4.75	56.5	1443.5	96.2
2	73.6	1426.4	94.4
0.425	463.5	1036.5	69.1
0.075	336.5	606.5	27.1



*Table of percent of fine and coarse grained soil*

Type	Soil	Percent (%)
Fine	Clay and silt	97.12
Coarse	Sand	36.15
	Gravel	18.71

**Remarks:**

Clay and Silt < 0.075mm  
 0.075mm < Sand < 2mm  
 Gravel > 2

2-Sep-2016

Total by

Calculated by

Mr. Kheng Chhann

Mr. Heng Haysong



**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magnkh.com  
 MP: 012-306-436  
 Website: www.magnkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEO-TECHNICAL STUDY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT PHNOM  
**Location** : PK2+000, PH204, Tan Phou, S/P Chhlong Offset : R/S 2.00 m  
**Tested date** : 30-Aug-2015 **Finished date** : 30-Aug-2015 **Coordinates** : N=+1515167 E=+106691  
**TP No.** : TP-08 **TP depth (m)** : 0.50 m

a	Test Number	1	2	3
b	Pycnometer Number	C66	C68	C62
c	Mass of pycnometer (g)	82.65	71.35	86.35
d	Mass of pycnometer and dry soil (g)	147.42	130.01	131.35
e	Mass of oven-dried soil (g)	64.77	58.66	45
f	Mass of pycnometer filled with water (g)	329.58	341.75	334.88
g	Mass of pycnometer filled with water and soil (g)	370.67	377.54	357.01
h	Specific gravity $w/(e+(f-g))$	2.735	2.715	2.720
i	Average specific gravity	2.717		
j	Specific gravity at 20°C	2.712		

Tested by

Mr. Kheng Chanre

2 Sep 2016

Calculated by

Mr. Hong Myereng



**MEKONG ADVANTECH GROUP CO., LTD.**  
#226D, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sok, Phnom Penh  
Email: [info@magkh.com](mailto:info@magkh.com)  
M/P: 017-3064436, Website: [www.magkh.com](http://www.magkh.com)

## MOISTURE CONTENT (AASHTO T265)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)

Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF HIGHWAY ROAD IMPROVEMENT PROJECT, PHASE II

Location : PK40+010, PR1534, Teak Pasa, Kampong Cham. Offset : LHS 2.50 m

Tested date : 29-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N =1353743 / E =476189

TP No. : TP-09 TP depth (m) : 0.30 m

No.	Description		
1	Cum number	149	50
2	Mass of can+wet soil (g)	92.50	107.30
3	Mass of can+dry soil (g)	88.33	103.00
4	Mass of can (g)	2.49	22.51
5	Mass of water (g)	4.57	4.30
6	Mass of dry soil (g)	85.84	80.49
7	Moisture content (%)	5.33	5.34
8	Average moisture content (%)	5.33	

2-Sep-2016

Tested by

Calculated by

Mr. Keng Channe

Mr. Hong Maynang





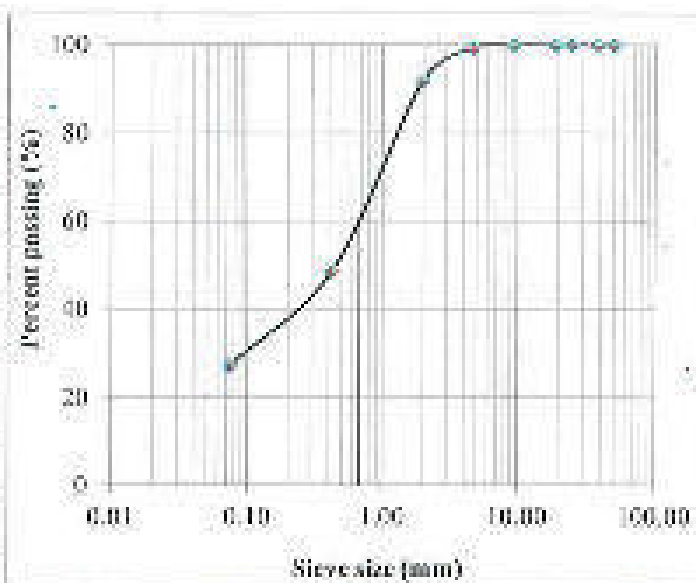
**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226B, Street 42P, Sangkat Preah Pithi Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@mgkh.com  
 M/P: 017-300-4136  
 Website: www.mgkh.com

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KHUJA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAGH)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK40+000, PR1534, Tonle Sap, Kampong Chhnang      **Offset** : LHS 2.00m  
**Tested date** : 30-Aug-2015      **Finished date** : 30-Aug-2015      **Coordinates** : N =1355703 / E =416189  
**TP No.** : TP-05      **TP depth (m)** : 0.70 m

*Total mass of dry soil* : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
15	0.0	1500.0	100.0
9.5	0.0	1500.0	100.0
4.75	11.2	1488.8	99.3
2	114.6	1377.2	91.8
0.425	646.4	730.8	48.7
0.075	120.5	410.5	27.4



*Table of percent of fine and coarse grained soil*

Type	Soil	Percent (%)
Fine	Clay and silt	27.37
Coarse	Sand	64.45
	Gravel	8.19

**Remarks:**

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

1-Sep-2015

Tested by

Calculated by

Mr. Kheng Channa

Mr. Hong Mayrang



**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226D, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-436  
 Website: www.magkh.com

## SPECIFIC GRAVITY

(ASTM D854-98)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)  
 Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
 Project : GEOTECHNICAL SERVICE FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT  
 Location : PK40+001, PK40+014, Chak Pras, K.P. Chhlong Other : L2S 2 00 m  
 Tested date : 30-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N = 1575963 / E = 418189  
 TP No. : TP-06 TP depth (m) : 0.70 m

a	Test Number	1	2	3
b	Pycnometer Number	C28	C8	C12
c	Mass of pycnometer (g)	69.93	115.45	83.92
d	Mass of pycnometer and dry soil (g)	138.31	132.69	105.34
e	Mass of oven-dried soil (g)	68.38	17.24	21.42
f	Mass of pycnometer filled with water (g)	336.4	329.06	337.88
g	Mass of pycnometer filled with water and soil (g)	375.80	331.02	345.88
h	Specific gravity $G_s$ (S.g.)	2.737	2.745	2.739
i	Average specific gravity	2.742		
j	Specific gravity at 20°C	2.737		

Tested by

M. Kheng Chhoun

2-Sep-2016

Calculated by

M. Hong Maysaeng



**MEKONG ADVANTECH GROUP CO., LTD.**  
4276B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
Email: info@magkh.com  
M/P: 017-309-436; Website: www.magkh.com

## MOISTURE CONTENT (AASHTO T265)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)

**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II

**Location** : PK45+000, PR1024, Teak Plos, Kampong Chhnang      **Offset** : RHP 2.50 m

**Tested date** : 29-Aug-2016    **Finished date** : 30-Aug-2016    **Coordinates** : N 1353224 / E 411945

**TP No.** : TP-10      **TP depth (m)** : 0.30 m

No.	Description		
1	Can number	50	67
2	Mass of can+wet soil (g)	107.85	84.75
3	Mass of can+dry soil (g)	104.15	82.16
4	Mass of can (g)	22.29	22.67
5	Mass of water (g)	3.70	2.59
6	Mass of dry soil (g)	81.85	59.49
7	Moisture content (%)	4.52	4.35
8	Average moisture content (%)	4.44	

2-Sep-2016

Tested by

Calculated by

Mr. Kheng Chhara

Mr. Hong Maysang

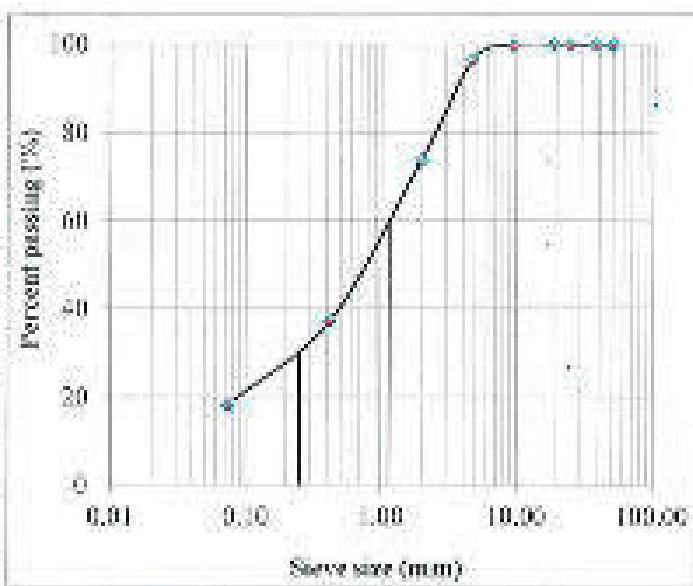


## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAC)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, FUSSEH  
**Location** : PK63+000, PRI534, Teak Phos, Kampong Chhnang Office : R/S 2.50 m  
**Tested date** : 30-Aug-2016 **Finalised date** : 30-Aug-2016 **Coordinates** : N 138224 / E 411945  
**TP No.** : TP-01 **TP depth (m)** : 0.75 m

*Total mass of dry soil* : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	0.0	1500.0	100.0
9.5	2.3	1497.5	99.8
4.75	49.5	1447.5	96.5
2	139.5	1168.5	77.9
0.425	547.9	566.4	37.4
0.075	185.6	274.8	18.3



*Table of percent of fine and coarse graded soil*

Type	Soil	Percent (%)
Fine	Clay and silt	18.32
Coarse	Sand	55.57
	Gravel	26.11

<b>Remarks:</b>
- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

Tested by

3-Sep-2016

Calculated by

Mr. Kheng Channe

Mr. Boj, Mugeang



**MEKONG ADVANTECH GROUP CO., LTD.**  
 3226B, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sak, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-436  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-93)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)  
 Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
 Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
 Location : PK43+000, PK1534, Teak Pass, K.P. Chhn. Offset : R/S 2.50 m  
 Tested date : 30-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N=1358224 / E=411945  
 TP No. : TP-10 TP depth (m) : 0.70 m (Sampling depth 20+mm)

a	Test Number	1	2	3
b	Pycnometer Number	C35	C12	C16
c	Mass of pycnometer (g)	70.77	99.17	89.4
d	Mass of pycnometer and dry soil (g)	129.34	117.05	123.74
e	Mass of oven-dried soil (g)	58.57	17.86	34.34
f	Mass of pycnometer filled with water (g)	351.76	336.76	336.92
g	Mass of pycnometer filled with water and soil (g)	388.95	348.12	358.70
h	Specific gravity $G_s(e+e-g)$	2.739	2.748	2.734
i	Average specific gravity	2.741		
j	Specific gravity at 20°C	2.735		

2-Sep-2016

Tested by

Calculated by

Mr. Kheng Channa

Mr. Hong Muanang



**MEKONG ADVANTECH GROUP CO., LTD.**  
 A356B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magh.com  
 M/P: 017 200 436; Website: www.magh.com

## MOISTURE CONTENT (AASHTO T263)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (SCI)

**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAGH)

**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II

**Location** : PK50+100, PR1534, Teak Phos, Kampong Chhnang **Offset** : LHS 2.20 m

**Tested date** : 29-Aug-2016 **Finished date** : 30-Aug-2016 **Coordinates** : N=1361452 / E=408157

**TP No.** : TP-11 **TP depth (m)** : 0.30 m

No.	Description		
1	Can number	55	75
2	Mass of wet soil (g)	85.46	106.69
3	Mass of can (dry soil) (g)	81.80	100.85
4	Mass of can (g)	23.76	12.86
5	Mass of water (g)	3.66	5.17
6	Mass of dry soil (g)	58.04	78.19
7	Moisture content (%)	6.30	6.61
8	Average moisture content (%)	6.41	

2-Sep-2016

Total by

Calculated by

Mr. Khang Chhann

Mr. Heng Mue Seng



**MEKONG ADVANTECH GROUP CO., LTD.**  
 V226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: [info@magkh.com](mailto:info@magkh.com)  
 M/P: 017-300-435  
 Website: [www.magkh.com](http://www.magkh.com)

## SIEVE ANALYSIS (AASHTO T27)

Study Team : KOBRA CONSULTANTS INTERNATIONAL (KCI)  
 Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
 Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
 Location : PK50+000, PR23, Koh Tean, Kamol Province      Offset : ± 1.018 ± 0.30 m  
 Tested date : 26-Aug-2016      Finished date : 29-Aug-2016      Coordinates : N = 1351492 / E = 408197  
 TP No. : TP-11      TP depth (m) : 0.70 m

Total mass of dry soil : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	0.0	1500.0	100.0
9.5	1.0	1481.0	98.7
4.75	63.6	1413.4	94.2
2	177.0	1240.4	82.7
0.425	31.8	1206.6	80.4
0.075	269.0	937.6	62.5

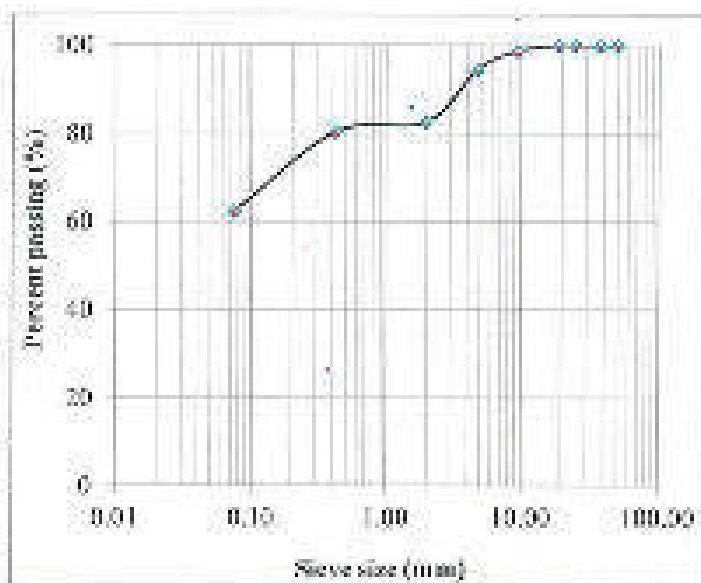


Table of percent of fine and coarse grained soil

Type	Soil	Percent (%)
Fine	Clay and silt	62.50
Coarse	Sand	20.39
	Gravel	17.11

**Remark:**

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 75mm
- Gravel > 75

Checked by

2-Sep-2016

Calculated by

Mr. Khang Channe

Mr. Hong Mignere



**MEKONG ADVANTECH GROUP CO., LTD.**  
 8226H, Street 42F, Sangkat Phnom Penh Thmey, Khan San Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-4136  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK20+003, PR 534, Teak Plee, K.P. Chhlong      **Offset** : LHS 2.30 m  
**Tested date** : 01-Sep-2016 **Finished date** : 01-Sep-2016 **Coordinates** : N = 1351492 / E = 408197  
**TP No.** : TP 13      **TP depth (m)** : 0.70 m

a	Test Number	1	2	3
b	Pycnometer Number	C13	8	C1
c	Mass of pycnometer (g)	83.94	45.83	110.52
d	Mass of pycnometer and dry soil (g)	133	65.34	142.91
e	Mass of oven-dried soil (g)	49.06	19.51	32.39
f	Mass of pycnometer filled with water (g)	331.43	153.25	138.27
g	Mass of pycnometer filled with water and soil (g)	362.56	165.57	158.77
h	Specific gravity $w/(e+(1-g))$	2.733	2.713	2.734
i	Average specific gravity	2.719		
j	Specific gravity at 20°C	2.713		

Tested by

Mr. Kheng Chhlong

2-Sep-2016

Calculated by

Mr. Hong Maysong





MEKONG ADVANTECH GROUP CO., LTD.  
#226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
Email: info@magh.com  
M/P: 017-300-436; Website: www.magh.com

## MOISTURE CONTENT

(AASHTO T265)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)

Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAGH)

Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II

Location : PK55+00; PR1534, Kamkar, Pursat Province Offset : RHS 1.50 m

Tested date : 29-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N =1364821/E =456123

TP No. : TP-12 TP depth (m) : 0.70 m

No.	Description		
1	Can number	75	151
2	Mass of can+wet soil (g)	85.11	89.01
3	Mass of can+dry soil (g)	81.75	85.01
4	Mass of can (g)	22.96	22.53
5	Mass of water (g)	3.36	4.00
6	Mass of dry soil (g)	58.79	62.50
7	Moisture content (%)	5.72	6.40
8	Average moisture content (%)	6.06	

2-Sep-2016

Tested by

Calculated by

Mr. Khang Chann

Mr. Heng Mueang

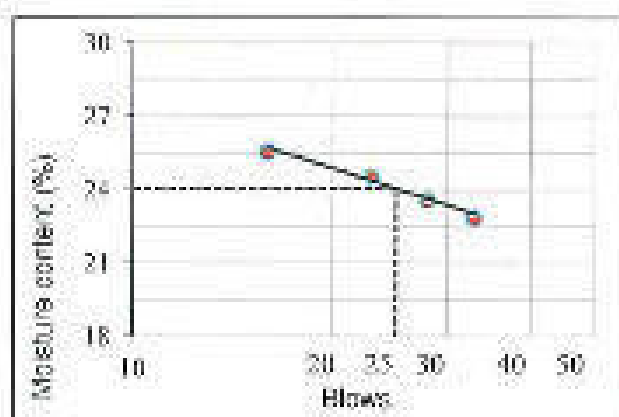


**MEKONG ADVANTECH GROUP CO., LTD.**  
 8226D, Street 42P, Sangkat Phnum Peah Thmey, Khan San Sak, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-436  
 Website: www.magkh.com

## ATTERBERG LIMITS (AASHTO T89 and T90)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : FEED TECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK55+000, PR 1534, Kaskay, Pursat Province Offbar : RHS 1.50 m  
**Tested date** : 31-Aug-2016 **Finished date** : 1-Sep-2016 **Coordinates** : N = 1361001 E = 104323  
**TP No.** : TP-12 **TP depth (m)** : 0.70 m

Number of blows	Liquid limit				Plastic limit	
	35	28	25	15	25	175
Can number	811	83	195	174	75	175
Mass of can + wet soil (g)	35.72	36.56	33.33	38.22	31.49	30.05
Mass of can + dry soil (g)	33.23	34.20	34.46	35.05	30.21	28.99
Mass of can (g)	32.36	32.74	32.78	32.67	22.63	22.50
Mass of water (g)	2.49	2.36	2.87	3.17	1.28	1.03
Mass of dry soil (g)	10.87	11.26	11.68	12.38	7.58	6.27
Moisture content (%)	22.91	23.62	24.57	25.6	15.85	16.37
Average moisture content (%)	22.91	23.62	24.57	25.6	16.53	



Liquid limit (LL) %	24.06
Plastic limit (PL) %	16.53
Plastic index (PI)	8.53

**Remark:**  
 PL = Plastic Limit; LL = Liquid Limit  
 PI = Plastic Index  
 AASHTO: American Association of State Highway and Transport Officials

Tested by

2-Sep-2016

Calculated by

Mr. Kheng Chhena

Mr. Hong Myung-gang



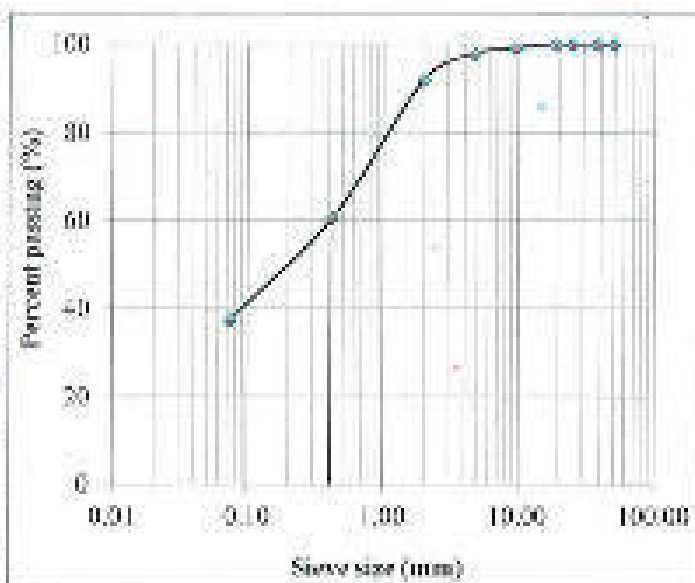
**MEKONG ADVANTECH GROUP CO., LTD.**  
 A226B, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sack, Phnom Penh  
 Email: [info@magh.com](mailto:info@magh.com)  
 M/P: 017-300-436  
 Website: [www.magh.com](http://www.magh.com)

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAGC)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK551000, PR1536, Kratie, Pursat Province **Offset** : R/LS 1.50 m  
**Tested date** : 20-Aug-2016 **Finished date** : 20-Aug-2016 **Coordinates** : N = 364501 / E = 404323  
**TP No.** : TP-12 **TP depth (m)** : 0.75 m

*Total mass of dry soil* : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	0.0	1500.0	100.0
9.5	12.4	1487.6	99.2
4.75	20.3	1469.7	97.9
2	87.9	1379.4	92.0
0.425	468.8	910.6	60.7
0.075	146.7	563.9	37.6



*Table of percent of fine and coarse grained soil*

Type	Soil	Percent (%)
Fine	Clay and silt	37.59
Coarse	Sand	54.37
	Gravel	8.04

**Remarks:**

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

Tested by

2-Sep-2016

Calculated by

Mr. Kheng Channa

Mr. Heng Myranta



**MEKONG ADVANTECH GROUP CO., LTD.**  
 P225D, Street 427, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 01 7-310-436  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL STUDY FOR THE PROJECT FOR PROVINCIAL ROAD IMPROVEMENT PROJECT PHASE II  
**Location** : PK55+000 PHUSI, Kradar, Preah Vihear ODBot + R/S 1.50 m  
**Tested date** : 01-Sep-2016 **Final date** : 01-Sep-2016 **Coordinates** : N = 1668017.0 = 164323  
**TP No.** : TP-12 **TP depth (m)** : 0.50 m

a	Test Number	1	2	3
b	Pycnometer Number	C30	5	9
c	Mass of pycnometer (g)	66.73	43.34	40.64
d	Mass of pycnometer and dry soil (g)	130.93	67.88	67.39
e	Mass of oven-dried soil (g)	64.21	24.64	26.95
f	Mass of pycnometer filled with water (g)	346.62	142.11	140.09
g	Mass of pycnometer filled with water and soil (g)	187.48	157.77	157.20
h	Specific gravity $G_s (F-g)$	2.743	2.744	2.739
i	Average specific gravity	2.741		
j	Specific gravity at 20°C	2.736		

2-Sep-2016

Tested by

Calculated by

Mr. Kheng Chanre

Mr. Hong Myndang



**MEKONG ADVANTECH GROUP CO., LTD.**  
#226D, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
Email: info@magkh.com  
MP: 017-300-436; Website: www.magkh.com

## MOISTURE CONTENT (AASHTO T265)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)

**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

**Project** : GROUND/PIEDestal SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT PHASE II

**Location** : PK60+000, PR1534, Kratie, Punt Province      **Offset** : LHS 2.50 m

**Tested date** : 25-Aug-2016      **Finished date** : 30-Aug-2016      **Coordinates** : N = 1367134 / E = 839853

**TP No.** : TP-13

**TP depth (m)** : 0.30 m

No.	Description		
1	Can number	N1	21
2	Mass of can + wet soil (g)	95.51	103.43
3	Mass of can + dry soil (g)	88.38	95.69
4	Mass of can (g)	21.83	22.68
5	Mass of water (g)	8.23	9.74
6	Mass of dry soil (g)	66.75	71.04
7	Moisture content (%)	13.83	13.71
8	Average moisture content (%)	13.77	

25-Sep-2016

Tested by

Calculated by

Mr. Kheng Channet

Mr. Hong Myong-ang

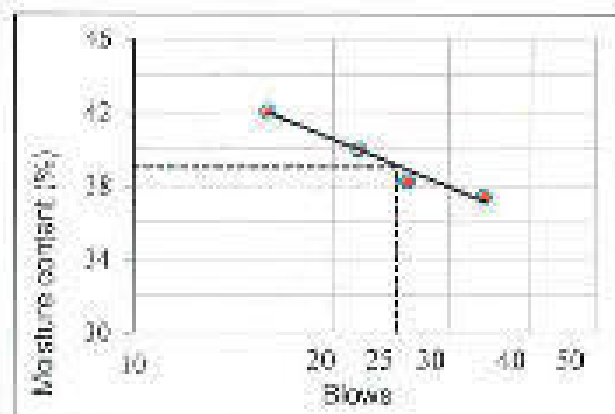


**MEKONG ADVANTECH GROUP CO., LTD.**  
 V22618, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-456  
 Website: www.magkh.com

## ATTERBERG LIMITS (AASHTO T89 and T90)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK90+000, PR-514, Kndok, Pnomol Province, Offset : LHS 2.50 m  
**Tested date** : 11-Aug-2016 **Finished date** : 1-Sep-2016 **Coordinates** : N = 1367134 / E = 389932  
**TP No.** : TP-13 **TP depth (m)** : 0.70 m

Number of blows		Liquid limit				Plastic limit	
		34	26	22	16		
Cum number		191	6	53	195	129	171
Mass of can+wet soil	(g)	35.32	36.42	36.78	37.54	36.82	36.77
Mass of can+dry soil	(g)	31.85	31.51	32.67	33.04	30.77	29.05
Mass of can	(g)	22.62	22.90	22.40	22.73	22.68	22.54
Mass of water	(g)	3.46	3.91	4.11	4.54	3.53	3.72
Mass of dry soil	(g)	9.24	10.21	10.27	10.31	7.59	6.51
Moisture content	(%)	37.45	38.36	40.02	42.10	20.42	20.28
Average moisture content	(%)	37.45	38.36	40.02	42.10	20.35	



Liquid limit (LL, %)	39.00
Plastic limit (PL, %)	20.35
Plastic index (PI)	18.65

**Remarks:**  
 PL = Plastic Limit; LL = Liquid Limit;  
 PI = Plastic Index  
 AASHTO: American Association of State  
 Highway and Transport Officials

Tested by

2-Sep-2016

Checked by

Mr. Kheng Chhara

Mr. Heng Mystrang



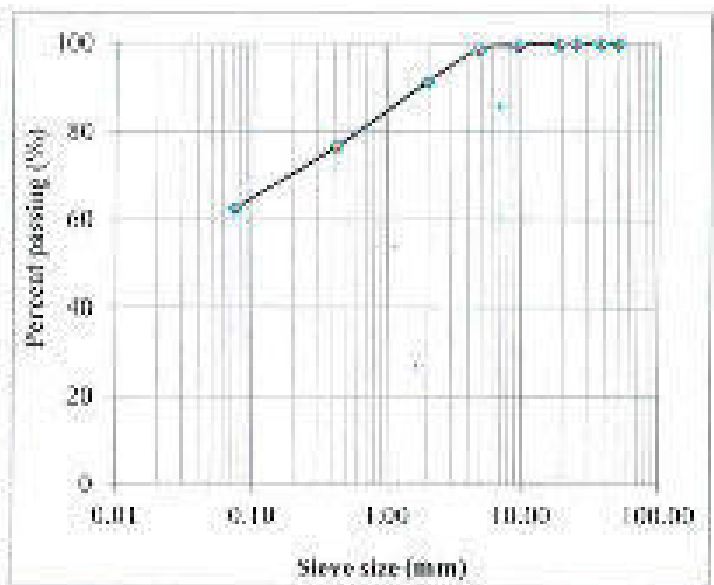
**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226B, Street #2P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-100-435  
 Website: www.magkh.com

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT PHASE II  
**Location** : PK60+000, PR1554, Kambar, Pursat Province      **Offset** : LHS 2.50 m  
**Tested date** : 30-Aug-2015      **Finished date** : 30-Aug-2015      **Coordinates** : N = 1362134 / E = 109652  
**TP No.** : TP-13      **TP depth (m)** : 0.70 m

**Total mass of dry soil** : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	0.0	1500.0	100.0
9.5	5.7	1494.3	99.6
4.75	15.4	1484.6	98.6
2	106.3	1393.6	92.9
0.625	218.6	1152.0	76.8
0.075	211.7	940.3	62.7



*Table of percent of fine and coarse grained soil*

Type	Soil	Percent (%)
Fine	Clay and silt	62.69
Coarse	Sand	28.09
	Gravel	8.60

### **Remarks:**

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

2-Sep-2015

Tested by:

Calculated by:

Mr. Kheng Channe

Mr. Hang Myeung



**MEKONG ADVANTECH GROUP CO., LTD.**  
 4226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magh.com  
 M/P: 017-300-436  
 Website: www.magh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEO-TECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT (PHNOM)  
**Location** : PK94+000, PR1534, Kndak, Preah Vihear **Office** : LHS 2.50 m  
**Tested date** : 01-Sep-2016 **Finished date** : 01-Sep-2016 **Coordinates** : N=1367114.7/E=399953  
**TP No.** : TP-13 **TP depth (m)** : 0.70 m

a	Test Number	1	2	3
b	Pycnometer Number	C19	C34	C13
c	Mass of pycnometer (g)	71.53	78.04	83.93
d	Mass of pycnometer and dry soil (g)	122.84	133.67	132.01
e	Mass of oven-dried soil (g)	51.31	55.59	28.09
f	Mass of pycnometer filled with water (g)	319.77	345.67	331.88
g	Mass of pycnometer filled with water and soil (g)	352.25	386.85	349.64
h	Specific gravity $e/(e+(f-g))$	2.725	2.724	2.719
i	Average specific gravity	2.724		
j	Specific gravity at 20°C	2.716		

1-Sep-2016

Tested by

Calculated by

Mr. Kheng Chann

Mr. Hong Maysong





**MEKONG ADVANTECH GROUP CO., LTD.**  
3226B, Street 42B, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
Email: info@magkh.com  
M/P: 017-300-436; Website: www.magkh.com

## MOISTURE CONTENT (AASHTO T265)

Study Team : KOREA CONSULTANTS INTERNATIONAL (KCI)

Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHNOM PENH

Location : PK73+000, PR1514, Kaekeo, Pursat Province Other : LHS 2.20 m

Tested date : 29-Aug-2016 Finished date : 30-Aug-2016 Coordinates : N=1340961 E=087512

TP No. : TP-44 TP depth (m) : 0.70 m

No.	Description		
1	Can number	185	581
2	Mass of can+wet soil (g)	95.79	96.46
3	Mass of can+dry soil (g)	93.15	94.19
4	Mass of can (g)	22.57	22.23
5	Mass of water (g)	2.44	2.27
6	Mass of dry soil (g)	94.28	91.95
7	Moisture content (%)	3.26	3.15
8	Average moisture content (%)	3.21	

3-Sep-2016

Tested by

Calculated by

Mr. Kheng Channe

Mr. Hong Myrseang



**MEKONG ADVANTECH GROUP CO., LTD.**  
 4236B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 MP: 017 266 135  
 Website: www.magkh.com

## SIEVE ANALYSIS (AASHTO-T27)

**Study Team** : KUREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-contract** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT I, PHASE II  
**Location** : PK05+000, PR1554, Kratie, Pinnat Province      **Offset** : L/S 220 m  
**Tested date** : 30-Aug-2016      **Finished date** : 30-Aug-2016      **Coordinates** : N = 1380861 / E = 317612  
**TP No.** : TP-14      **TP depth (m)** : 0.30 m

Total mass of dry soil : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
15	0.0	1500.0	100.0
9.5	5.4	1494.6	99.6
4.75	5.7	1494.3	99.6
2	21.5	1478.5	98.6
0.425	334.1	1165.9	77.7
0.075	789.2	710.8	47.4

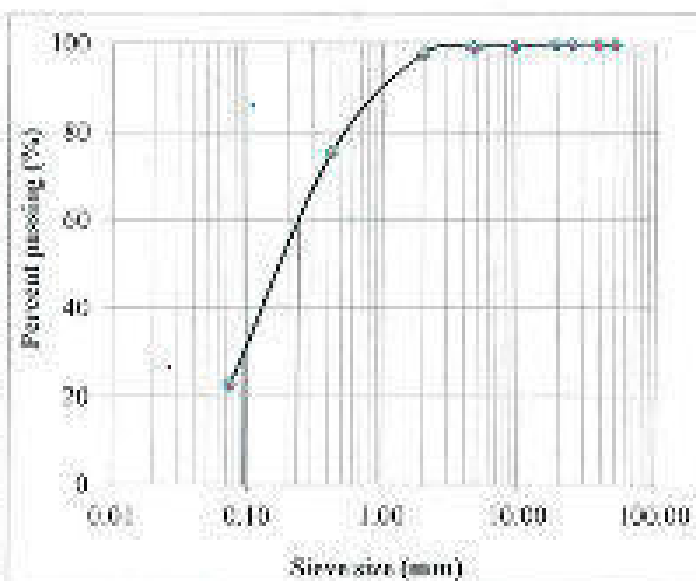


Table of percent of fine and coarse retained soil

Type	Soil	Percent (%)
Fine	Clay and silt	23.87
Coarse	Sand	74.85
	Gravel	2.24

**Remarks:**

Clay and Silt < 0.075mm  
 0.075mm < Sand < 2mm  
 Gravel > 2

1-Sep-2016

Tested by

Calculated by

Mr. Kheng Chanre

Mr. Heng Maysreng



**MEKONG ADVANTECH GROUP CO., LTD.**  
 #226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 MP: 011-300 436  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team** : KOKKA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAC)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II  
**Location** : PK73+000, PHU S4, Kndor, Preaek Pivon, Otdet  
 LHS 2.26 m  
**Tested date** : 01-Sep-2016 **Finished date** : 01-Sep-2016 **Coordinates** : N : 1340881 / E : 1057612  
**TP No.** : TP-14 **TP depth (m)** : 0.70 m

a	Test Number	1	2	3
b	Pycnometer Number	C60	5	A1
c	Mass of pycnometer (g)	72.98	43.2	41.7
d	Mass of pycnometer and dry soil (g)	129.32	65.47	63.37
e	Mass of oven-dried soil (g)	56.34	22.27	21.67
f	Mass of pycnometer filled with water (g)	120.53	142.11	139.96
g	Mass of pycnometer filled with water and soil (g)	156.15	156.18	154.93
h	Specific gravity $G_s$ (±0.01)	2.719	2.716	2.721
i	Average specific gravity	2.718		
j	Specific gravity at 20°C	2.713		

2-Sep-2016

**Tested by** **Calculated by**

Mr. Kheng Chané

Mr. Hong Muey-wong



**MEKONG ADVANTECH GROUP CO., LTD.**  
A226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
Email: [info@magkh.com](mailto:info@magkh.com)  
MP: 017-300-636; Website: [www.magkh.com](http://www.magkh.com)

## MOISTURE CONTENT (AASHTO T265)

Study Team : KORISA CONSULTANTS INTERNATIONAL (KCI)

Sub-consultant : MEKONG ADVANTECH GROUP CO., LTD. (MAG)

Project : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHASE II

Location : PEKOUHOL, PEKOUH, Kerkor, Pursat Province      Offset : R15 0.3 m

Tested date : 29-Aug-2016      Finished date : 30-Aug-2016      Coordinates : N 1383122 / E 387324

TP No. : 13-15      TP depth (m) : 0.70 m

No.	Description		
1	Can number	240	39
2	Mass of can+wet soil (g)	87.94	102.50
3	Mass of can+dry soil (g)	85.07	99.34
4	Mass of can (g)	22.49	22.68
5	Mass of water (g)	2.87	3.16
6	Mass of dry soil (g)	62.58	76.66
7	Moisture content (%)	4.63	4.12
8	Average moisture content (%)	4.37	

2-Sep-2016

Tested by

Calculated by

Mr. Khang Channe

Mr. Hong Mayseng

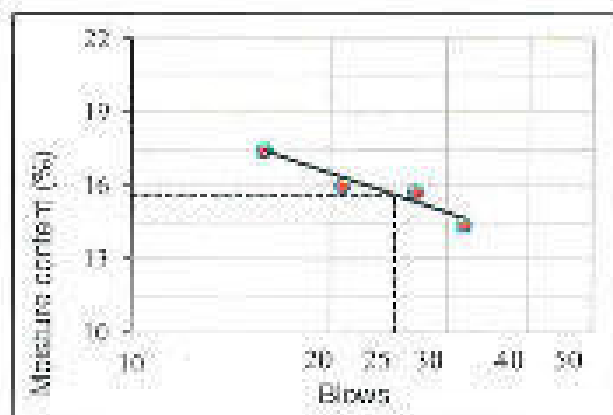


**MEKONG ADVANTECH GROUP CO., LTD.**  
 V226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 M/F: 017-300-436  
 Website: www.magkh.com

## ATTERBERG LIMITS (AASHTO T89 and T90)

**Study Team** : KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT PHASE II  
**Location** : PK30+000, PR1534, Kratie, Phnom Province      **Offset** :      **RHS 0.80 m**  
**Tested date** : 11-Aug-2016      **Finished date** : 1-Sep-2016      **Coordinates** : N = 1345122.72 = 387124  
**TP No.** : TP-15      **TP depth (m)** : 0.20 m

Number of blows		Liquid limit				Plastic limit	
		32	27	21	16		
Cut number		23	8	94	3	28	11
Mass of rem-wet soil	(g)	36.15	35.86	36.78	36.15	31.57	30.51
Mass of rem-dry soil	(g)	31.45	35.74	36.12	36.70	30.77	29.74
Mass of rem	(g)	22.67	23.30	22.67	23.66	23.42	23.61
Mass of water	(g)	1.70	2.12	2.15	2.45	0.90	0.77
Mass of dry soil	(g)	11.78	13.44	13.43	14.04	8.33	7.11
Moisture content	(%)	14.43	15.77	15.06	17.45	10.78	10.83
Average moisture content	(%)	14.43	15.77	15.06	17.45	10.80	



Liquid limit (LL) (%)	15.86
Plastic limit (PL) (%)	10.80
Plastic index (PI)	4.85

**Remark:**  
 PL – Plastic Limit; LL – Liquid Limit;  
 PI – Plastic Index  
 AASHTO: American Association of State  
 Highway and Transport Officials

Tested by

1-Sep-2016

Calculated by

Mr. Kheng Chhann

Mr. Hong Mayvong



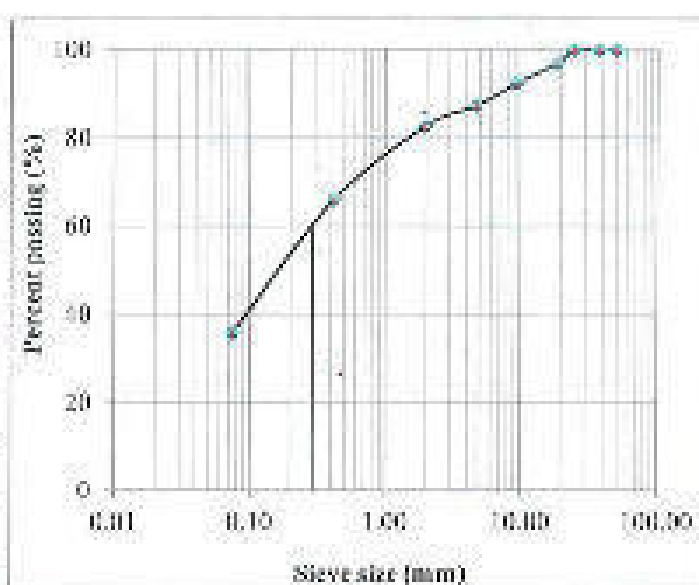
**MEKONG ADVANTECH GROUP CO., LTD.**  
 5226H, Street 42P, Sangkat Phnom Penh Thmey, Khan San Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-300-436  
 Website: www.magkh.com

## SIEVE ANALYSIS (AASHTO T27)

**Study Team** : KORDA CONSULTANTS INTERNATIONAL (KCI)  
**Subconsultant** : MEKONG ADVANTECH GROUP CO., LTD. (MAGK)  
**Project** : GEOTECHNICAL SURVEY FOR FUTURE PROJECT OF PROVINCIAL ROAD IMPROVEMENT PROJECT, PHNOM  
**Location** : PK80+000, PR1314, Kaskas, Pursat Province **Offset** : RHS 0.8 m  
**Tested date** : 30-Aug-2016 **Finished date** : 30-Aug-2016 **Coordinates** : N =1585123 / E =187324  
**TP No.** : TP-15 **TP depth (m)** : 0.70 m

*Total mass of dry soil* : 1500.0 g

Sieve size (mm)	Mass of retaining (g)	Mass of passing (g)	Percent passing (%)
50	0.0	1500.0	100.0
37.5	0.0	1500.0	100.0
25	0.0	1500.0	100.0
19	45.0	1455.0	97.0
9.5	88.7	1411.3	93.4
4.75	76.5	1403.5	87.3
2	70.2	1359.8	82.6
0.425	248.2	991.8	56.1
0.075	452.1	539.3	36.0



*Table of percent of fine and coarse grained soil*

Type	Soil	Percent (%)
Fine	Clay and silt	35.95
Coarse	Sand	46.60
	Gravel	17.36

### Remarks

- Clay and Silt < 0.075mm
- 0.075mm < Sand < 2mm
- Gravel > 2

2-Sep-2016

Tested by

Checked by

Mr. Kheng Chhann

Mr. Hong Moukang



**MEKONG ADVANTECH GROUP CO., LTD.**  
 A226B, Street 42P, Sangkat Phnom Penh Thmey, Khan Sen Sok, Phnom Penh  
 Email: info@magkh.com  
 M/P: 017-309-436  
 Website: www.magkh.com

## SPECIFIC GRAVITY (ASTM D854-98)

**Study Team :** KOREA CONSULTANTS INTERNATIONAL (KCI)  
**Sub-consultant :** MEKONG ADVANTECH GROUP CO., LTD. (MAG)  
**Project :** GEOTECHNICAL SURVEY FOR HIGHWAY PROJECT FOR PROVINCIAL ROAD IMPROVEMENT PROJECT (Phase II)  
**Location :** PC85+000, PHUSIA, Kratie, Pursat Province **Offset :** - R/S 0.50 m  
**Tested date :** 01-Sep-2016 **Finished date :** 01-Sep-2016 **Coordinates :** + N = 138122 / E = 383724  
**TP No. :** TP-15 **TP depth (m) :** 0.50 m

a	Test Number	1	2	3
b	Pycnometer Number	C8	C15	C6
c	Mass of pycnometer (g)	115.36	117.53	115.49
d	Mass of pycnometer and dry soil (g)	166.34	157.60	136.70
e	Mass of oven-dried soil (g)	50.98	40.38	15.21
f	Mass of pycnometer filled with water (g)	320.06	328.26	339.12
g	Mass of pycnometer filled with water and soil (g)	352.58	341.22	348.75
h	Specific gravity $G_s$ (20°C)	2.762	2.747	2.731
i	Average specific gravity	2.739		
j	Specific gravity at 20°C	2.733		

1-Sep-2016

Tested by

Calculated by

Mr. Kheng Chanin

Mr. Heng Myaeweng





**Provincial Roads Improvement Project  
ADB Loan No. 2839-CAM/8254-CAM**

**Feasibility Study on Second Provincial Roads  
Improvement Project**

**Appendix-II B**

**Table 2D-1 Summary of Additional Laboratory Test  
Results for PR 312 (Existing Subgrade/Subbase Below  
Base Course and for Base Course Materials)**



APPENDIX II B

Table 2-D-1 Summary of Additional Laboratory Tests Results for Samples Collected from Project Roads

Laboratory Test results														
Ref. No.	Location (km)	Offset (m)	Test Pit No.	DMC (%)	MRD (kg/cm <sup>2</sup> )	% passing by weight (ASTM T 27)				Atterberg Limits (ASTM T 85 & 90)		Class- cation ASTM M 145	4 days soaked California at 80% RDD	Remarks
						2.0 mm sieve	0.425 mm sieve	0.075mm sieve	LL (%)	PL (%)				
PR 312 (Ch 27+100) at MR to Baniay Original Border	3+000	LHS 1.0	1	8.92	2.198	42.0	26.0	6.0	21.30	0.13	A-1-4	68	Sample from existing subgrade Sub-base	
	15+000	RHS 2.0	2	8.06	2.184	44.0	25.0	13.0	22.20	0.18	A-2-4	74		
	25+000	LHS 1.5	3	8.90	2.102	23.0	45.0	3.0	18.25	4.22	A-1-5	107		
	3+000	LHS 1.0	1	8.90	2.181	35.0	17.0	6.0	21.50	7.29	A-2-4	122	Sample from existing base course	
	15+000	RHS 2.0	2	7.40	2.178	47.0	28.0	19.0	22.50	0.13	A-2-4	50		
	25+000	LHS 1.5	3	8.90	2.296	17.0	9.0	4.0	10.70	0.18	A-2-4	145		
PR 1034 (Tbox) from Ch 27+500 to MR33 to New Mount about 50 Mts at Pursaq	3+000	LHS 1.0	1	7.25	2.150	94.0	55.0	30.0	18.30	7.15	A-2-4	11	Sample from existing subgrade	
	45+000	RHS 1.5	2	7.30	2.143	83.0	80.0	31.0	20.00	8.54	A-2-4	28		
	60+000	LHS 1.5	3	11.85	1.863	69.0	70.0	96.0	64.00	27.00	A-1-5	4		
	3+000	LHS 1.5	1	8.87	2.340	46.0	27.0	14.0	15.80	3.38	A-1-5	47	Sample from existing sterile wearing surface	
	45+000	RHS 1.5	2	9.30	2.102	62.0	35.0	25.0	20.40	10.41	A-2-5	29		
	60+000	LHS 1.5	3	8.80	2.180	47.0	31.0	20.0	24.80	0.24	A-2-4	50		

### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg No:  
Road No.: PR312 Sample Date : 17-09-2016 Test Date : 21-09-16  
Sample Location: PK 5+000 LHS 1.0m PU Sample No.:  
Sample Description: Sub base Material Lab No: PR312/004 Depth :  
Borrow Pit Qty =

#### DATA SHEET

#### CBR CALCULATIONS

No of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	52.62	127.43	74.77	121.34
30	73.40	146.79	104.28	139.60
65	98.32	196.65	138.70	187.28

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level =

70.36 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level =

105 Kg/cm<sup>2</sup>

#### Summary For Lab Test Result of Base Course Material.

Grade	Gradation		PI (%)	LL (%)	MDD (g/cc)	OMC (%)	Soundness (%)	LAA (%)	CBR at 95% of MDD
	Passing Sieve in mm(%)								
	0.425	0.275							
B	19.92	6.17	6.13	21.50	2.136	6.50	-	-	96
Specification Requirement			PI ≤ 6	LL ≤ 25	-	-		LAA ≤ 40	CBR ≥ 80

Remarks:

Contractor:	Casultant:		
Tested by	Inspected by	Date:	
Contractor's representative	Checked by:	Date:	
	Approved by:	Date:	

### Moisture-Density Relationship AASHTO T-155 for CBR Test.

Consultant: \_\_\_\_\_ Contractor: \_\_\_\_\_ Contract Pkg. No.: \_\_\_\_\_  
 Base No.: PR312 Sample Date: 17/09/2016 Test Date: 21/09/16  
 Sample Location: PK 3+000 LHS 1.0m PR Sample No.: \_\_\_\_\_  
 Sample Description: Sub base Material Lab No: PR312/004 Depth: \_\_\_\_\_

Below PR Qty = \_\_\_\_\_

Weight of Hammer: 4.54 kg Free fall height = 457 mm with a flat circular face of dia: 50.8 mm

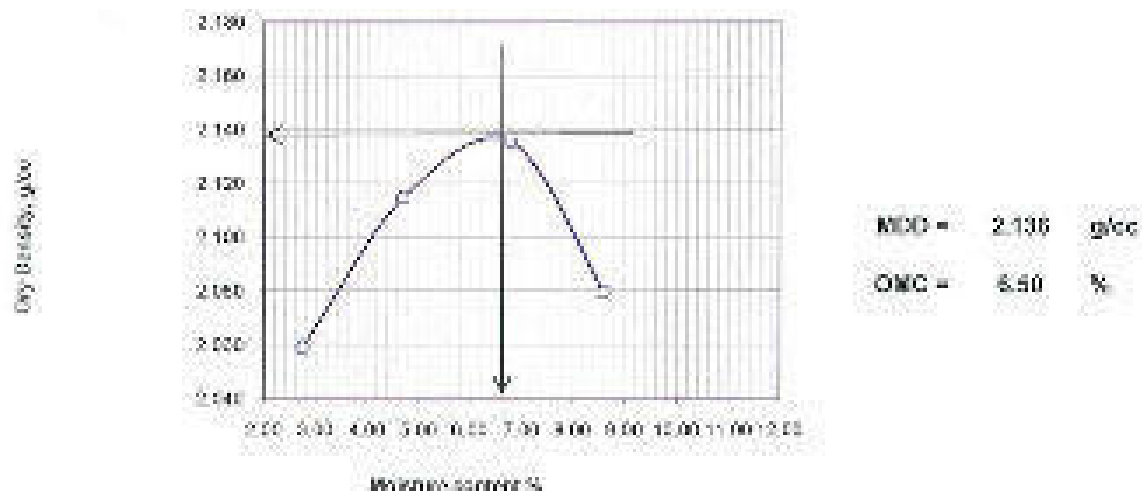
#### Determination of Density

Trial No.			1	2	3	4	5
$W_1$	Wt. of wet compacted material (moist)	g	1218.1	1219.1	1233.7	1249.1	
$W_2$	Wt. of Mould	g	769.7	759.7	759.7	759.7	
$W_3$	Wt. of wet compacted material ( $W_1 - W_2$ )	g	458.4	459.4	473.7	489.4	
$V_m$	Volume of Mould (by filling water)	cc	2165.70	2166.70	2166.70	2166.70	
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	2.117	2.115	2.281	2.259	
$\gamma_{dry}$	Dry Density = $\gamma_{wet} / (1 + m_w / 100)$	g/cc	2.060	2.116	2.136	2.050	

#### Determination of Moisture Content:

Can No.							
$m_1$	Wt. of weight material + Can	g	141.00	151.00	132.00	149.00	
$m_2$	Wt. of dry material + Can	g	137.50	145.00	124.70	138.80	
$m_3$	Weight of water ( $m_1 - m_2$ )	g	3.40	6.00	7.30	10.40	
$m_4$	Weight of can	g	15.00	10.00	17.20	18.00	
$m_5$	Weight of dry material ( $m_2 - m_4$ )	g	122.50	127.00	107.50	120.80	
$m_6$	Moisture Content ( $m_3 / m_5 \times 100$ )	%	2.77	4.72	6.79	8.52	

#### Moisture Density Relationship



Computation:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Consultant:	Contractor:	Contract Pkg. No.:
Road No.: PR312	Sample Date : 17-09-2016	Test Date : 21-09-16
Sample Location: PK 5+000 LHS 1.0m		Pit/Sample No.:
Sample Description: Sub base Material	Lab No: PR312/004	Depth :

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		A1	A2	A3
Wt. of compacted wet materials +Mould	g	12166	12074	12034
Wt of Mould	g	7832	8086	8118
Wt of wet compacted materials in mould	g	4333	4638	4816
Volume of Mould	cc	2060.3	2124	2112.7
Wet Density = Wt of wet compacted materials/Volume of mould	g/cc	2.113	2.184	2.280
Moisture Content	%	6.20	6.88	6.64
Dry Density=(Wet Density/(1+m/100))	g/cc	1.990	2.048	2.138

#### MOISTURE DETERMINATION

No. of blows per layer		10		30		65	
Moisture Can No.		E1	A7	A23	A24	A21	A33
Wt of Can + Wet Materials	g	155.80	173.00	148.00	138.00	147.00	144.00
Wt of can + Dry Materials	g	150.80	164.00	140.00	119.00	138.00	136.00
Wt of Moisture	g	8.40	9.00	8.00	7.00	8.00	8.00
Wt of can	g	16.10	18.00	18.00	17.00	18.00	18.00
Wt of dry materials	g	134.50	146.00	124.00	102.00	120.00	118.00
Moisture content	%	6.25	6.16	6.45	6.86	6.50	6.78
Average Moisture Content	%	6.20		6.66		6.64	

Note:

MDD = 2.136 g/cc      OMC = 6.60 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Consultant:		Contractor:		Contract Pkg No:							
Road No.: PR312		Sample Date: 17-09-2016		Test Date: 21-09-16							
Sample Location: PK 5+000 L+R 1.0m				P/Sample No:							
Sample Description: Sub base Material		Lab No: PRS/2004		Depth:							
Borrow Pit Qty: #											
<b>CBR Test (T193): Swell and Penetration Data</b>											
<b>SWELL DATA</b>		Surcharge Weight: 4.514 kg									
Date	Time	Remarks	Mold No/1	Height =	117	Mold No/2	Height =	117	Mold No/3	Height =	117
			Reading in mm		Swell %	Reading in mm		Swell %	Reading in mm		Swell %
19/09/16	3	Start	2.73		0	4.30		0	5.855		0
	24h		3.02		0.25	4.02		0.19	5.935		0.12
	48h		3.15		0.50	4.60		0.26	5.982		0.15
	72h		3.20		0.46	4.81		0.26	5.932		0.15
22/09/16	96h	Ended	3.20		0.40	4.61		0.20	5.991		0.16

Penetration		Proving Ring Reading and Stress								
		(10 Blows)			(25 Blows)			(50 Blows)		
inch	mm	Test Reading	Load in lb	Stress in kg/cm <sup>2</sup>	Test Reading	Load in lb	Stress in kg/cm <sup>2</sup>	Test Reading	Load in lb	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	4.334	0.000	0	0.0000	0.000	0	0.0000	0.000
0.005	0.04	0	1.979	0.000	0	1.9404	0.004	0	2.3957	0.243
0.010	0.27	10	4.410	10.000	10	4.2667	22.157	20	8.0213	26.041
0.015	0.41	20	6.336	26.205	24	6.9352	47.234	48	12.0943	53.722
0.020	0.84	30	8.807	42.625	40	11.4022	73.066	74	16.6673	66.323
0.030	2.01	70	18.183	101.022	67	22.3746	123.483	117	30.7610	162.025
0.040	6.06	100	24.183	127.424	106	27.8836	149.781	142	37.3548	198.649
0.050	8.86	110	24.442	155.120	107	28.2600	173.073	150	44.6804	225.454
0.060	7.62	124	32.032	171.710	109	36.3445	182.407	186	48.0601	257.527
0.080	8.89	140	44.715	187.247	104	37.0605	189.413	190	50.7435	267.371
0.400	10.16	157	35.220	189.221	145	39.1751	226.339	200	62.6843	270.555

10 Blows

25 Blows

50 Blows

Contractor:		Consultant:	
Tested by:		Inspected by:	Date:
Contractor's representative:		Checked by:	Date:
		Approved by:	Date:

# Determination of California Bearing Ratio(CBR) ( AASHTO T 193)

Contract:

Condition:

Contract Pkg.No.:

Road No.: PR212

Sample Date: 17-02-2016

Test Date: 21-09-16

Sample Location: PK 5+000 LHS 1.0m

Lab No: PR312004

Sample Description: Sub base Material

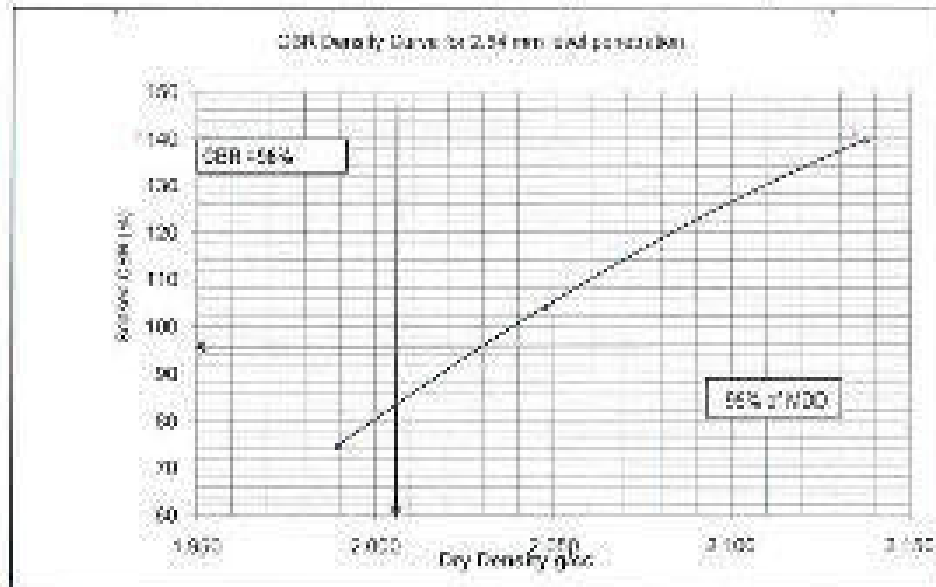
CBR Calculation :	10 Blows	30 Blows	60 Blows
CBR Calculations from corrected load / stress	Stress at 2.54mm = 52.025 kg/cm <sup>2</sup>	Stress at 2.54mm = 75.12575 kg/cm <sup>2</sup>	Stress at 2.54 mm = 98.325 kg/cm <sup>2</sup>
	CBR = 74.77 %	CBR = 104.28 %	CBR = 139.732 %
	Stress at 5.08mm = 107.04 kg/cm <sup>2</sup>	Stress at 5.08mm = 146.791 kg/cm <sup>2</sup>	Stress at 5.08mm = 190.645 kg/cm <sup>2</sup>
	CBR = 121.34 %	CBR = 189.50 %	CBR = 187.26 %

Moisture-Density Data from direct "CBR MDT"

No. of blows	10	30	60
Dry Density (g/cc)	1.915	2.048	2.138
Corrected CBR (%)	74.77	104.28	139.73

Corresponding CBR from 2.5mm penetration level

Plotting value for 95% of Maximum Dry Density (MDD)	1.925	g/cc	CBR Result (%)
Plotting value for 95% of Maximum Dry Density (MDD)	2.075	g/cc	95



Contractor:

Consultant:

Tested by:

Inspected by:

Date:

Contractor's representative:

Checked by:

Date:

Approved by:

Date:



### Sieve Analysis of Fine and Coarse Aggregate

Consultant:

Contractor:

Contract Pkg No.:

Road No.: PR312

Sample Date: 17-09-2016

Test Date: 21-09-16

Sample Location: PK 5+000 LHS 1.0m 0

Pile/Sample No.:

Sample Description: Subbase Material

Lab No: PR312/004

Depth:

Test Method: AASHTO T27/T89

Borrow Pit Qty: 7

Weight of dry soil + weight of can:

g

Weight of Can:

g

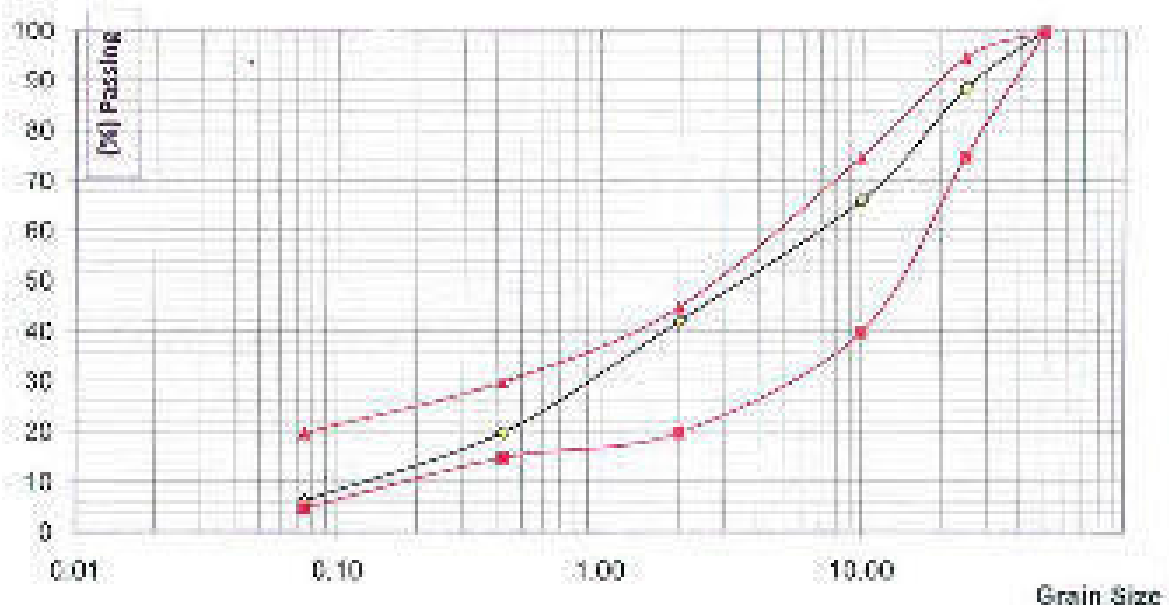
Weight of dry soil:

4663.00

g

ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	532.00	532.00	11.43	88.57	89	75-85
3/8"	10.00	1045.00	1581.00	33.88	66.02	66	40-75
#10	2.000	1117.00	2698.00	57.86	42.02	42	20-45
#40	0.425	1002.00	3701.00	80.19	19.82	20	15-30
#200	0.075	636.00	4366.00	93.63	6.17	6	5-20
Pan	0.075	267.00					

### Grade B



Contractor	Consultant	
Tested by:	Inspected by:	Date:
Contractor's representative	Checked by:	Date:
	Approved by:	Date:

### Plasticity Index Test AASHTO T-89 and T-90

Consultant:

Contractor:

Contract Pkg No.:

Road No: PR314D, NR13

Sample Date : 17-09-2016

Test Date : 21-09-16

Sample Location: PK 5+000 LH-S 1.0m

PR/Sample No.:

Sample Description: Base Course Material

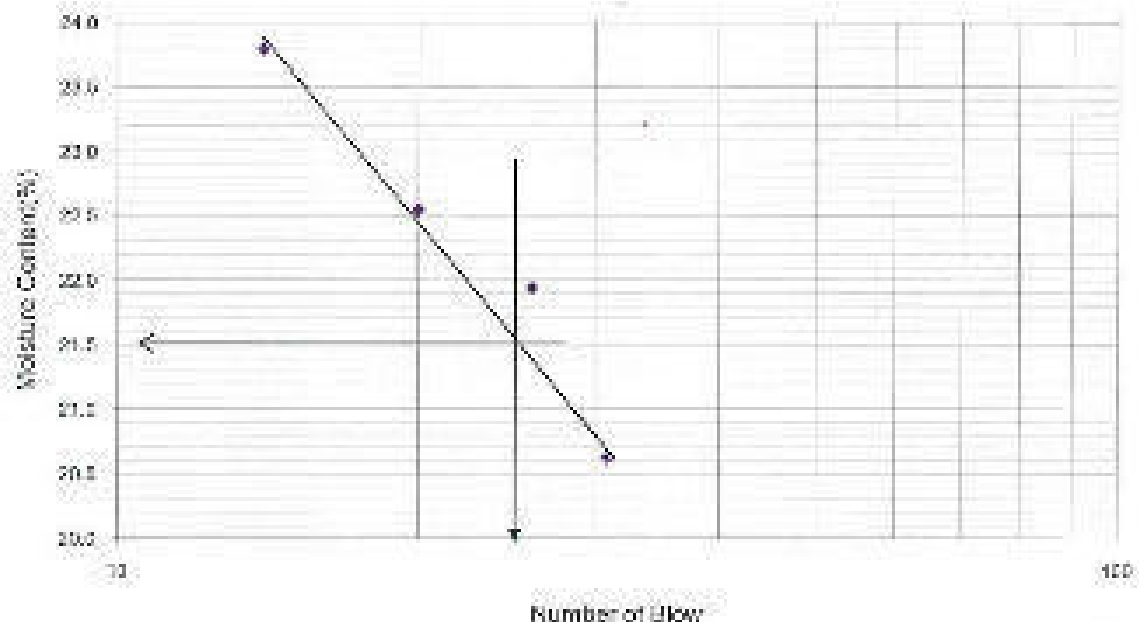
Lab No: PR312/004

Depth :

Reinw Fill Qty =

Data Sheet

Liquid Limit (LL)				Plastic Limit (%)					
Number of Blows				14	20	26	31	36	
Can Number				N4	N5	N1	N2		N3, N6
W1	Weight of can + Wet soil	g		25.70	26.40	25.10	25.30		30.00, 30.60
W2	Weight of can + Dry soil	g		22.70	23.40	22.40	22.70		27.30, 27.60
W3	Weight of can	g		19.10	18.10	16.10	16.10		10.20, 9.90
W4	Weight of water = (W1-W2)	g		3.00	3.00	2.70	2.60		2.70, 3.00
W5	Weight of dry soil = (W2-W3)	g		12.60	13.30	12.30	12.60		17.10, 17.70
W6	Moisture content = (W4/W5*100)	%		23.81	22.55	21.95	20.63		15.75, 16.85
LL	Liquid limit (from graph)	%		21.60					16.37
PI	Plastic Index	%		5.13					



Contractor:	Consulting:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg. No.:  
 Road No.: PR312 Sample Date : 17-08-2016 Test Date : 18-08-16  
 Sample Location: PK 15+000/RHS 2m Pit/Sample No.:  
 Sample Description: Sub-base Material Lab No: PR312/002 Depth:   
 Borrow Pt. Qty =

#### DATA SHEET

#### CBR CALCULATIONS

No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	18.00	55.39	25.50	52.78
30	58.16	93.32	82.64	93.64
65	70.63	109.40	100.35	104.18

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level = 70.35 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 105 Kg/cm<sup>2</sup>

#### Summary For Lab Test Result of Base Course Material.

Grade	Gradation		PI (%)	LL (%)	MDD (g/cc)	OMC (%)	Soundness (%)	LAA (%)	CBR at 95% of MDD
	Passing Sieve in mm(%)								
	0.425	0.075							
B	25.34	14.89	6.10	22.20	2.164	6.08			74
Specification Requirement			or PI ≤ 6	LL ≤ 25	-	-		LAA ≤ 40	CBR ≥ 80

Remarks:

Contractor	Consultant:		
Tested by	Inspected by:	Date:	
Contractor's representative	Checked by:	Date:	
	Approved by:	Date:	

Moisture-Density Relationship AASHTO T-180 for CBR Test.						
Consultant:		Contractor:		Contract Pkg.No.:		
Road No.: PR312		Sample Date : 17/09/2016		Test Date : 19/09/16		
Sample Location: PK 10+000 RHS 2m				PI'Sample No.		
Sample Description: Sub-base Material		Lab No: PR312/032		Depth :		
Borrow Pit Qty =						
Weight of Rammer : 4.54 kg Free fall Height = 457 mm with a flat circular base of dia. 50.8 mm						
Determination of Density						
Trial No.			1	2	3	4
$W_1$	Wt of wet compacted material + mold	g	12140	12470	12652	12628
$W_2$	Wt of Mold	g	7587	7587	7587	7587
$W_3$	Wt of wet compacted materials ( $W_1 - W_2$ )	g	4593.0	4881.0	5065.0	5032.0
$V_m$	Volume of Mold by filling water	cc	2165.70	2165.70	2165.70	2165.70
$\gamma_{wet}$	Wet Density = $(W_1 - W_2) / V_m$	g/cc	2.121	2.251	2.339	2.323
$\gamma_{dry}$	Dry Density = $\gamma_{wet} / (1 + m_w / 100)$	g/cc	2.097	2.104	2.164	2.099
Determination of Moisture Content :						
Can Nos						
$m$	Wt of wet material + Can	g	154.00	150.00	159.00	151.00
$m_1$	Wt of dry material + Can	g	145.50	150.00	157.80	147.00
$m_2$	Weight of water ( $m - m_1$ )	g	8.45	8.10	11.40	14.00
$m_3$	Weight of can	g	17.20	15.80	16.10	16.00
$m_4$	Weight of dry material ( $m_1 - m_3$ )	g	124.40	135.00	141.00	131.00
$m_5$	Moisture Content ( $m_2 / m_4$ ) x 100	%	6.79	6.00	8.08	10.69
<p>Moisture Density Relationship</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div> <p>Y-axis: Dry Density, g/cc</p> <p>X-axis: Moisture Content, %</p> </div> <div> <p>MDD = 2.164 g/cc</p> <p>OMC = 8.08 %</p> </div> </div>						
Computer: Tested by: Contractor's representative:			Gasutant: Inspected by: Checked by: Approved by:			
					Date	
					Date	
					Date	

### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Consultant:	Contractor:	Contract Pkg.No:
Road No: PR312	Sample Date : 17-09-2016	Test Date : 19-09-16
Sample Location: PK 15+000 RHS 2m		PinSample No:
Sample Description: Sub base Material	Lab No: PR312/002	Depth:

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		F1	F2	F3
Wt. of compacted wet materials +Mould	g	12704	12939	13248
Wt of Mould	g	6144	6163	6354
Wt of wet compacted materials in mould	g	4660	4746	4892
Volume of Mould	cc	2109	2111.1	2114.7
Wet Density = Wt of wet compacted materials/volume of mould	g/cc	2.162	2.249	2.313
Moisture Content	%	8.34	8.47	8.13
Dry Density=Wet Density/(1+mc/100)	g/cc	1.986	2.073	2.139

#### MOISTURE DETERMINATION

No. of blows per layer		10		30		65	
Moisture Can No.		A3	A20	A5	E5	E3	A8
Wet of Can+Wet Materials	g	161.00	161.00	164.00	159.00	159.00	149.00
Wt of can +Dry Materials	g	150.00	150.00	162.40	146.10	149.40	139.00
Wt of Moisture	g	11.00	11.00	11.60	10.90	10.60	10.00
Wt of can	g	18.20	18.00	17.90	17.00	16.10	17.90
Wt of dry materials	g	131.80	132.00	134.50	131.10	132.90	121.10
Moisture content	%	8.35	8.33	8.62	8.31	8.01	8.28
Average Moisture Content	%	8.34		8.47		8.13	

Note:

MDD = 2.164 g/cc      CMC = 8.99 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Consultant:		Contractor:		Contract Pkg No:							
Road No: FR312		Sample Date: 12-09-2013		Test Date: 18-09-16							
Sample Location: PK 13+000 R&IS 2m				Pkg Sample No:							
Sample Description: Sub base Material		Lab No: FR312/002		Depth:							
Barrow Pk City -											
<b>CBR Test (T193): Swell and Penetration Data</b>											
<b>SWELL DATA</b>		Sandbag Weight: 4.551 kg									
Date	Time	Remarks	Wt.No(F1)	Height -	11?	Wt.No(F2)	Height -	11?	Wt.No(F3)	Height -	11?
			Reading in mm	Swell %	Reading in mm	Swell %	Reading in mm	Swell %			
16/09/16	0	Start	2.73	0	4.35	0	0.500	0			
	24h		1.02	0.25	4.53	0.19	5.550	0.19			
	48h		1.19	0.26	4.61	0.26	5.550	0.16			
	72h		1.20	0.40	4.61	0.26	5.550	0.16			
22/09/16	88h	Ended	1.20	0.40	4.61	0.26	5.550	0.16			

Penetration		Proving Ring Reading and Stress								
		10 Blows			150 Blows			155 Blows		
inch	mm	Dist. Reading	Load in lb	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in lb	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in lb	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	0.000	0.000	0	0.0000	0.000	0	0.0000	0.000
0.005	0.13	2	0.006	2.410	12	0.0060	16.634	16	0.0058	16.612
0.010	0.25	4	0.010	0.509	24	0.0104	33.336	36	0.0101	36.775
0.015	0.37	6	0.016	12.483	36	0.0164	45.989	48	0.0166	55.325
0.020	0.51	10	0.018	19.513	48	0.0186	52.163	54	0.0189	70.668
0.025	0.63	16	0.022	34.521	68	0.0246	60.320	68	0.0252	51.328
0.030	0.76	20	0.027	55.383	71	0.0279	60.320	76	0.0270	108.581
0.035	0.89	32	0.033	73.396	80	0.0336	113.785	87	0.0340	120.460
0.040	1.02	40	0.040	98.400	96	0.0400	127.423	100	0.0400	142.650
0.045	0.99	64	0.045	140.325	104	0.0457	144.022	112	0.0447	145.160
0.050	11.14	88	0.057	171.554	116	0.0560	184.661	121	0.0552	187.684

10 Blows

150 Blows

155 Blows

<b>Contractor:</b>		<b>Consultant:</b>	
Tested by:	Inspected by:	Date:	
Contractor's representative:	Checked by:	Date:	
	Approved by:	Date:	

# Determination of California Bearing Ratio(CBR) ( AASHTO T 193)

Consultant:

Contractor:

Contract Pkg No.:

Road No: PK312

Sample Date: 17-09-2018

Test Date: 18-09-18

Sample Location: PK 15+000, R.H.S 3m

Lab No: PH0125007

Sample Description: Sub base Material

CBR Calculation :	10 Blows	30 Blows	60 Blows
	Stress at 2.54mm= 14.000 kg/cm <sup>2</sup>	Stress at 2.54mm= 66.10266 kg/cm <sup>2</sup>	Stress at 2.54 mm= 104.401 kg/cm <sup>2</sup>
CBR Calculated from corrected load / stress	CBR = 20.58 %	CBR = 82.84 %	CBR = 103.385 %
	Stress at 5.08mm= 35.395 kg/cm <sup>2</sup>	Stress at 5.08mm= 18.323 kg/cm <sup>2</sup>	Stress at 5.08mm= 100.401 kg/cm <sup>2</sup>
	CBR = 52.76 %	CBR = 23.64 %	CBR = 104.10 %

Moisture Density Data from sheet "C BR M.D"

No of blows	10	30	65
Dry Density , g/cc	1.957	2.073	2.158
Corrected CBR ( % )	20.58	82.84	103.35

Potting value for 95% of Maximum Dry Density (MDD)

1.935

g/cc

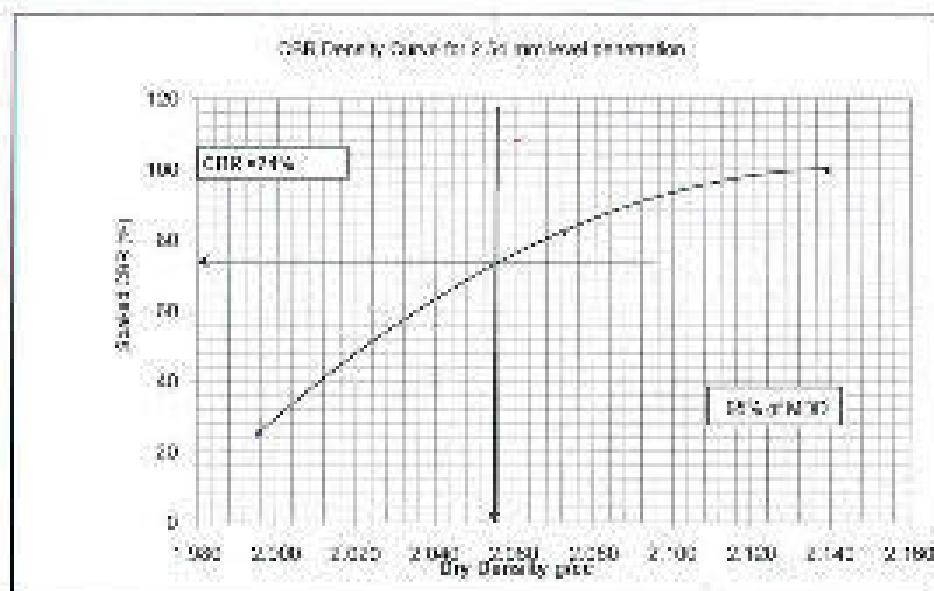
CBR Result (%)

Potting value for 95% of Maximum Dry Density (MDD)

2.058

g/cc

74



Contractor:

Consultant:

Tested by:

Inspected by:

Date:

Contractor's representative:

Checked by:

Date:

Approved by:

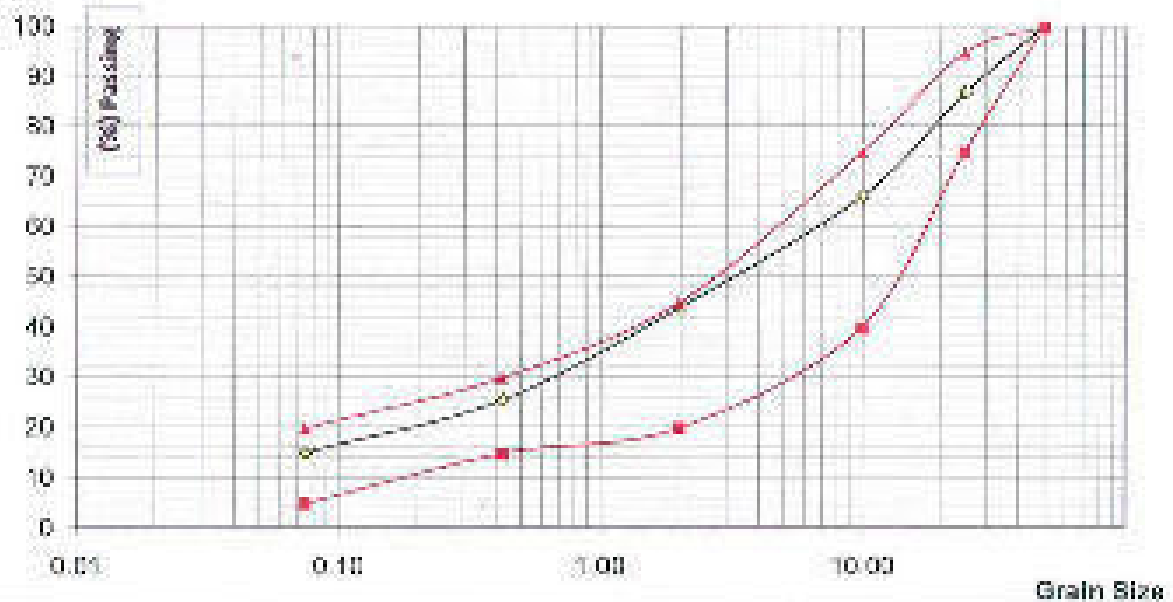
Date:

### Sieve Analysis of Fine and Coarse Aggregate

Consultant:	Contractor:	Contract Pkg No.:
Road No.: PR312	Sample Date: 17-09-2016	Test Date: 19-09-16
Sample Location: PK 15+000 RH-5 2m Ø		Pit/Sample No:
Sample Description: Subbase Material	Lab No: PR312/002	Depth:
Test Method: AASHTO T27/T88	Source Pit Qty: -	

Weight of dry soil + weight of can: _____ g				Weight of Can: _____ g			
Weight of dry soil: 5656.00 g							
ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	752.00	752.00	13.29	86.71	87	70-86
3/8"	10.00	1171.00	1923.00	33.99	66.02	66	40-75
# 10	2.000	1257.00	3180.00	56.19	43.81	44	20-45
# 40	0.425	1045.00	4225.00	74.66	25.34	25	15-30
# 200	0.075	592.00	4817.00	85.12	14.88	15	5-20
Pan	-0.075	842.00					

Grade B



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:



Plasticity Index Test AASHTO T-89 and T-90									
Consultant:			Contractor:			Contract Pkg No:			
Road No: PR314B, NR13			Sample Date:			Test Date:			
Sample Location: 16+000 R/H 2.0m						PISample No.:			
Sample Description: Subbase Course Material			Lab No: PR312M02			Depth:			
Borrow Pit Qty =									
Data Sheet									

Liquid Limit (LL)							Plastic Limit (%)			
Number of blows			15	20	25	31	36			
Can Number			A6	G7	N1	N4		C10	C11	
W1	Weight of can + Wet soil	g	29.10	26.80	26.60	30.50		29.90	25.60	
W2	Weight of can + Dry soil	g	25.40	23.70	23.60	26.90		27.40	26.40	
W3	Weight of can	g	10.10	10.30	10.00	10.00		10.20	10.10	
W4	Weight of water = (W1-W2)	g	3.70	3.20	3.00	3.60		2.50	2.20	
W5	Weight of dry soil = (W2-W3)	g	15.30	13.70	13.60	16.90		17.20	16.30	
W6	Moisture content = (W4/W5*100)	%	24.18	23.35	22.08	21.30		14.63	13.50	
LL	Liquid limit (from graph)	%	22.20					14.02		
PI	Plastic Index	%	8.18							

Contractor:		Consultant:	
Tested by:	Inspected by:	Date:	
Contractor's representative:	Checked by:	Date:	
	Approved by:	Date:	

### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg.No.  
Road No.: PR312 Sample Date : 17-09-2016 Test Date : 21-09-16  
Sample Location: PK 26+000 LHS 2.0m Pit/Sample No.:  
Sample Description: Sub Base Material Lab No: PR312/006 Depth:  
Borrow Pit City :

#### DATA SHEET

#### CBR CALCULATIONS

No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	89.24	109.40	98.38	104.19
30	92.08	109.40	100.65	104.19
65	105.25	173.10	149.54	184.86

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level = 70.36 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 106 Kg/cm<sup>2</sup>

#### Summary For Lab Test Result of Base Course Material.

Gradation			PI (%)	LI (%)	MDD (g/cc)	OMG (%)	Soundness (%)	LAA (%)	CBR at 95% of MDD
Grade	Passing Sieve in mm(%)								
	0.425	0.075							
A	10.07	4.60	4.22	18.25	2.302	6.50	-	-	133
Specification Requirement			0s PI ≤ 6	LL ≤ 25	-	-		LAA ≤ 40	CBR ≥ 90

Remarks:


Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### Moisture-Density Relationship AASHTO T-180 for CBR Test

Consultant	Contractor	Contract Pkg. No.
Road No.: PR312	Sample Date: 17-09-2016	Test Date: 21-09-16
Sample Location: PK 26+600 LHS 2.0m		Pb Sample No.:
Sample Description: Sub Base Material	Lab No: PR312/000	Depth:

Refer to P1 Qty =

Weight of Rammer: 4.54 kg Free fall height = 457 mm with a flat circular base of dia: 50.8 mm

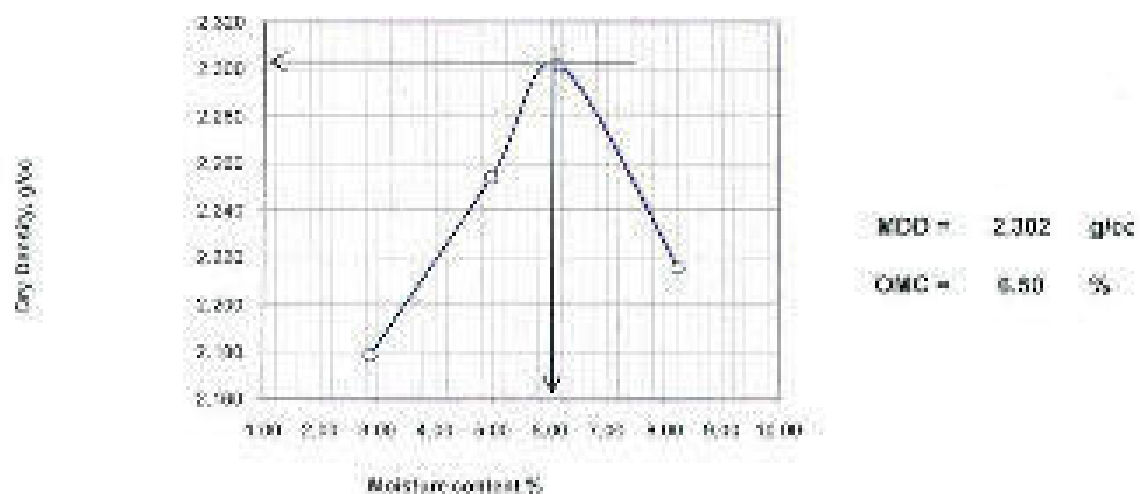
#### Determination of Density

Trial No.			1	2	3	4	5
W <sub>1</sub>	Wt. of wet compacted material-mould	g	12453	12773	12590	12793	
W <sub>2</sub>	Wt. of Mould	g	7097	7097	7097	7097	
W <sub>3</sub>	Wt. of wet compacted material (W <sub>1</sub> -W <sub>2</sub> )	g	4596.0	5126.0	5259.0	5196.0	
V <sub>w</sub>	Volume of Mould by filling water	cc	2185.70	2185.70	2185.70	2185.70	
γ <sub>sat</sub>	Wet Density = W <sub>3</sub> / V <sub>w</sub>	g/cc	2.099	2.347	2.414	2.386	
γ <sub>dry</sub>	Dry Density = γ <sub>sat</sub> / (1 + w <sub>3</sub> / 100)	g/cc	2.179	2.255	2.302	2.216	

#### Determination of Moisture Content:

	Can No.					
m	Wt. of weight material + Can	g	175.00	160.00	201.00	244.00
m <sub>1</sub>	Wt. of dry material + Can	g	170.50	155.90	190.40	236.70
m <sub>2</sub>	Weight of water (m - m <sub>1</sub> )	g	4.50	6.70	10.60	17.30
m <sub>3</sub>	Weight of can	g	15.00	10.70	18.00	17.00
m <sub>4</sub>	Weight of dry material (m <sub>1</sub> - m <sub>3</sub> )	g	155.50	134.60	172.40	219.70
m <sub>5</sub>	Moisture Content (m <sub>2</sub> / m <sub>4</sub> × 100)	%	2.89	4.98	6.15	8.25

#### Moisture-Density Relationship



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative's:	Checked by:	Date:
	Approved by:	Date:

Moisture-Density Relationship for Different Blows in CBR Test(T-193)							
Consultant:		Contractor:		Contract Pkg. No.:			
Road No.: PR312		Sample Date: 17-06-2018		Test Date: 21-06-18			
Sample Location: PK 25+000 LHS 2.0m				File Sample No.:			
Sample Description: Sub-Base Material		Lab No: PR312/006		Depth:			
<b>DETERMINATION OF DENSITY</b>							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Mould No.		D1		D2		D3	
Wt. of compacted wet materials +Mould	g	12510		12959		13170	
Wt of Mould	g	7975		8071		8000	
Wt of wet compacted materials in mould	g	4535		4888		5176	
Volume of Mould	cc	2115.6		2111.8		2111.1	
Wet Density = Wt. of wet compacted materials/volume of mould	g/cc	2.143		2.315		2.452	
Moisture Content	%	6.27		6.43		6.45	
Dry Density=Wet Density/(1+mc/100)	g/cc	2.017		2.175		2.303	
<b>MOISTURE DETERMINATION</b>							
No. of Blows per layer		10		30		65	
Moisture Can No.		A20	A2	E7	A4	A5	A32
Wt of Can+Wet Materials	g	196.00	195.00	178.00	187.00	202.00	181.00
Wt of can +Dry Materials	g	185.00	185.00	168.00	177.00	191.00	171.00
Wt of Moisture	g	11.00	10.00	10.00	10.00	11.00	10.00
Wt of can	g	17.00	18.00	15.80	18.00	18.00	18.00
Wt of dry materials	g	168.00	167.00	152.60	159.00	173.00	153.00
Moisture content	%	6.55	5.99	6.55	6.29	6.30	6.54
Average Moisture Content	%	6.27		6.43		6.45	
Note: <div style="text-align: center; margin-top: 10px;"> <math>MLD = 2.302 \text{ g/cc}</math> ,    <math>OMC = 6.60 \%</math> </div>							
Contractor:		Consultant:					
Tested by		Inspected by				Date:	
Contractor's representative		Checked by				Date:	
		Approved by:				Date:	

Consultant:		Contractor:		Contract Pkg No:							
Road No: PR012		Sample Date: 17-06-2016		Test Date: 21-09-16							
Sample Location: PK 26+000 LHS 2.0m		Lab No: PRS12/006		P/Sample No:							
Sample Description: Sub Base Material		Depth:									
Barrow P/City:											
<b>CBR Test (T193): Swell and Penetration Data</b>											
<b>SWELL DATA</b>		Surcharge Weight: 4.551 kg									
Date	Time	Remarks	Mis/No/F1	H(mm) =	117	Mis/No/F2	H(mm) =	117	Mis/No/F3	H(mm) =	117
			Reading in mm	Swell %	Reading in mm	Swell %	Reading in mm	Swell %			
22/09/16	1	Start	2.93	0	2.84	0	4.392	0			
	24h		3.02	0.03	2.75	0.09	4.392	0.02			
	48h		3.09	0.06	2.72	0.07	4.402	0.02			
	72h		3.12	0.12	2.69	0.17	4.402	0.05			
26/09/16	95h	Ended	3.12	0.12	2.64	0.17	4.400	0.17			

Penetration		Proving Ring Reading and Stress								
		110 Blows			22 Blows			60 Blows		
inch	mm	RAW Reading	Load in kN	Stress in kg/cm <sup>2</sup>	RAW Reading	Load in kN	Stress in kg/cm <sup>2</sup>	RAW Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000
0.025	0.64	7	1.340	0.664	15	3.0425	20.772	24	5.5213	22.021
0.051	1.27	16	4.260	20.137	33	6.4733	60.316	35	7.8806	40.549
0.075	1.91	27	9.728	51.259	50	13.1400	69.244	57	14.9604	79.925
0.100	2.54	33	14.349	69.261	66.5	17.4842	90.091	78	19.0813	109.247
0.154	3.91	53	31.141	155.920	73	18.1802	101.392	87	25.0032	131.304
0.200	5.08	73	39.721	194.401	78	20.1704	109.401	128	32.6590	175.923
0.250	6.35	93	32.340	157.210	93.5	24.6623	115.620	141	37.5212	184.890
0.300	7.62	97	26.906	134.328	99.5	23.8213	125.942	180	41.2185	216.020
0.350	8.89	103	26.010	129.322	91	23.6322	119.019	194	44.7001	229.999
0.400	10.16	112	28.024	142.251	95.5	23.1289	132.251	194	48.3773	254.000

10 Blows

20 Blows

60 Blows

<u>Contractor:</u>		<u>Consultant:</u>	
Tested by:		Inspected by:	Date:
Contractor's representative:		Checked by:	Date:
		Approved by:	Date:

Determination of California Bearing Ratio(CBR) ( AASHTO T 193)						
Contract:		Contractor:		Contract Pkg No.:		
Road No: PH012		Sample Date: 17-05-2016		Test Date: 21-05-16		
Sample Location: PK 25+000 LHS 2.0m		Lab No: PH0120006				
Sample Description: Sub Base Material						
CBR Calculation:	10 Blows		30 Blows		60 Blows	
CBR Calculations from corrected test values	Stress at 2.54mm = 98.941 kg/cm <sup>2</sup>		Stress at 2.54mm = 82.35067 kg/cm <sup>2</sup>		Stress at 2.54 mm = 109.347 kg/cm <sup>2</sup>	
	CBR = 98.98 %		CBR = 190.89 %		CBR = 149.941 %	
	Stress at 5.08mm = 109.401 kg/cm <sup>2</sup>		Stress at 5.08mm = 109.401 kg/cm <sup>2</sup>		Stress at 5.08mm = 173.165 kg/cm <sup>2</sup>	
	CBR = 104.16 %		CBR = 104.16 %		CBR = 164.06 %	
Moisture Density Data from corel * CBR 1477			Moisture	10	30	60
Corresponding CBR from 2.54mm penetration level			Dry-Density g/cc	2.017	2.176	2.303
			Corrected CBR (%)	98.99	120.35	149.94
Plotting value of Maximum Dry Density (MDD)		MDD	g/cc	CBR Result (%)		
Plotting value for 90% of Maximum Dry Density (RDD)		2.187	g/cc	133		
Contractor:						
Contractor:						
Tested by:		Inspected by:		Date:		
Contractor's representative:		Checked by:		Date:		
		Approved by:		Date:		

### Sieve Analysis of Fine and Coarse Aggregate

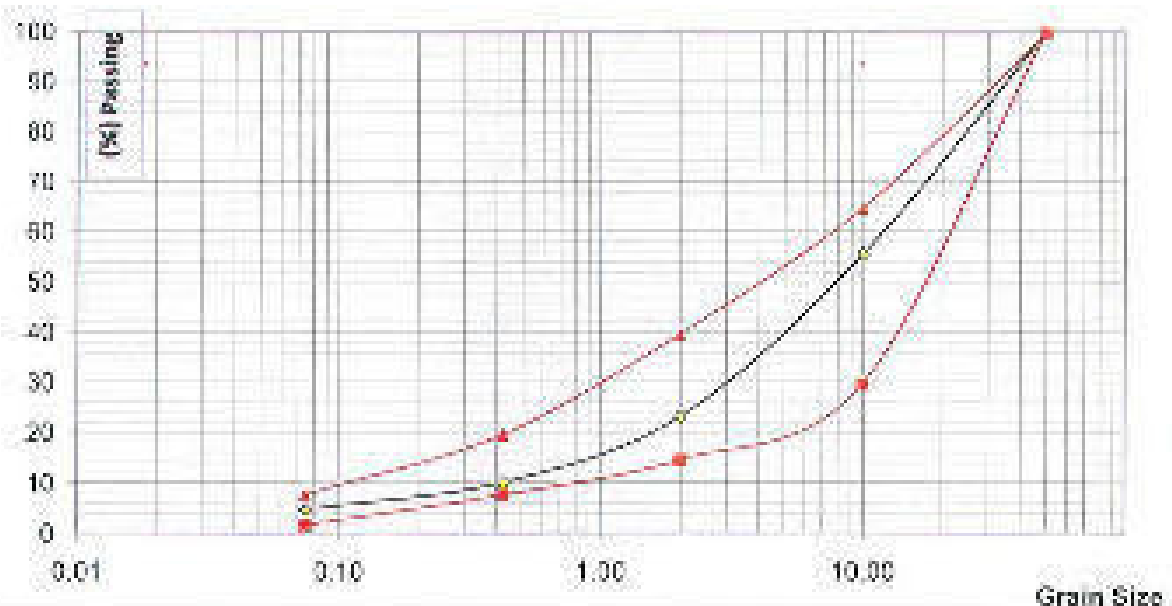
Consultant:	Contractor:	Contract Pkg No.:
Road No.: PR312	Sample Date: 17-09-2018	Test Date: 21-09-18
Sample Location: PK 25+000 LHS 2.0r 0		Pin Sample No.:
Sample Description: Subbase Material	Lab No: PR312/005	Depth:
Test Method: AASHTO T27/T88	Source PI Dry: -	

Weight of dry soil + weight of can: 9 g	Weight of Can: 9 g
---	--------------------

Weight of dry soil: 5829.00 g	
-------------------------------	--

ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	966.00	966.00	16.20	83.71	84	-
3/8"	10.00	1688.00	2655.00	44.44	55.56	56	30-65
# 10	2.000	1520.00	4166.00	76.63	23.17	23	15-40
# 40	0.425 "	777.00	5032.00	89.89	10.00	10	9-20
# 200	0.075	324.00	5688.00	96.40	4.00	5	2-8
Fan	0.075	273.00					

#### Grade A



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### Plasticity Index Test AASHTO T-99 and T-90

Consultant:

Contractor:

Contract Pkg No:

Road No: PR314D NR13

Sample Date : 17-06-2015

Test Date : 27-06-15

Sample Location: PK 26+000 LHS 2.0m

PISample No:

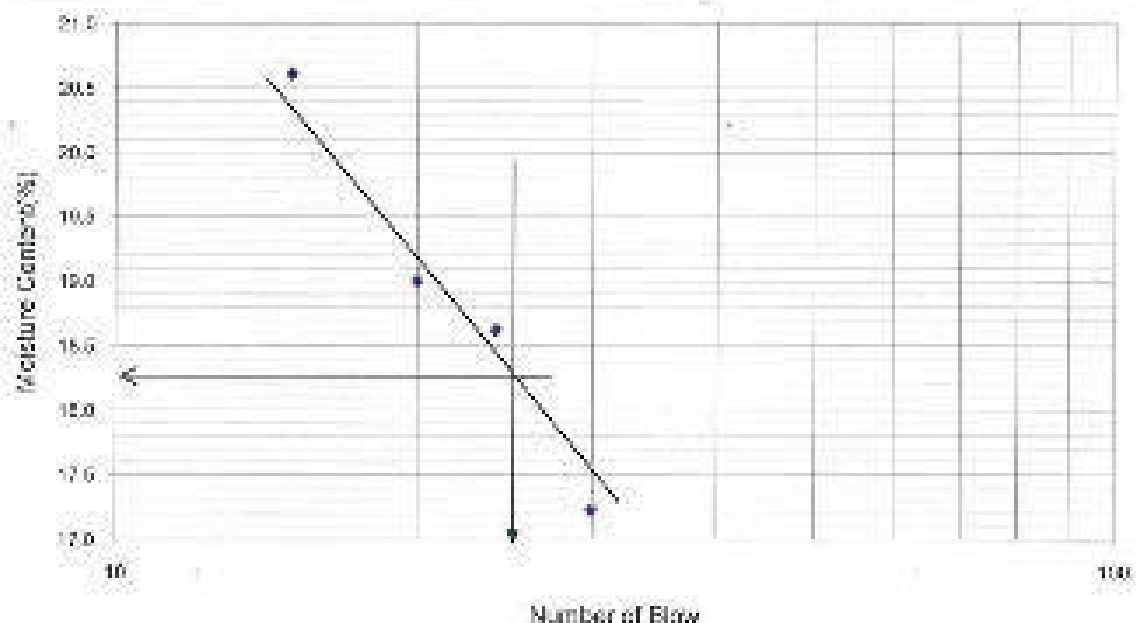
Sample Description: Subbase Course Material Lab No: PR312006

Depth:

Revised File Qty =

Data Sheet

Liquid Limit (LL)				Plastic Limit (%)				
Number of blows				15	20	24	30	36
Can Number				C10	N6	N3	C11	
W1	Weight of can + Wet soil	g		29.10	27.00	28.30	27.10	
W2	Weight of can + Dry soil	g		25.80	24.30	25.30	24.50	
W3	Weight of can	g		9.80	10.10	10.20	10.10	
W4	Weight of water = (W1-W2)	g		3.30	2.70	3.00	2.60	
W5	Weight of dry soil = (W2-W3)	g		16.00	14.20	15.10	14.50	
W6	Moisture content = (W4/W5*100)	%		20.63	19.01	19.83	17.24	
LL	Liquid limit (from graph)	%		18.25				14.03
PI	Plastic Index	%		4.22				



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:



### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg. No.:  
Road No.: PR312 Sample Date: 17-05-2016 Test Date: 21-05-16  
Sample Location: PK 5+000 LHS 1.0m Pit/Sample No.:  
Sample Description: Base Course Material Lab No: PR312/003 Depth:   
Borrow Pit Qty =

#### DATA SHEET

#### CBR CALCULATIONS

No. of Blows per Layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	66.08	141.25	92.46	134.63
30	87.24	168.95	123.86	160.90
60	101.08	186.49	143.84	180.03

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level =

70.36 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level =

105 Kg/cm<sup>2</sup>

Summary For Lab Test Result of Base Course Material.

Gradation			PI (%)	LL (%)	MDD (g/cc)	OMC (%)	Soundness (%)	LAA (%)	CBR at 95% of MDD
Grade	Passing Sizes in mm (%)								
	0.425	0.075							
B	17.33	6.11	7.28	21.50	2.191	6.50	-	-	122
Specification Requirement			Or PI ≤ 6	LL ≤ 25	-	-		LAA ≤ 40	CBR ≥ 80

Remarks:

Contractor:	Consultant:		
Tested by:	Inspected by:	Date:	
Contractor's representative:	Checked by:	Date:	
	Approved by:	Date:	

### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Consultant:	Contractor:	Contract Pkg.No.:
Road No.: PR312	Sample Date : 17-09-2016	Test Date : 21-09-16
Sample Location: PK 5+000 LHS 1.0m		PI/Sample No.:
Sample Description: Base Course Material	Lab No: PR312/003	Depth:

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		B1	B2	B3
Wt. of compacted wet materials (Mould)	g	12513	12855	12106
Wt of Mould	g	9115	9151	9191
Wt of wet compacted materials in mould	g	4398	4704	4915
Volume of Mould	cc	2099.3	2116.2	2111.7
Wet Density = Wt of wet compacted materials/volume of mould	g/cc	2.096	2.223	2.320
Moisture Content	%	6.68	6.28	6.28
Dry Density=Wet Density/(1+mc/100)	g/cc	1.964	2.091	2.180

#### MOISTURE DETERMINATION

No. of blows per layer		10		30		65	
Moisture Can No.		A30	A14	E5	A36	A8	E3
Wet of Can+Wet Materials	g	157.00	151.00	169.00	162.00	166.00	162.00
Wt of can +Dry Materials	g	148.00	143.00	160.00	163.50	159.00	153.50
Wt of Moisture	g	9.00	8.00	9.00	8.50	9.00	8.50
Wt of can	g	18.00	18.70	17.00	18.00	17.50	16.10
Wt of dry materials	g	130.00	124.30	143.00	135.50	141.10	137.40
Moisture content	%	6.92	6.44	6.29	6.27	6.38	6.18
Average Moisture Content	%	6.68		6.28		6.28	

Note:

MDD = 2.191 g/cc ,      OMC = 6.50 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Consultant:		Contractor:		Contract No.:				
Road No.: PR312		Sample Date: 17-09-2016		Test Date: 21-09-16				
Sample Location: PR 5+000 LBS 1 Km				PR Sample No.:				
Sample Description: Base Course Material		Lab No: PR212003		Depth:				
Borrow Pit Qty: =								
<b>CBR Test (119): Swell and Permeation Data</b>								
<b>SWELL DATA</b>		Surcharge Weight: 4.581 kg						
Date	Time	Remarks	Mold No. F1 (4mm) -		Mold No. F2 (4mm) -		Mold No. F3 (4mm) -	
			Reading in mm	Swell %	Reading in mm	Swell %	Reading in mm	Swell %
19/09/16	0	Start	2.73	0	4.30	0	5.600	0
	24h		3.02	0.25	4.52	0.10	5.650	0.10
	48h		3.19	0.30	4.52	0.26	5.650	0.16
	72h		3.20	0.40	4.51	0.29	5.650	0.18
21/09/16	95h	Ended	3.20	0.40	4.51	0.29	5.650	0.18

1										
Penetration		Proctor Ring Reading and Stress								
		(10 Blows)			(20 Blows)			(55 Blows)		
inch	mm	Dist. Reading	Load in ton	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in ton	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in ton	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	0.000	0.000	0	0.000	0.000	0	0.0000	0.000
0.005	0.01	4	0.005	0.009	4	0.005	0.009	21	0.0012	20.001
0.010	0.02	16	0.017	22.157	23	0.0172	21.851	40	0.0100	20.000
0.025	0.01	101	0.015	43.984	101	0.0154	43.954	67	0.0094	20.005
0.100	0.25	47	0.0257	65.237	63	0.0249	57.249	73	0.0090	19.999
0.150	0.38	16	0.0174	112.882	96	0.02405	112.543	54	0.0145	150.179
0.200	0.50	92	0.0113	141.252	123	0.02362	103.449	110	0.0116	108.028
0.300	0.75	120	0.0150	159.173	144	0.02605	123.413	124	0.0092	171.716
0.350	0.88	108	0.0145	180.747	151	0.02608	204.109	147	0.0092	208.580
0.400	1.00	142	0.0135	195.545	155	0.02552	214.540	160	0.0072	224.573
0.450	1.13	119	0.0140	210.440	160	0.02718	232.901	173	0.0092	238.625

10 Blows

20 Blows

55 Blows

Contractor:		Consultant:	
Tested by:		Inspected by:	Date:
Contractor's representative:		Checked by:	Date:
		Approved by:	Date:

# Determination of California Bearing Ratio(CBR) | AASHTO T 193

Consultant:

Contractor:

Contract Pkg No:

Road No.: PR312

Sample Date : 17-09-2018

Test Date : 21-09-18

Sample Location: PK 5+000 LHS 1.0m

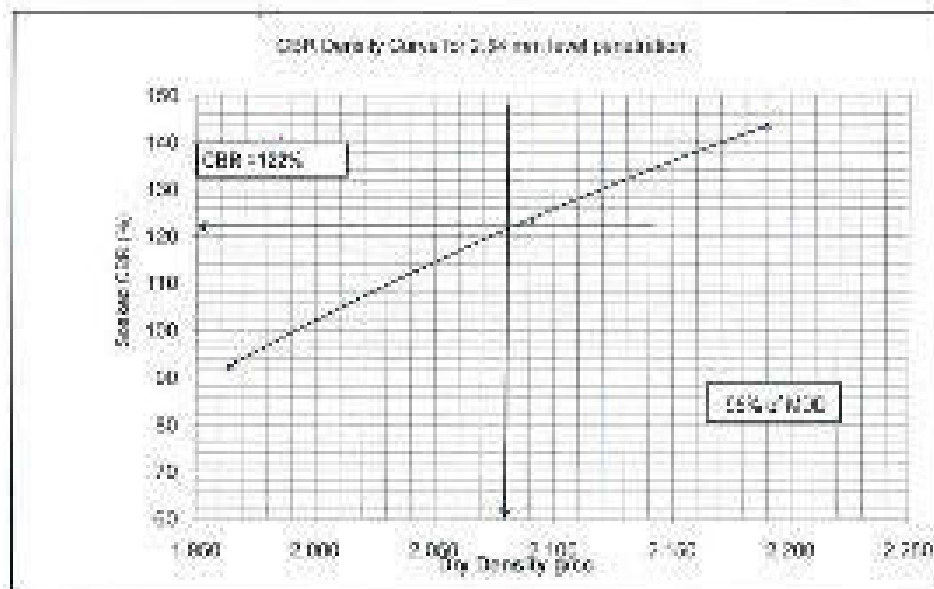
Lab No: PR312/C03

Sample Description: Base Course Material

CBR Calculation:	10 Blows	20 Blows	45 Blows
CBR Calculations from corrected (post) stress	Stress at 2.54mm = 55.037 kg/cm <sup>2</sup>	Stress at 2.54mm = 87.24283 kg/cm <sup>2</sup>	Stress at 2.54 mm = 124.063 kg/cm <sup>2</sup>
	CBR = 97.48 %	CBR = 123.93 %	CBR = 143.64 %
	Stress at 5.00mm = 141.002 kg/cm <sup>2</sup>	Stress at 5.00mm = 163.943 kg/cm <sup>2</sup>	Stress at 5.00mm = 194.445 kg/cm <sup>2</sup>
	CBR = 154.55 %	CBR = 160.90 %	CBR = 140.23 %

Moisture-Density Data from sieve 75 (GRIND)	No. of blows	10	20	45
	Dry Density (g/cc)	1.154	2.091	2.150
Corresponding CBR from 2.54mm penetration level	Corrected CBR (%)	92.48	123.93	143.64

Plotting value of Maximum Dry Density	MDD	g/cc	CBR Result (%)
Plotting value for 95% of Maximum Dry Density (MDD)	2.011	g/cc	123



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### Moisture-Density Relationship AASHTO T-180 for CBR Test

Consultant: \_\_\_\_\_ Contractor: \_\_\_\_\_ Corridor Pkg. No.: \_\_\_\_\_  
 Road No.: PR312 Sample Date: 17-09-2018 Test Date: 21-09-18  
 Sample Location: PK 0+000 LHS 1.0m P/Sample No.: \_\_\_\_\_  
 Sample Description: Base Course Material Lab No: PR312/003 Depth: \_\_\_\_\_

Remove Pl Qty = \_\_\_\_\_

Weight of Rammer = 4.54 kg Free fall height = 457 mm with a lat circular face of dia: 50.0 mm

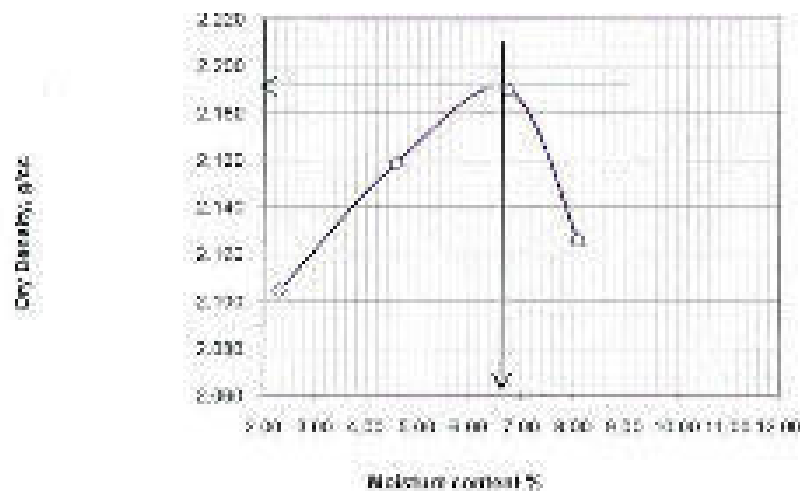
#### Determination of Density

Trial No.			1	2	3	4	5
$W_1$	Wt of wet compacted material-mould	g	12252	12410	12600	12573	
$W_2$	Wt of Mould	g	7597	7597	7597	7597	
$W_3$	Wt of wet compacted materials( $W_1/W_2$ )	g	4565.0	4811.0	5003.0	4976.0	
$V_w$	Volume of Mould (by filling water)	cc	2165.70	2165.70	2165.70	2165.70	
$\gamma_{wet}$	Wet Density = $W_3/V_w$	g/cc	2.104	2.258	2.318	2.318	
$\gamma_d$	Dry Density = $\gamma_{wet}/(1+m_w \times 100)$	g/cc	2.105	2.159	2.161	2.126	

#### Determination of Moisture Content:

Can No.							
$m$	Wt of weight material+ Can	g	157.00	147.00	149.00	156.00	
$m_1$	Wt of dry material + Can	g	153.80	141.50	135.00	154.80	
$m_2$	Weight of water ( $m - m_1$ )	g	3.20	5.50	14.00	11.20	
$m_3$	Weight of can	g	16.00	17.00	16.00	18.00	
$m_4$	Weight of dry material( $m - m_3$ )	g	137.50	124.50	119.00	136.00	
$m_5$	Moisture Content ( $m_2/m_4 \times 100$ )	%	2.32	4.35	6.72	8.11	

#### Moisture Density Relationship



MDU = 2.181 g/cc

OMC = 6.50 %

Contractor:	Consultant:	
Tested by:	Prepared by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

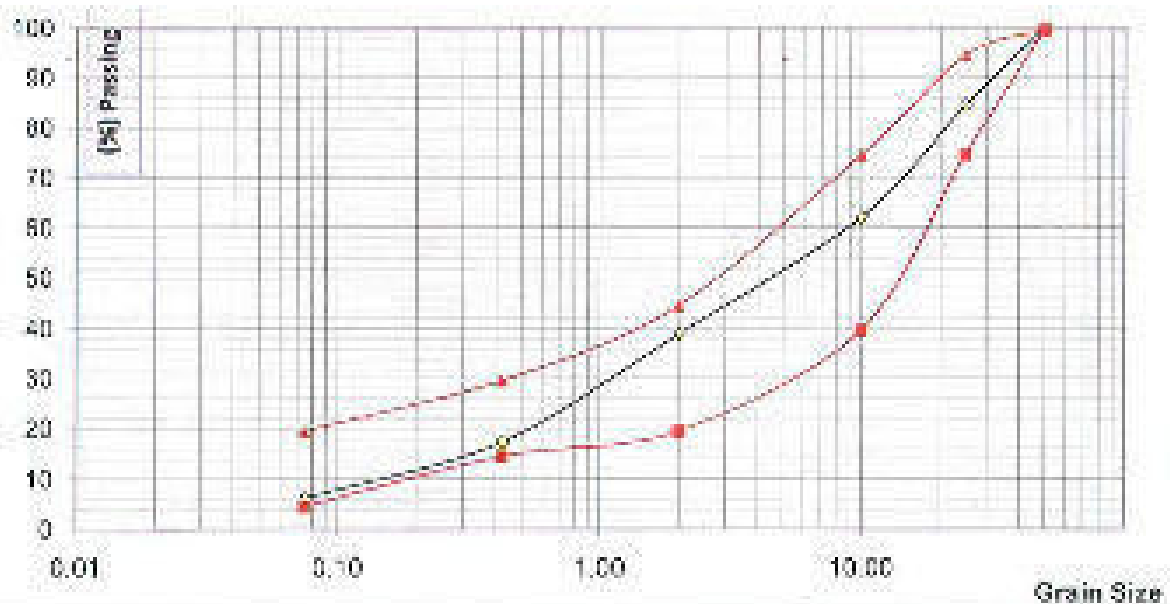
### Sieve Analysis of Fine and Coarse Aggregate

Consultant:	Contractor:	Contract Pkg No.:
Road No.: PR312	Sample Date: 17-09-2016	Test Date: 21-09-19
Sample Location: PK 5+000 LHS 1.0m		File Sample No.:
Sample Description: Base Course Material	Lab No: PR312/003	Depth:
Test Method: AASHTO T27/T88	Barrow PEGy =	

Weight of dry soil + weight of can: _____ g	Weight of Can: _____ g
Weight of dry soil: 7195.00 g	

ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained(g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	1114.00	1114.00	15.48	84.52	86	75-95
3/8"	10.00	1610.00	2724.00	37.85	62.15	62	40-75
#10	2.000	1670.00	4394.00	61.06	38.94	38	20-45
#40	0.425	1555.00	5949.00	82.67	17.33	17	15-30
#200	0.075	867.00	6756.00	93.89	6.11	6	5-20
Fan	0.075	440.00					

#### Grade B



Contractor	Consultant	
Tested by:	Inspected by:	Date:
Contractor's representative	Checked by:	Date:
	Approved by:	Date:

### Plasticity Index Test AASHTO T-89 and T-90

Consultant:

Contractor:

Contract Pkg No.:

Road No. PR3140, NR13

Sample Date: 17-08-2018

Test Date: 21-09-18

Sample Location: PK 5+000 LHS 10m

P/Sample No:

Sample Description: Base Course Material

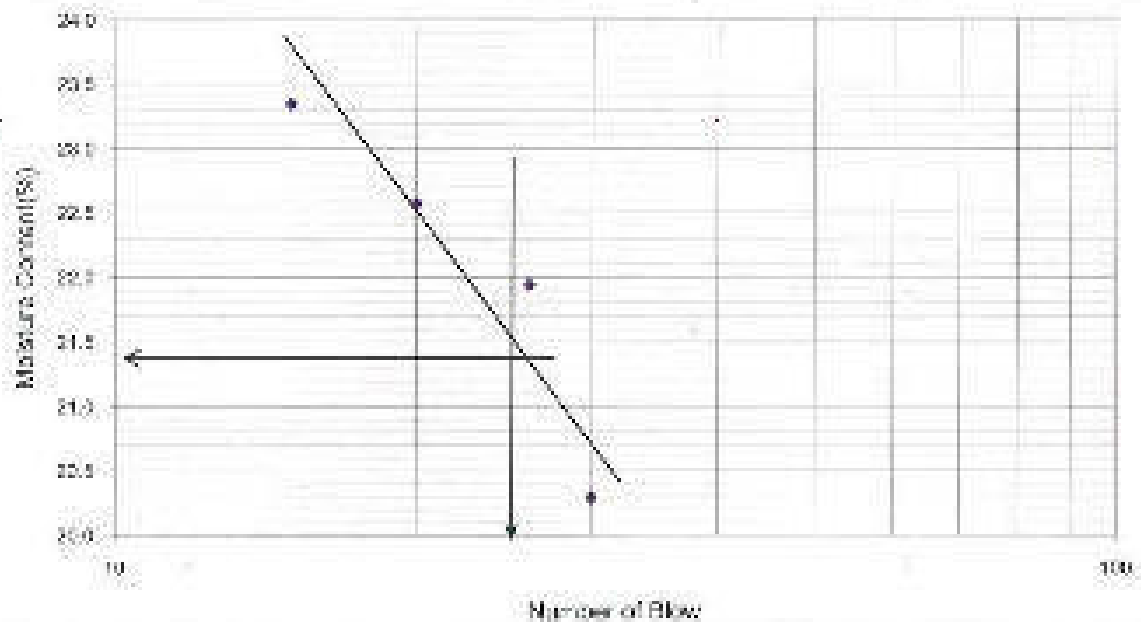
Lab No: PR312/005

Depth:

Borrow Pit Qty: =

Date Sheet

Liquid Limit (LL)							Plastic Limit (%)			
Number of blows			15	20	25	30				36
Can Number			A7	A2	A4	A5		A3	A1	
W1	Weight of can + Wet soil	g	35.60	33.90	33.30	33.80		36.80	34.00	
W2	Weight of can + Dry soil	g	32.40	33.40	30.60	31.10		34.30	32.00	
W3	Weight of can	g	16.70	17.90	18.30	17.00		17.80	18.10	
W4	Weight of water = (W1-W2)	g	3.20	0.50	2.70	2.70		2.30	2.00	
W5	Weight of dry soil = (W2-W3)	g	15.70	15.50	12.30	13.30		16.40	13.90	
W6	Moisture content = (W4/W5*100)	%	20.38	22.58	21.95	20.30		14.02	14.39	
LL	Liquid limit (from graph)	%	21.50					14.21		
PI	Plastic Index	%	7.29							



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg.No.:  
Road No.: PR312 Sample Date : 17-09-2016 Test Date : 19-09-16  
Sample Location: PK 15+000 RHS 2m Pit/Sample No.:  
Sample Description: Base Course Material Lab No.: PR312/001 Depth :  
Borrow Pit Qty =

#### DATA SHEET

#### CBR CALCULATIONS

No of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	33.24	55.38	47.22	52.76
30	63.70	121.56	90.51	125.29
65	74.78	121.56	103.25	125.29

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level = 70.36 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 100 Kg/cm<sup>2</sup>

#### Summary For Lab Test Result of Base Course Material.

Grade	Gradation		PI (%)	LL (%)	MDD (g/cc)	OMC (%)	Soundness (%)	LAA (%)	CBR at 95% <MDD
	0.425	0.075							
B	27.82	16.51	8.13	22.50	2.178	7.46	-	-	90
Specification Requirement			Os PI ≤ 6	LL ≤ 25	-	-	-	LAA ≤ 40	CBR ≥ 80

Remarks:

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:



### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Consultant:	Contractor:	Contract Pkg No:
Road No.: PR312	Sample Date : 17-09-2016	Test Date : 19-09-16
Sample Location: PK 15+000 RHS 2m		PU Sample No:
Sample Description: Base Course Material	Lab No: PR312/001	Depth:

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	20 Blows	55 Blows
Mould No.		E1	E2	E3
Wt. of compacted wet materials +Mould	g	12954	12599	13032
Wt of Mould	g	7899	7842	8200
Wt of wet compacted materials in mould	g	4465	4724	4832
Volume of Mould	cc	2094.6	2117	2102.5
Wet Density = Wt.of wet compacted materials/volume of mould	g/cc	2.143	2.231	2.298
Moisture Content	%	7.96	7.70	7.65
Dry Density=Wet Density/(1+m/100)	g/cc	1.985	2.072	2.135

#### MOISTURE DETERMINATION

No. of blows per layer		10		30		65	
Moisture Can No.		A23	A35	A23	E4	A14	A1
Wet of Can/Wet Materials	g	156.00	153.00	162.00	158.00	154.00	183.00
Wt of can +Dry Materials	g	146.00	144.80	152.80	148.30	145.10	172.00
Wt of Moisture	g	10.00	8.10	9.10	9.70	8.90	11.00
Wt of can	g	31.80	32.10	31.10	27.10	27.30	30.00
Wt of dry materials	g	114.50	112.90	121.90	122.20	117.80	142.00
Moisture content	%	8.73	7.18	7.47	7.94	7.65	7.75
Average Moisture Content	%	7.96		7.70		7.66	

Note:

MDD = 2.14 g/cc , OMC = 8.38 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Consultant:		Contractor:		Contract Pkg. No.:				
Road No.: P9312		Sample Date: 17-09-2018		Test Date: 19-09-18				
Sample Location: PK 15+000 R.H.S. An				P/Sample No:				
Sample Description: Base Course Material		Lot No: 1703/2001		Depth:				
Borrow Pit Qty: -								
<b>CBR Test (T193): Swell and Penetration Data</b>								
<b>SWELL DATA</b>		Surcharge Weight: 4.60 kg						
Date	Time	Remarks	MM No. E1	110	MM No. E2	117	MM No. E3	117
			0.1mm =	Swell %	0.1mm =	Swell %	0.1mm =	Swell %
19/09/18	0	Start	5.35	0	3.90	0	4.620	0
	24h		5.25	0.05	3.95	0.04	4.650	0.05
	48h		5.35	0.05	3.95	0.05	4.660	0.05
	72h		5.35	0.05	3.95	0.05	4.660	0.05
20/09/18	96h	Ended	5.35	0.05	3.95	0.05	4.660	0.05

Penetration		Proving Ring Reading and Stress								
		(10 Blows)			(30 Blows)			(60 Blows)		
mm	mm	Cal Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Cal Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Cal Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000
0.025	0.04	5	1.245	0.524	0	2.1034	11.075	10	4.7326	24.927
0.050	1.25	6	2.388	12.468	17	4.4999	25.043	22	5.7452	30.466
0.075	1.94	10	4.502	22.157	34	8.1503	45.902	39	9.9910	52.060
0.100	2.84	24	8.343	35.235	48	12.0543	65.452	54	14.1771	74.184
0.150	3.64	35	9.624	45.666	73	16.1633	91.690	79	18.6302	96.700
0.200	6.04	40	10.515	55.553	98	24.5774	131.966	96	24.5774	131.956
0.250	8.25	45	12.084	62.112	115	28.7141	158.169	124	31.2119	166.941
0.300	7.52	51	13.460	70.632	124	32.852	179.718	154	40.4997	213.263
0.350	4.84	65	14.483	78.185	135	35.4437	196.964	167	47.9681	254.342
0.400	10.16	64	15.034	85.474	142	37.5275	198.621	173	45.2202	236.190

10 Blows

30 Blows

60 Blows

Contractor:		Contractor:	
Tested by:		Inspected by:	Date:
Contractor's representative:		Checked by:	Date:
		Approved by:	Date:

### Determination of California Bearing Ratio(CBR) ( AASHTO T 193)

Consultant:	Contractor:	Contract Pkg No.:
Road No.: PR312	Sample Date : 17-05-2016	Test Date : 19-05-16
Sample Location: Chitrakathi Colony	Lab No: RC401	15/Sample No.:
Sample Description: Base Course Material		

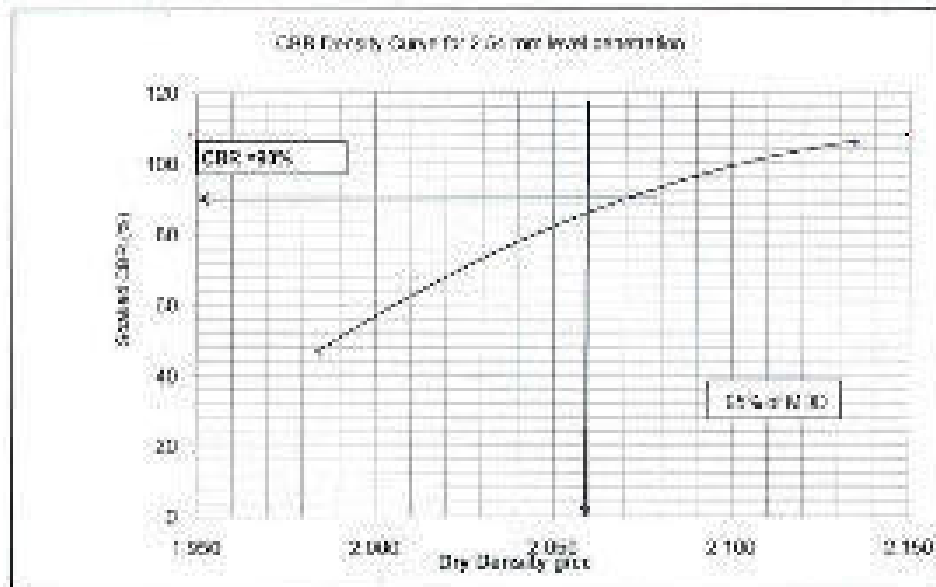
CBR Calculation :	10 Blows	30 Blows	45 Blows
	Stress at 2.54mm = kg/cm <sup>2</sup>	Stress at 2.54mm = kg/cm <sup>2</sup>	Stress at 2.54 mm = kg/cm <sup>2</sup>
CBR =	47.22 %	CBR = 90.51 %	CBR = 100.25 %
	Stress at 5.08mm = kg/cm <sup>2</sup>	Stress at 5.08mm = kg/cm <sup>2</sup>	Stress at 5.08mm = kg/cm <sup>2</sup>
CBR =	52.76 %	CBR = 125.29 %	CBR = 125.21 %

Moisture-Density Data from sheet " CBR M3"

Moist Blows	10	30	45
Dry-Density , g/cc	1.935	2.072	2.135
Corresponding CBR ( % )	47.22	90.51	100.25

Corresponding CBR from 2.54mm penetration level

Plotting value for 95% of Maximum Dry Density (MDD)	1.928	g/cc	CBR Result (%)
Plotting value for 95% of Maximum Dry Density (MDD)	2.093	g/cc	90



Contractor:	Checked by:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Sieve Analysis of Fine and Coarse Aggregate							
Consultant		Contractor		Contract Pkg.No			
Road No.: PR312		Sample Date : 17-09-2015		Test Date : 18-09-16			
Sample Location: PK 15+000 RHS 2m				PR/Sample No.:			
Sample Description: Base Course Material		Lab No: PR312/001		Depth :			
Test Method : AASHTO T27/T98		Borrow Pit Qty -					
Weight of dry soil + weight of can				g	Weight of Can		g
Weight of dry soil:				5201.03	g		
ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	970.00	970.00	15.84	84.08	84	75-85
3/8"	10.00	1019.00	1989.00	32.08	67.82	66	40-75
# 10	2.000	1339.00	3299.00	52.94	46.99	47	20-45
# 40	0.425	1197.00	4496.00	72.18	27.82	28	15-30
# 200	0.075	577.00	5053.00	81.49	18.51	19	5-20
Pan	-0.075	1148.00					

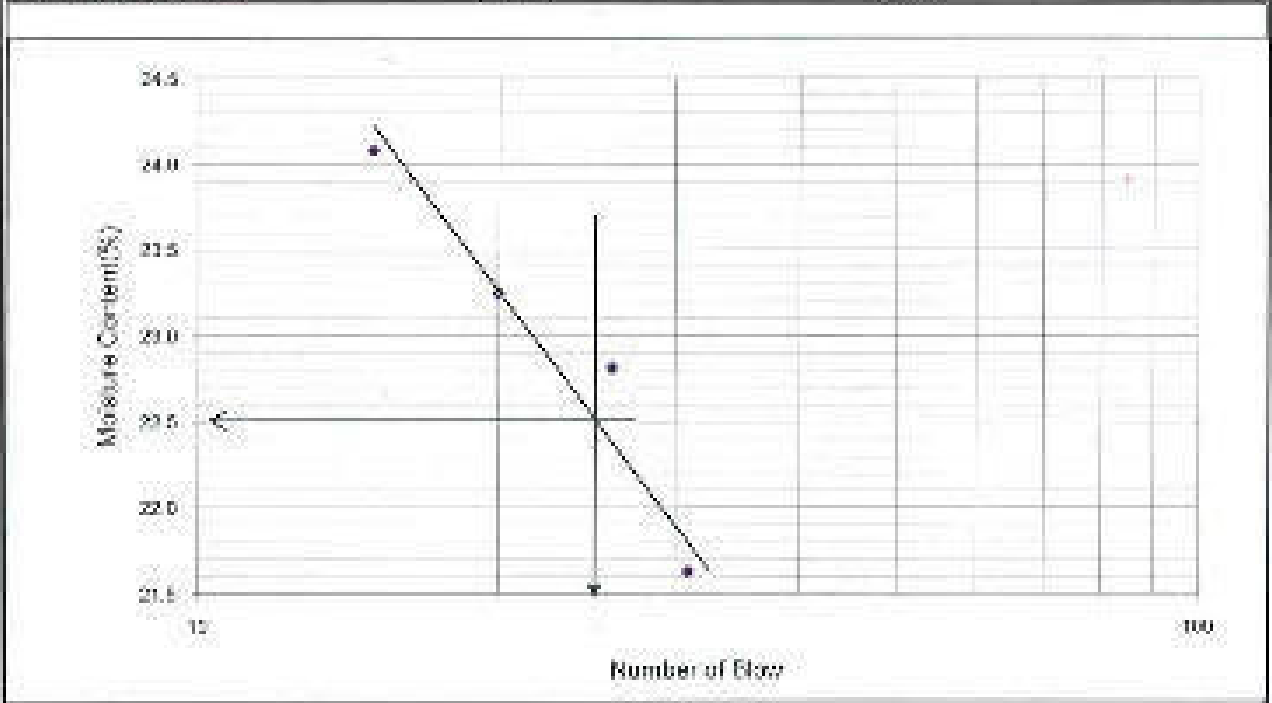
  

Grade B

Contractor	Consultant	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Plasticity Index Test AASHTO T-89 and T-90		
Consultant:	Contractor:	Contract Pkg. No.:
Road No.: PR314D, NR13	Sample Date:	Test Date:
Sample Location:		Plot Sample No.:
Sample Description: Base Course Material	Lab No.: PR312001	Depth:
Borrow Fill City =		
Data Sheet		

Liquid Limit (LL)						Plastic Limit (%)		
Number of Blows			16	20	25	31	36	
Can Number			C4	43	C8	K1		
W1	Weight of can + Wet soil	g	26.90	25.80	29.20	30.90		27.50
W2	Weight of can + Dry soil	g	23.80	22.80	24.80	28.90		25.20
W3	Weight of can	g	5.90	5.90	9.90	9.90		9.90
W4	Weight of water = (W1-W2)	g	3.10	3.00	3.40	3.70		2.30
W5	Weight of dry soil = (W2-W3)	g	13.70	12.80	14.90	17.10		15.40
W6	Moisture content = (W4/W5*100)	%	24.09	23.26	22.82	21.64		14.94
LL	Liquid limit (from graph)	%	22.50					14.37
PI	Plastic Index	%	8.13					



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

# Moisture-Density Relationship AASHTO T-155 for CBR Test.

Consultant

Contractor

Contract Pkg.No.:

Roll No: PR312

Sample Date : 17-09-2018

Test Date : 19-09-18

Sample Location: PK 15+000 RHS 2m

PW Sample No:

Sample Description: Base Course Material

Lab No: PR312/001

Depth:

Borrow Pit Qty =

Weight of Rammer: 4.54 kg Free fall height = 457 mm with a flat circular face of dia 60.8 mm

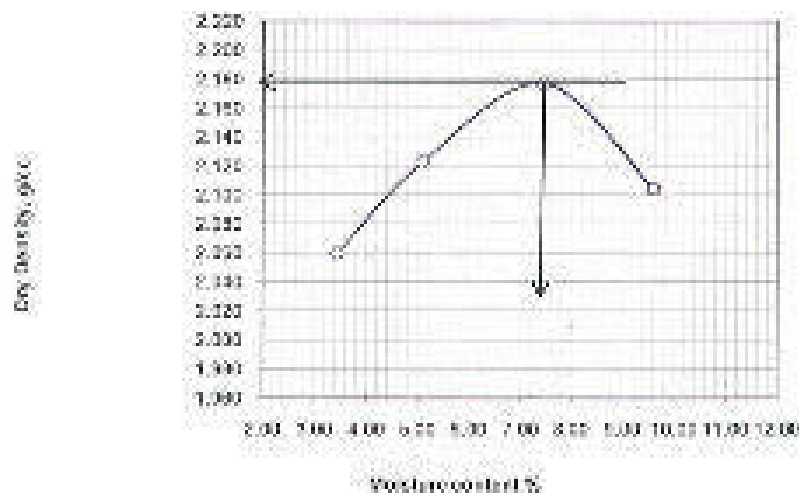
Determination of Density

Trial No.			1	2	3	4	5
$W_1$	Wt. of wet compacted material in mould	g	4321.4	4243.0	4265.0	4259.0	
$W_2$	Wt. of Mould	g	759.7	759.7	759.7	759.7	
$W_3$	Wt. of wet compacted material ( $W_1 - W_2$ )	g	4617.0	4533.0	4505.0	4499.0	
$V_m$	Volume of Mould by filling water)	lit	2185.70	2185.70	2185.70	2185.70	
$\gamma_{sat}$	Wet Density = $W_3 / V_m$	g/cc	2.107	2.073	2.040	2.007	
$\gamma_{dry}$	Dry Density = $\gamma_{sat} / (1 + w\% / 100)$	g/cc	2.081	2.123	2.178	2.105	

Determination of Moisture Content:

Can Nos.							
$m_1$	Wt. of weight material + Can	g	176.00	180.00	185.00	189.00	
$m_2$	Wt. of dry material + Can	g	170.70	140.00	154.00	174.00	
$m_3$	Weight of water ( $m_1 - m_2$ )	g	5.30	6.40	10.20	15.00	
$m_4$	Weight of can	g	17.20	15.00	18.00	18.00	
$m_5$	Weight of dry material ( $m_2 - m_4$ )	g	153.50	125.00	136.00	156.00	
$m_6$	Moisture Content ( $m_3 / m_5 \times 100$ )	%	3.45	5.10	7.46	9.62	

Moisture-Density Relationship



MDD = 2.178 g/cc

OMC = 7.46 %

Contractor

Consultant

Tested by:

Inspected by:

Date:

Contractor's representative:

Checked by:

Date:

Approved by:

Date:

### CBR Penetration Test (AASHTO T-193)

Consultant: Contractor: Contract Pkg.No.:  
Road No.: PR312 Sample Date: 17-09-2015 Test Date: 21-09-16  
Sample Location: PK 25+000 LHS 2.0m Pit/Sample No.:  
Sample Description: Base Course Material Lab No.: PR312/005 Depth: \_\_\_\_\_  
Borrow Pit Qty: \_\_\_\_\_

#### DATA SHEET

#### CBR CALCULATIONS

No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	77.56	123.26	110.15	117.38
30	105.25	154.79	149.54	156.95
65	108.40	180.02	155.44	171.45

Corrected Unit Load/Standard Unit Load \* 100

Standard Unit Load at 2.54 mm penetration level =

70.38 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level =

105 Kg/cm<sup>2</sup>

#### Summary For Lab Test Result of Base Course Material.

Gradation			PI (%)	LL (%)	MDD (g/cc)	OMC (%)	Soundness (%)	LAA (%)	CBR at 95% of MDD
Grade	Passing Sieve in mm(%)								
	0.425	0.075							
A	8.51	4.04	5.18	18.70	2.256	6.50	-	-	145
Specification Requirement			PI ≤ 5	LL ≤ 25	-	-		LAA ≤ 40	CBR ≥ 80

Remarks:

Contractor:	Consultant:		
Tested by	Inspected by	Date:	
Contractor's representative:	Checked by	Date:	
	Approved by:	Date:	

### Moisture-Density Relationship AASHTO T-190 for CBR Test

Consultant:	Contractor:	Contract Pkg No:
Road No: PR312	Sample Date: 17-09-2016	Test Date: 21-08-13
Sample Location: PK 25+000 LHS 2.0m		Pur Sample No:
Sample Description: Base Course Material	Lab No: PR312/005	Depth:

Borrow Pit Qty =

Weight of Rammer = 4.54 kg Free fall height = 457 mm with a flat circular face of dia: 50.8 mm

#### Determination of Density

Trial No.			1	2	3	4	5
$W_1$	Wt of wet compacted material + mould	g	12208	12608	12702	12636	12400
$W_2$	Wt of Mould	g	7597	7597	7597	7597	7597
$W_3$	Wt of wet compacted materials ( $W_1 - W_2$ )	g	4611.0	4911.0	5105.0	5039.0	4803.0
$V_m$	Volume of Mould (by filling water)	cc	2165.70	2165.70	2165.70	2165.70	2165.70
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	2.129	2.268	2.359	2.326	2.259
$\gamma_d$	Dry Density = $\gamma_{wet} / (1 + m_w / 100)$	g/cc	2.005	2.176	2.258	2.146	2.045

#### Determination of Moisture Content:

	Can No.					
$m$	Wt of wet material + Can	g	162.00	166.00	144.00	168.00
$m_1$	Wt of dry material + Can	g	153.00	160.00	136.00	157.20
$m_2$	Weight of water ( $m - m_1$ )	g	9.00	6.00	8.00	10.80
$m_3$	Weight of can	g	15.00	15.00	18.00	17.20
$m_4$	Weight of dry material ( $m_1 - m_3$ )	g	144.00	145.00	118.00	140.00
$m_5$	Moisture Content ( $m_2 / m_4$ ) x 100	%	2.08	4.14	6.83	8.43

Moisture-Density Relationship



MDD = 2.258 g/cc

CMC = 6.60 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:



### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Consultant:	Contractor:	Contract Pkg No:
Road No.: PR312	Sample Date : 17-09-2016	Test Date : 21-09-16
Sample Location: PK 20+000 LHS 2.0m		P/Sample No:
Sample Description: Base Course Material	Lab No: PR312/005	Depth:

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	30. Blows	65 Blows
Mould No.		C1	C2	C3
Wt. of compacted wet materials +Mould	g	13316	13553	13478
Wt of Mould	g	2670	2732	2475
Wt of wet compacted materials in mould	g	4840	4827	5001
Volume of Mould	cc	2109.6	2107.6	2120.3
Wet Density = Wt. of wet compacted materials/volume of mould	g/cc	2.189	2.290	2.359
Moisture Content	%	8.01	8.23	8.37
Dry Density=Wet Density/(1+m/100)	g/cc	2.075	2.156	2.217

#### MOISTURE DETERMINATION

No. of blows per layer		10		30		65	
Moisture Can No		F4	A22	F8	A1	A3	A5
Wet of Can+ Wet Materials	g	180.00	194.00	210.00	182.00	157.00	179.00
Wt of can + Dry Materials	g	151.00	185.00	199.00	172.00	149.00	169.00
Wt of Moisture	g	9.00	9.00	11.00	10.00	6.00	10.00
Wt of can	g	15.90	17.20	15.90	17.00	19.20	17.90
Wt of dry materials	g	135.10	167.80	183.10	155.00	130.80	151.10
Moisture content	%	6.66	5.35	6.01	6.45	6.12	6.62
Average Moisture Content	%	6.01		6.23		6.37	

Note:

MDD = 2.268 g/cc      OMC = 6.50 %

Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

Consultant:		Contractor:		Contract Pkg. No.:				
Road No.: PR312		Sample Date: 17-09-2016		Test Date: 21-09-16				
Sample Location: PK 25+000 LHS 2.0m				PU Sample No.:				
Sample Description: Base Course Material		Lab No.: PR312P005		Depth:				
Remov. Pk Qty. =								
<b>CBR Test (T193): Swell and Penetration Data</b>								
<b>SWELL DATA</b>		Surcharge Weight: 4.551 kg						
Date	Time	Remarks	Mat.No. 1	Height =	112	Mat.No.12	Height =	112
			Reading in mm	Swell %	Reading in mm	Swell %	Reading in mm	Swell %
10/02/16	1	Start	2.58	0	2.54	0	4.350	0
	24h		3.02	0.00	2.75	0.09	4.350	0.02
	48h		3.09	0.00	2.72	0.07	4.400	0.03
	72h		3.12	0.12	2.84	0.17	4.425	0.05
22/02/16	96h	Ended	3.12	0.12	2.94	0.17	4.450	0.11

Penetration		Proctor Ring Reading and Stress								
		110 Blows			130 Blows			155 Blows		
mm	mm	Dist. Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dist. Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0	0.000	0.000	0	0.0000	0.000	0	0.0000	0.000
0.005	0.04	5	2.100	11.279	11	2.9921	15.233	22	5.7942	30.466
0.010	0.22	10	4.200	22.557	20	6.9790	31.467	30	9.4015	42.901
0.015	0.51	45	11.543	55.163	54	14.1377	74.791	95	15.3123	61.703
0.020	0.94	68	14.724	71.940	96	19.8419	103.242	124	20.7909	100.001
0.025	1.31	77	20.545	102.032	90	23.0220	124.034	101	26.0540	125.667
0.030	1.65	85	25.430	128.543	119	31.2406	154.744	150	34.1198	160.627
0.035	1.35	82	25.290	127.913	129	36.2959	182.491	147	30.6490	202.364
0.040	1.62	100	26.095	133.346	159	40.7928	214.845	160	42.0802	201.672
0.050	1.68	112	26.007	133.190	175	46.0010	240.395	191	47.5683	232.603
0.060	18.15	121	31.913	167.954	180	49.4250	250.347	190	55.4600	265.883

11 Blows

30 Blows

95 Blows

Contractor:		Consultant:	
Tested by:		Inspected by:	Date:
Contractor's representative:		Checked by:	Date:
		Approved by:	Date:

# Determination of California Bearing Ratio(CBR) ( AASHTO T 193)

Consultant:

Contractor:

Contract Pkg.No.:

Road No.: PR012

Sample Date: 17-08-2016

Test Date: 21-09-16

Sample Location: PK 25+000 LHS 2.0m

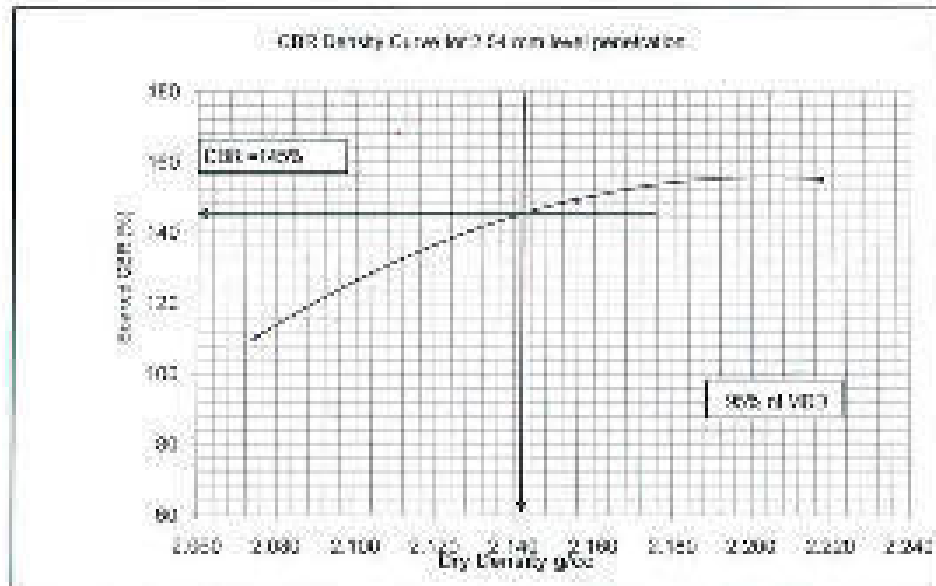
Lab No: PRS12005

Sample Description: Base Course Material

CBR Calculation :	10 Blow	30 Blow	45 Blow
CBR Calculations from corrected test values	Stress at 2.54mm = 77.240 kg/cm <sup>2</sup>	Stress at 2.54mm = 106.2467 kg/cm <sup>2</sup>	Stress at 2.54 mm = 108.457 kg/cm <sup>2</sup>
	CBR = 110.10 %	CBR = 149.94 %	CBR = 155.444 %
	Stress at 5.08mm = 102.247 kg/cm <sup>2</sup>	Stress at 5.08mm = 154.714 kg/cm <sup>2</sup>	Stress at 5.08mm = 160.227 kg/cm <sup>2</sup>
	CBR = 117.24 %	CBR = 155.35 %	CBR = 171.43 %

Moisture-Density Data from sheet " CBR MDT	Soil Class	10	30	45
	Dry-Density (g / cc)	2.073	2.156	2.217
Corresponding CBR from 2.54mm penetration level	Corrected CBR (%)	110.10	149.94	155.44

Plotting value of Maximum Dry Density (MDD)	MDD	g/cc	CBR Result (%)
Plotting value for 90% of Maximum Dry Density (MDD)	2.143	g/cc	145



Contractor:	Consultant:	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

### Sieve Analysis of Fine and Coarse Aggregate

Consultant:

Contractor:

Contract Pkg.No.:

Road No.: P7312

Sample Date : 17-09-2016

Test Date : 21-09-16

Sample Location: PK 25+000 LHS 2.0m

RD/Sample No.:

Sample Description: Base Course Material

Lab No: PR312/005

Depth :

Test Method : AASHTO T27/100

Empty Pk Qty =

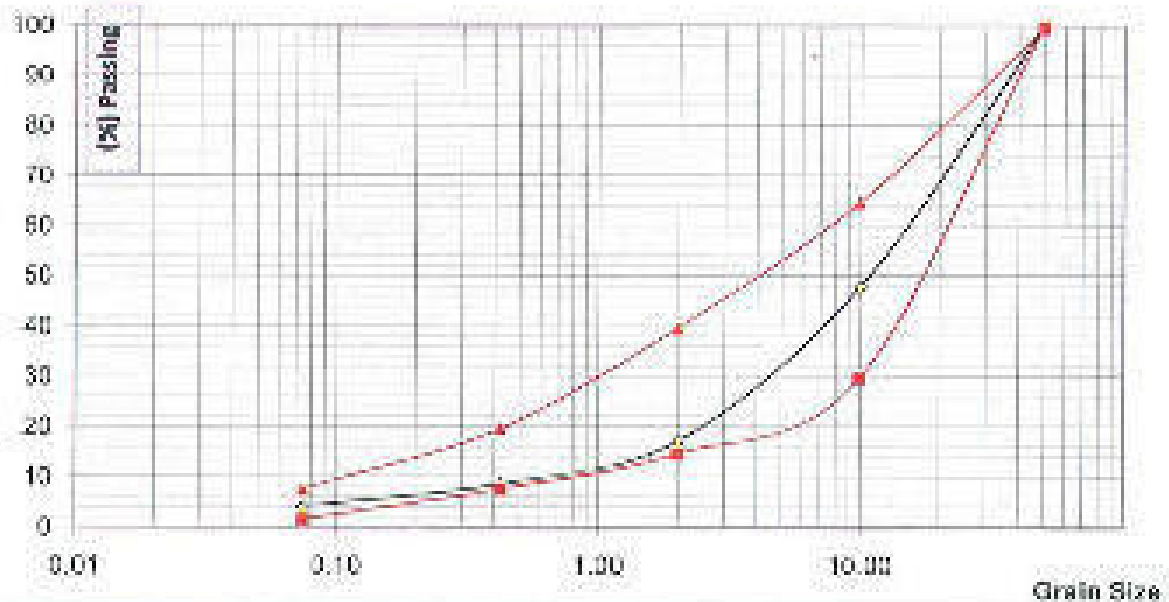
Weight of dry soil + weight of can: g

Weight of Can: g

Weight of dry soil: 5243.00 g

ASTM Sieve	Size (mm)	Weight Retained (g)	Cumulative weight retained(g)	Cumulative retained (%)	Passing Percentage (%)		Specification
					Observation	Report	
2"	50.00	0.00	0	0.00	100.00	100	100
1"	25.00	1287.00	1287.00	23.58	76.41	76	-
3/8"	10.00	1494.00	2781.00	52.08	47.91	48	30-65
N#10	2.000	1616.00	4397.00	82.08	17.11	17	15-40
N#40	0.425	451.00	4797.00	91.49	8.51	9	8-20
N#200	0.075	234.00	5031.00	95.95	4.04	4	2-8
Pan	0.075	212.00					

#### Grade A



Contractor	Consultant	
Tested by:	Inspected by:	Date:
Contractor's representative:	Checked by:	Date:
	Approved by:	Date:

**Plasticity Index Test AASHTO T-89 and T-90**

Consultant:

Contractor:

Contract Pkg No:

Road No: PR314D NR13

Sample Date : 17-08-2018

Test Date : 21-08-18

Sample Location: PK 25+000 LHS 2.0m

PR/Sample No:

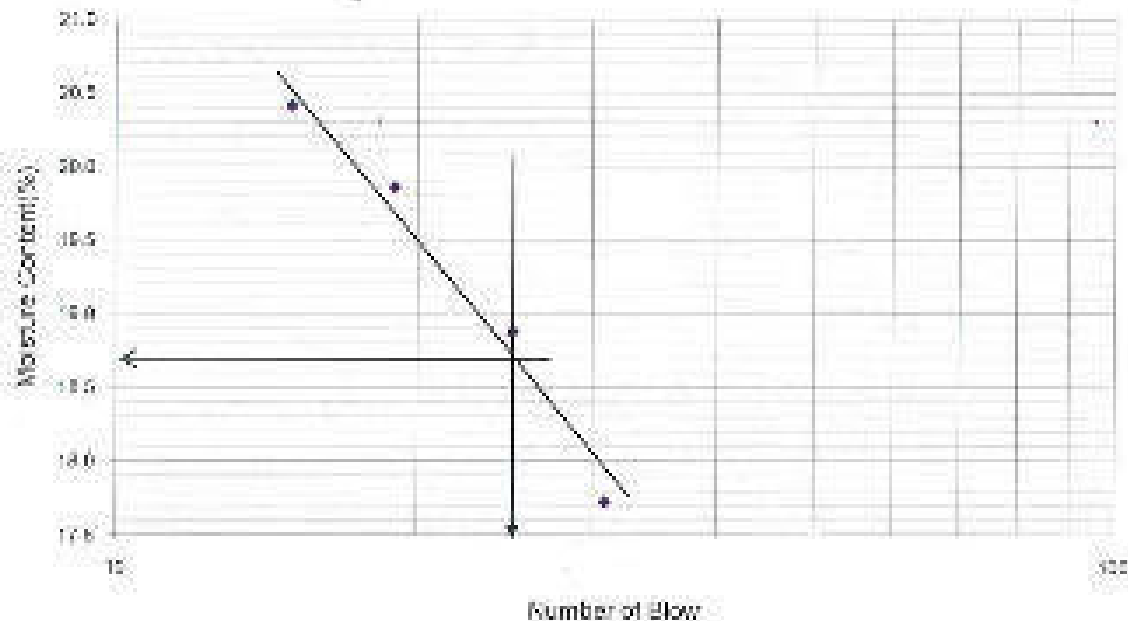
Sample Description: Base Course Material

Lot No: PR312/005

Depth :

Borrow Pit Qty =  
Data Sheet

Liquid Limit (LL)							Plastic Limit (%)			
Number of blows			15	19	25	31	36			
Can Number			C18	A2	C4	K1		N4	G7	
W1	Weight of can + Wet soil	g	27.00	27.30	26.90	26.60		26.50	27.60	
W2	Weight of can + Dry soil	g	24.10	24.40	24.20	24.00		24.50	26.00	
W3	Weight of can	g	9.90	9.80	9.90	9.90		10.00	10.00	
W4	Weight of water = (W1-W2)	g	2.90	2.90	2.70	2.60		2.00	1.60	
W5	Weight of dry soil = (W2-W3)	g	14.20	14.60	14.30	14.10		14.50	16.00	
W6	Moisture content = (W4/W5*100)	%	20.42	19.86	18.88	17.73		13.79	11.25	
LL	Liquid limit (from graph)	%	18.70					12.52		
PI	Plastic Index	%	6.18							



Contractor:

Consultant:

Tested by:

Inspected by:

Date:

Contractor's representative:

Checked by:

Date:

Approved by:

Date:



**Provincial Roads Improvement Project  
ADB Loan No. 2839-CAM/8254-CAM**

**Feasibility Study on Second Provincial Roads  
Improvement Project**

**Appendix-II B**

**Table 2D-1 Summary of Additional Laboratory Test  
Results for PR 1534 (Existing Subgrade/Below Lateritic  
Wearing Course and for Lateritic Wearing Course  
Materials)**





**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**CBR Penetration Test (AASHTO T-193): Result Summary**

Contract No.:	Contractor:	Road No: PR1534
Lab. No.:	Sampled No.: S-01	Date Test: 20-09-16
Location: 05+000 LHS_1.5m	Date Sample: 17-09-16	Barrow Pit: 1
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.18m
Soaking started on: 20-09-16	CBR Testing Date:	20-09-16
MDD(g/cc): 2.340	g/cc	OMC(%): 5.75 %

**DATA SHEET**

**CBR CALCULATIONS**

No. of Blows per Layer	Corrected Unit Load (Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	15.81	51.67	21.33	49.21
30	34.54	81.11	49.21	77.24
65	42.14	88.29	59.88	84.56

CBR = Corrected Unit Load / Standard Unit Load \* 100  
Standard Unit Load at 2.54 mm penetration level = 70.36 Kg/cm<sup>2</sup>  
Standard Unit Load at 5.08 mm penetration level = 106 Kg/cm<sup>2</sup>

**CBR Reporting**

CBR (%)	AI % of Specified Dry Density (AASHTO T-193)	Moisture Content (MC) at Molding (%)
50.00	90	5.91
47.00	95	5.91
	98	
	100	

**Remarks:**

Tested by Contractor:

Witnessed by Consultant:

Checked by Consultant:

Saing Vatha  
Lab Technician  
Date:

Meas Sophaney  
Lab Technician  
Date:

Chhun Sokcheek  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

Moisture-Density Relationship for Different Blows in CBR Test(T-193)							
Contract No.:		Contractor:		Road No. PR 1534			
Lab. No.:		Sampled No. S-01		Date Test: 20-08-16			
Location: 16+000 - 16+150		Date Sample: 17-08-16		Source: P11			
Description: Existing Road (Laterite)		Sampled By: ME		Depth: 0.0 - 0.10m			
DETERMINATION OF DENSITY							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Mould No.		C1		C2		C3	
Wt. of compacted wet materials +Mould	g	11415		11505		12095	
Wt of Mould+Base Plat	g	6771		6837		6747	
Wt of wet compacted materials in mould	g	4644		4668		5348	
Volume of Mould	cc	2130		2120		2133	
Wet Density = Wt of wet compacted materials/volume of mould	g/cc	2.172		2.362		2.607	
Moisture Content	%	5.74		6.10		5.89	
Dry Density=Wet Density/(1+m/100)	g/cc	2.054		2.245		2.368	
MOISTURE DETERMINATION							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B11	B7	B19	B12	B21	B30
Wet of Can+Wet Materials	g	415.50	393.70	357.80	399.70	361.40	352.50
Wt of can +Dry Materials	g	396.50	374.30	347.90	342.00	345.90	372.40
Wt of Moisture	g	21.00	19.40	19.90	18.70	15.50	20.40
Wt of can	g	30.15	32.62	25.15	32.04	33.07	26.57
Wt of dry materials	g	351.63	341.26	322.71	309.47	312.53	345.83
Moisture content	%	5.87	5.68	6.17	5.94	5.91	6.60
Average Moisture Content	%	5.74		5.10		5.89	
<div> <div>Tested by Contractor</div> <div>Witnessed by Consultant</div> <div>Checked by Consultant</div> </div> <div> <div>Sang Vatha</div> <div>Lab Technician</div> <div>Date:</div> </div> <div> <div>Meas Sophaany</div> <div>Lab Technician</div> <div>Date:</div> </div> <div> <div>Chhun Sokchhak</div> <div>Material Engineer</div> <div>Date:</div> </div>							

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

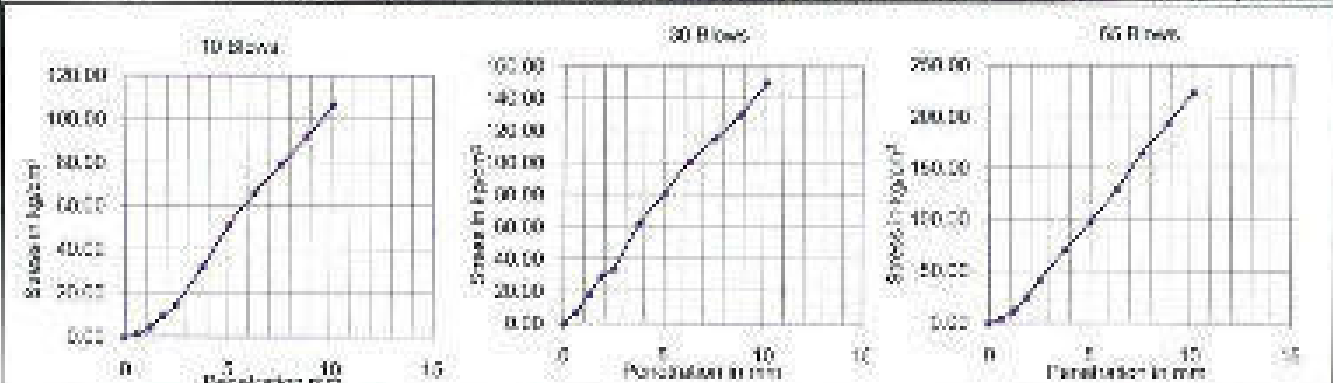
**Determination of California Bearing Ratio(CBR) ( AASHTO T-183)**

Contract No.:	Contractor:	Road No. PR.153A
Lab. No.:	Sample No.: S-01	Date Test: 20-09-18
Location: 05+000 LHS 3.0m	Date Sample: 17-09-18	Borrow Pit: 1
Description: Existing Road (Laterite)	Sanctioned By: ME	Depth: 0.0 - 0.15m
Soaking started on: 20-09-18	CBR Testing Date: 24-09-18	MBDg/cc: 2.340
		OMC(%): 5.75

**CBR Test (T183), Swell and Penetration Data**

SWELL DATA			Surcharge Weights			
			4.581 kg			
Date	Time	Remarks	Mold No.1	Height = 9885	Mold No.2	Height = 9885
			Reading in mm	Swell %	Reading in mm	Swell %
20-09-18	4.30	Start	381	0	3	0
21-09-18	8.00		393	0.02	3	0.00
22-09-18	8.00		394	0.03	3	0.00
23-09-18	8.00		394	0.03	3	0.00
24-09-18	8.00	Ended	394	0.03	3	0.00

Penetration		Proctor Ring Reading and Stress								
		Mold No.G1 (10 Blows)			Mold No.G2 (30 Blows)			Mold No.G3 (45 Blows)		
inch	mm	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0.0	0.0000	0.000	0.0	0.0000	0.000	0.0	0.0000	0.000
0.025	0.64	9.0	0.2140	1.443	28.0	1.4245	7.525	15.0	0.0058	4.546
0.050	1.27	15.0	0.6760	4.516	55.0	3.4324	18.184	45.0	2.3016	12.123
0.075	1.91	24.0	1.8832	9.514	102.0	5.6444	28.730	75.0	4.0734	25.400
0.100	2.54	32.0	2.6490	15.009	150.0	6.9761	34.898	115.0	3.0005	42.141
0.150	3.81	112.0	6.1276	37.207	217.0	11.8916	60.604	200.0	15.7100	82.150
0.200	5.08	175.0	9.5192	57.888	351.0	15.2108	87.107	344.0	15.5512	89.291
0.250	6.35	250.0	13.6040	80.306	500.0	19.1500	101.023	450.0	24.6500	125.387
0.300	7.62	315.0	19.0700	109.295	680.0	21.5200	115.455	575.0	31.5400	165.065
0.350	8.89	380.0	17.6900	92.564	850.0	24.7500	125.484	675.0	35.9200	184.070
0.400	10.16	390.0	20.2760	105.755	890.0	26.4900	135.031	745.0	42.2440	225.197



Tested by Contractor	Witnessed by Consultant	Checked by Consultant
   Sering Vallin Lab Technician Date:	   Neas Sophanny Lab Technician Date:	   Chuan Sakchaek Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No: S-01	Date Test: 26-09-18
Location: 051000 LHS_1.5m	Date Sample: 17-09-18	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.18m

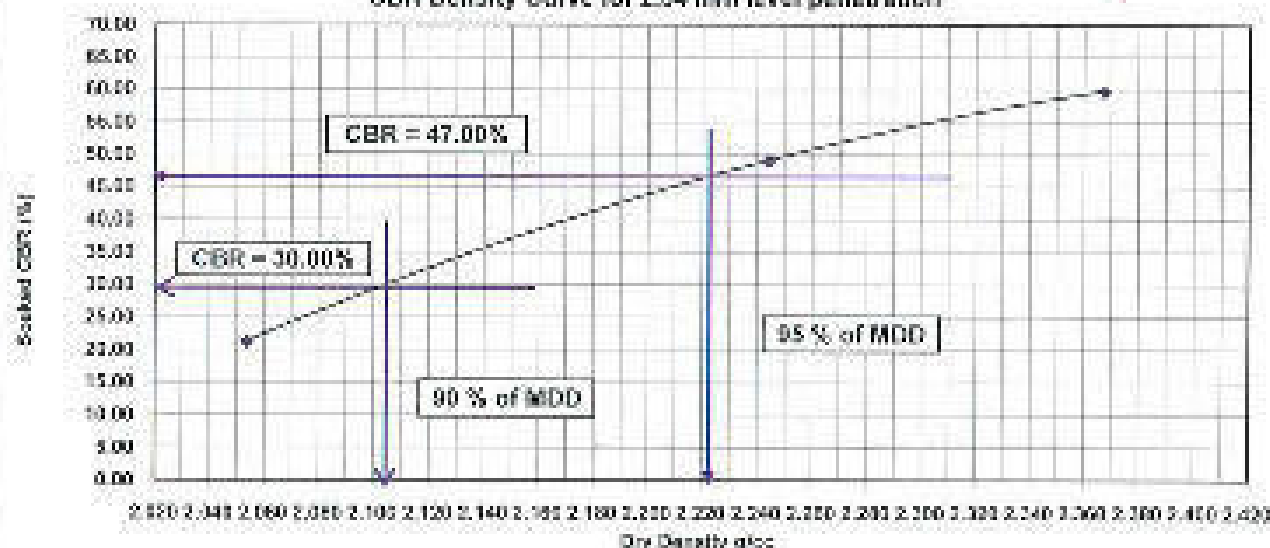
**CBR Test (AASHTO T-193)**

CBR Calculation :	15 Blows	30 Blows	65 Blows
CBR Calculations from corrected load stress of Form No. 50A graphs	Stress at 2.54mm = 15.01 kg/cm <sup>2</sup>	Stress at 2.54mm = 34.04 kg/cm <sup>2</sup>	Stress at 2.54 mm = 42.14 kg/cm <sup>2</sup>
	CBR = 21.38 %	CBR = 48.21 %	CBR = 58.85 %
	Stress at 5.08mm = 51.87 kg/cm <sup>2</sup>	Stress at 5.08mm = 81.11 kg/cm <sup>2</sup>	Stress at 5.08mm = 95.25 kg/cm <sup>2</sup>
	CBR = 40.21 %	CBR = 77.24 %	CBR = 84.56 %

Moldair Density Data from sheet " CBR MD "	343.8	280.5	270.7	85
	327.2	2,054	2,245	2,968
Corresponding CBR from 2.54 mm penetration level	Corrected CBR ( % )	21.38	48.21	58.85

Floating value for 90% of Maximum Dry Density (MDD)	2.106	g/cc
Floating value for 95% of Maximum Dry Density (MDD)	2.223	g/cc

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor	Witnessed by Consultant	Checked by Consultant
 Gang Vatha Lab Technician Date:	 Maas Sophanny Lab Technician Date:	 Chhun Sokheak Material Engineer Date:

## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

#### Moisture-Density Relationship AASHTO T-180 for CBR Test

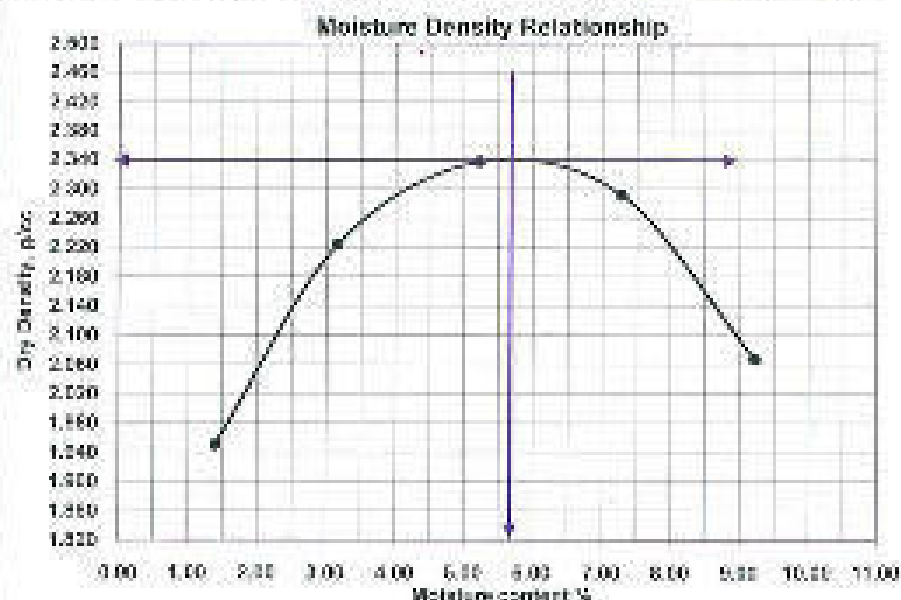
Control No.	Contractor	Road No. PR.1534
Lab. No.	Sampled No.: S-01	Date Test: 20/09/16
Location: BS+000 UHS_1.5m	Date Sample: 17/09/16	Barcode P11
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.15m
Weight of Rammer: 4.581 kg, Free fall height = 447 mm, with a fall rammer base of dia. 50.8 mm		

#### Determination of Density

Trial No.	I	II	III	IV	V
$W_1$ Wet of wet compacted material+Mould	g	9250.0	10530.0	10530.0	10620.0
$W_2$ Wet of Mould+Base Plat	g	5624.0	5624.0	5624.0	5624.0
$W_3$ Wet of wet compacted materials( $W_1-W_2$ )	g	4226	4905	5206	4829
$V_m$ Volume of Mould (by filling water)	cc	2138.00	2138.00	2138.00	2138.00
$\gamma_{wet}$ Wet Density = $W_3 / V_m$	g/cc	1.977	2.295	2.458	2.257
$\gamma_d$ Dry Density = $\gamma_{wet} / (1 + m_p / 100)$	g/cc	1.949	2.224	2.335	2.291

#### Determination of Moisture Content :

Can Nos.			B6	B10	B36	B25	B7
m	Vol. of weight material+ Can	g	403.40	420.30	374.10	376.00	412.50
m <sub>1</sub>	Vol. of dry material + Can	g	403.20	408.40	356.80	352.60	380.40
m <sub>2</sub>	Weight of water = (m-m <sub>1</sub> )	g	5.20	11.90	17.30	23.40	32.10
m <sub>3</sub>	Weight of can	g	31.01	31.11	25.29	31.30	32.52
m <sub>4</sub>	Weight of dry material = (m <sub>1</sub> -m <sub>3</sub> )	g	372.18	375.29	331.51	321.30	347.79
m <sub>5</sub>	Moisture Content = (m <sub>2</sub> / m <sub>4</sub> ) x 100	%	1.40	3.17	5.22	7.28	9.23



MDD = 2.340 g/cc

OMC = 5.75 %

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vattha  
Lab Technician  
Date:

Moas Sophammy  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Sieve Analysis of Fine and Coarse Aggregate**

Control No:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No: S-01	Date Test: 23-05-16
Location: 05+000 LHS, 1.0m	Date Sample: 17-05-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: MF	Depth: 0.0 - 0.18m
Test Method : AASHTO T-27/T-88		Trial : 01

Weight of dry soil + weight of can:	6805.0	g	Weight of can:	100.5	g
Weight of dry soil	6705.0	g	Test Method:		

ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Confirm Specification Grade
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00						
3/4"	19.00						
1/2"	12.50						
3/8"	9.50	815.3	815.3	12.16	87.84	88	
#4	4.75						
#4							
#8	2.36						
#10	2.00	2682.40	3497.70	52.17	47.83	48	
#18	1.18						
#30	0.60						
#40	0.425	1370.1	4867.80	72.67	27.33	27	
#50	0.300						
#60	0.250						
#100	0.150						
#200	0.075	895.4	5763.20	85.93	14.07	14	
Pan	0.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophany  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

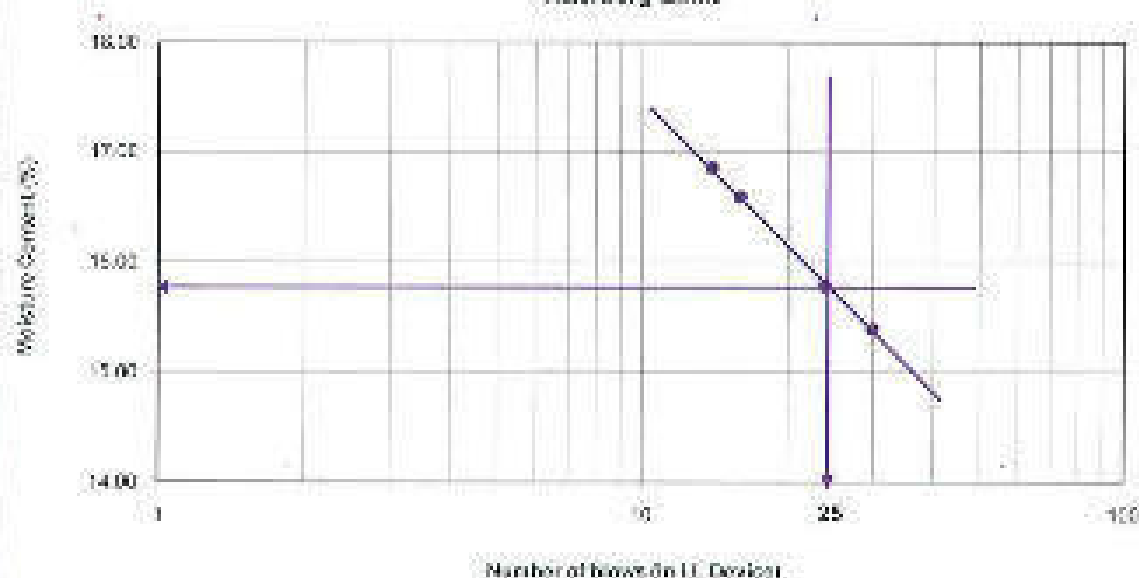
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Contract No.:	Contractor:	Road No.: PR.1534
Lab. No.:	Sampled No.: S-01	Date Test: 23-09-16
Location: 05+000 LHS, 1.5m	Date Sample: 17-08-16	Runway Pk. 1
Description: Existing Road (Latent)	Sampled By: MF	Depth: 0.0 - 0.15m
Test Method : AASHTO T-89 and T-90		
Data Sheet		

Liquid Limit (LL)							Plastic Limit (PL)		
Symbol	Description	No. of blows / Can No. / Unit	14	16	24	30	58	531	
$W_1$	Weight of can + Wet soil	g	31.15	31.45	30.17	25.99	24.50	24.24	
$W_2$	Weight of can + Dry soil	g	26.85	26.32	26.24	27.73	26.52	25.32	
$W_3$	Weight of can	g	15.73	15.75	15.07	15.03	16.05	15.33	
$W_4$	Weight of water = ( $W_1 - W_3$ )	g	2.21	2.17	1.50	1.81	0.80	0.82	
$W_5$	Weight of dry soil = ( $W_2 - W_3$ )	g	13.13	13.07	12.22	11.75	7.99	5.44	
$W_6$	Moisture content = ( $W_4/W_5 \times 100$ )	%	15.97	16.60	15.70	15.40	12.52	12.97	
LL	Liquid Limit (from graph)	%	15.60				12.44		
PI	Plastic Index	%	3.36						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saling Vatha  
Lab Technician  
Date:

Messa Sophanny  
Lab Technician  
Date:

Chhun Sasdech  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

<b>Summary of test Result (Embankment Material)</b>							
<b>1. Description</b>							
Consultant	KCI Engineering Co. Ltd / VECC/SBK/SANAC	Contractor	GLIMPANG-VSC JV				
Lab No.	133-54	Date of sampling	05-01-2015				
Sample No.	S. 125	Date completed of testing	25-01-2015				
Description	Silty Clayey & Sand For Embankment Materials	Location	Borrow Pit PK: 11+500/RHS_550m, PR_150B-W, Size 60x50x3.3m				
<b>2. Test Result</b>							
Item	1. Sieve (%)	2. Atterberg Limit			4. Proctor		5. CBR (%)
	# 0.075mm	LL (%)	PL (%)	PI	MDD ( g/cc )	OMC ( % )	( 90% of MDD )
Test Result	13.97	15.80	12.44	3.36	2.340	5.75	30.00
Specification	-	-	-	-	-	-	≥ 4
Decision	-	-	-	-	-	-	Accept
<b>3. Engineer's Comment</b>							
<b>4. Certification</b>							
Item	Name	Position	Date	Signature			
Tested By		Lab Technician					
Checked By		Material Engineer					
Reviewed By		Int. Material Engineer					
Approved By		Resident Engineer					



## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

#### CBR Penetration Test (AASHTO T-193): Result Summary

Contract No.:	Contractor:	Road No: PR.1534
Lab. No:	Sampled No.:	Date Test: 20-09-16
Location: 451000 RKS_1.5m	Date Sample: 17-09-16	Formwork:
Description: Existing Road (Laterals)	Sampled By: ME	Depth: 0.0 - 0.07m
Soaking started on: 20-09-16	CBR Testing Date:	24-09-16
MDD(g/cc): 2.152	g/cc	OMC(%): 9.30 %

#### DATA SHEET

#### CBR CALCULATIONS

No. of Rows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	15.88	22.60	22.56	21.72
30	38.38	58.02	54.54	55.25
65	65.23	101.60	82.09	90.73

$$CBR = \frac{\text{Corrected Unit Load}}{\text{Standard Unit Load}} \times 100$$

Standard Unit Load at 2.54 mm penetration level = 70.35 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 105 Kg/cm<sup>2</sup>

#### CBR Reporting:

CBR (%)	At % of Specified Dry Density (AASHTO T-193)	Mixture Content (MC) at Rounding (%)
30.00	90	9.22
59.00	95	9.22
	98	
	100	

#### Remarks:

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vattha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chuan Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

Moisture-Density Relationship for Different Blows in CBR Test(T-193)							
Control No.:		Contractor:		Road No. PR.1534			
Lab. No.:		Sample No.:		Date Test : 20-09-16			
Location: 45+000 R/S, 1.5m		Date Sample: 17-09-16		Borrow Pit:			
Description: Existing Road (Laterite)		Sampled By: ME		Depth: 0.0 - 0.07m			
<b>DETERMINATION OF DENSITY</b>							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Mould No.		B11		B2		B3	
Wt. of compacted wet materials +Mould	g	11235		11665		12025	
Wt of Mould + Base Pan	g	6783		6823		7005	
Wt of wet compacted materials in mould	g	4472		4742		5020	
Volume of Mould	cc	2144		2141		2131	
Wet Density = Wt.of wet compacted materials/volume of mould	g/cc	2.086		2.215		2.366	
Moisture Content	%	9.22		9.27		9.17	
Dry Density=Wet Density/(1+m/100)	g/cc	1.910		2.027		2.168	
<b>MOISTURE DETERMINATION</b>							
No. of blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B22	B2	B6	B23	B33	B8
Wet of Can+Wet Materials	g	361.00	345.00	334.50	325.40	335.70	337.50
Wt of can +Dry Materials	g	324.00	318.00	309.20	293.00	302.00	312.20
Wt of Moisture	g	37.00	26.99	25.30	25.50	25.50	25.30
Wt of can	g	32.00	25.35	31.25	20.37	26.71	32.97
Wt of dry materials	g	292.00	292.65	278.05	268.63	275.19	279.23
Moisture content	%	9.22	9.16	9.05	9.46	9.29	9.05
Average Moisture Content	%	9.22		9.27		9.17	
<div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"> <p>Tested by Contractor</p> <p><u>Saing Vatha</u> Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Witnessed by Consultant</p> <p><u>Maas Saphanny</u> Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Checked by Consultant</p> <p><u>Chuan Sokcheak</u> Material Engineer Date:</p> </div> </div>							

## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

#### Moisture-Density Relationship for Different Blows in CBR Test(T-193)

Contract No.	Contractor	Road No. PR.1534
Lab. No.:	Sampled No.:	Date Test : 20-09-16
Location: 45+000 RHS, 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.07m

#### DETERMINATION OF DENSITY

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		B11	B2	B3
Wt. of compacted wet materials +Mould	g	11235	11555	12025
Wt of Mould+Base Plat	g	6783	6823	7005
Wt of wet compacted materials in mould	g	4472	4742	5020
Volume of Mould	cc	2144	2141	2131
Wet Density = Wt.of wet compacted materials/volume of mould	g/cc	2.086	2.215	2.356
Moisture Content	%	9.22	9.27	9.17
Dry Density=Wet Density/(1+m/100)	g/cc	1.910	2.027	2.168

#### MOISTURE DETERMINATION

No. of blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B22	B2	B6	B23	B33	B8
Wet of Can+Wet Materials	g	381.00	345.80	334.50	326.49	330.70	337.50
Wt of can +Dry Materials	g	329.10	318.00	300.22	299.59	302.90	312.20
Wt of Moisture	g	51.90	27.80	34.28	26.90	27.80	25.30
Wt of can	g	32.60	26.39	31.21	30.97	24.71	30.97
Wt of dry materials	g	296.50	291.61	275.03	268.62	278.19	281.23
Moisture content	%	17.50	9.53	12.46	9.45	9.34	9.00
Average Moisture Content	%	9.22		9.27		9.17	

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Mosa Sophanny  
Lab Technician  
Date:

Chuan Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

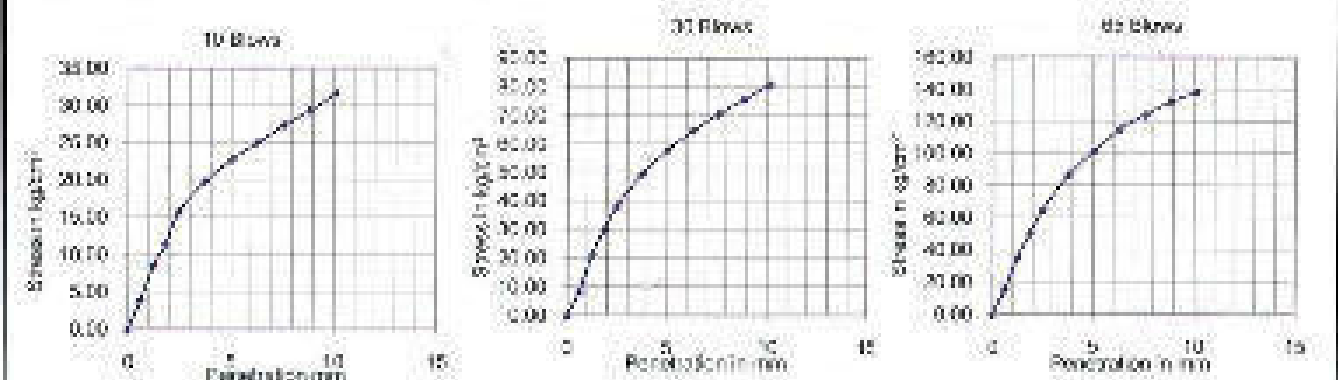
**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Contract No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.:	Date Test: 28-09-16
Location: 45+000 R/H5 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Lateral)	Sampled By: ME	Depth: 0.0 - 0.07m
Soaking started on: 20-09-16	CBR Testing Date: 24-09-16	Moisture: 2.151      DMC(%) : 9.30

**CBR Test (T193): Swell and Penetration Data**

SWELL DATA			Surcharge Weights				4.201 kg				
Date	Time	Remarks	Mold No.1	H(mm) =	SGSS	Mold No.2	H(mm) =	SGSS	Mold No.3	H(mm) =	SGSS
			Reading in mm		Swell %	Reading in mm		Swell %	Reading in mm		Swell %
20-09-16	3:45	Start	2		0	0		0	50		0
21-09-16	8:00		19		0.18	17		0.18	170		0.10
22-09-16	8:00		20		0.19	18		0.18	170		0.10
23-09-16	8:00		20		0.19	19		0.20	170		0.10
24-09-16	8:00	Ended	20		0.19	19		0.20	170		0.10

Penetration		Proving Ring Reading and Stress								
		Mould No.B1 (10 Blows)			Mould No.B2 (30 Blows)			Mould No.B3 (65 Blows)		
inch	mm	Oil Reading	Load in kN	Stress in kgf/cm <sup>2</sup>	Oil Reading	Load in kN	Stress in kgf/cm <sup>2</sup>	Oil Reading	Load in kN	Stress in kgf/cm <sup>2</sup>
0.000	0.00	0.0	0.0000	0.000	0.0	0.0000	0.000	0.0	0.0000	0.000
0.025	0.64	16.0	0.7072	4.341	30.0	1.3440	8.550	72.0	3.0140	18.875
0.050	1.27	28.0	1.2440	8.059	50.0	2.2550	14.379	120.0	4.7404	29.572
0.075	1.91	40.0	2.1000	11.645	100.0	5.7540	35.907	190.0	8.6445	53.822
0.100	2.54	55.0	3.0040	15.873	150.0	7.7554	48.309	230.0	12.3648	55.232
0.150	3.81	85.0	3.7812	19.914	170.0	9.4255	46.646	250.0	16.4540	55.032
0.200	5.08	95.0	4.3290	22.803	200.0	11.0149	55.016	250.0	19.2590	101.500
0.250	6.35	95.0	4.7876	25.111	220.0	12.7090	64.943	250.0	21.6700	116.466
0.300	7.62	25.0	5.2080	27.421	240.0	13.4280	71.178	420.0	23.9738	124.591
0.350	8.89	100.0	5.7090	29.441	260.0	14.6134	75.812	470.0	26.2060	132.773
0.400	10.15	110.0	6.0280	31.750	280.0	15.3860	81.107	480.0	25.3540	126.545



Tested by Contractor:	Witnessed by Consultant:	Checked by Consultant:
   Seng Vatha Lab Technician Date:	   Meas Sophany Lab Technician Date:	   Chhun Sokheak Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.:	Date Test: 20-09-18
Location: 45+000 R+L 1.5m	Date Sample: 17-09-18	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ML	Depth: 0.0 - 0.07m

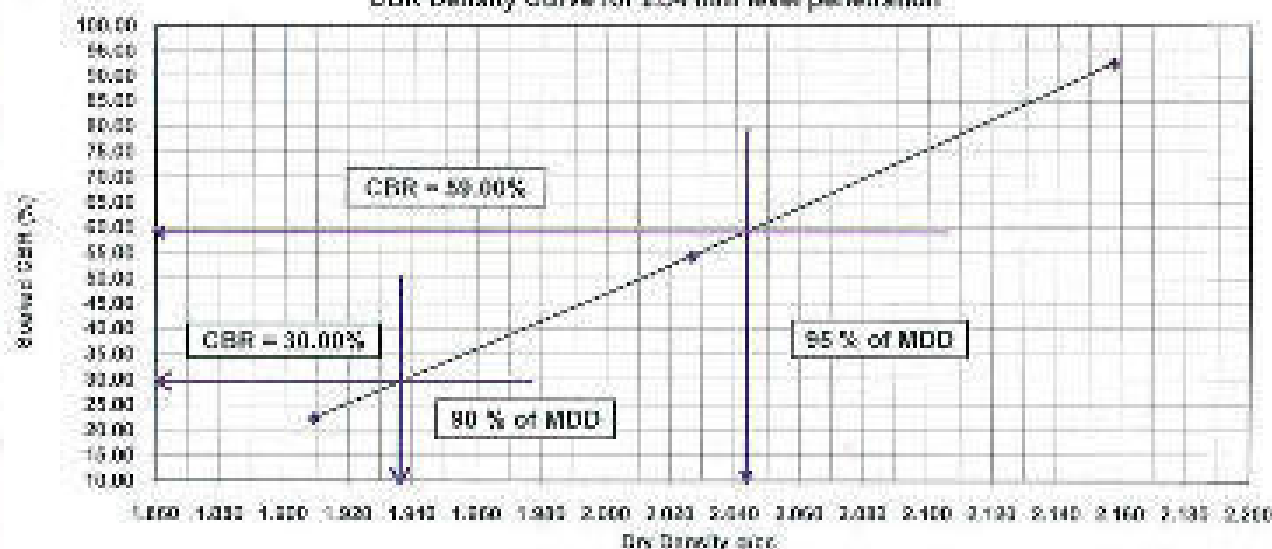
**CBR Test (AASHTO T-193)**

CBR Calculation:	10 Blows	30 Blows	65 Blows
CBR Calculations from corrected load / stress of Form No. 94 graphs	Stress at 2.54mm = 15.03 kg/cm <sup>2</sup>	Stress at 2.54mm = 30.39 kg/cm <sup>2</sup>	Stress at 2.54 mm = 65.23 kg/cm <sup>2</sup>
	CBR = 22.65 %	CBR = 54.54 %	CBR = 82.69 %
	Stress at 5.08mm = 25.00 kg/cm <sup>2</sup>	Stress at 5.08mm = 35.02 kg/cm <sup>2</sup>	Stress at 5.08mm = 101.60 kg/cm <sup>2</sup>
	CBR = 21.02 %	CBR = 55.25 %	CBR = 85.70 %

Moisture-Density Data from sheet 1 CBR MDP	343.9	269.5	275.7	65
	327.2	1.910	2.027	2.158
Corresponding CBR from 2.54 mm penetration level	Corrected CBR ( % )	22.56	54.64	82.68

Plotting value for 80% of Maximum Dry Density (MDD)	1.937	g/cc
Plotting value for 95% of Maximum Dry Density (MDD)	2.044	g/cc

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Mess Sophanny  
Lab Technician  
Date:

Chhun Sokchek  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship AASHTO T-180 for CBR Test**

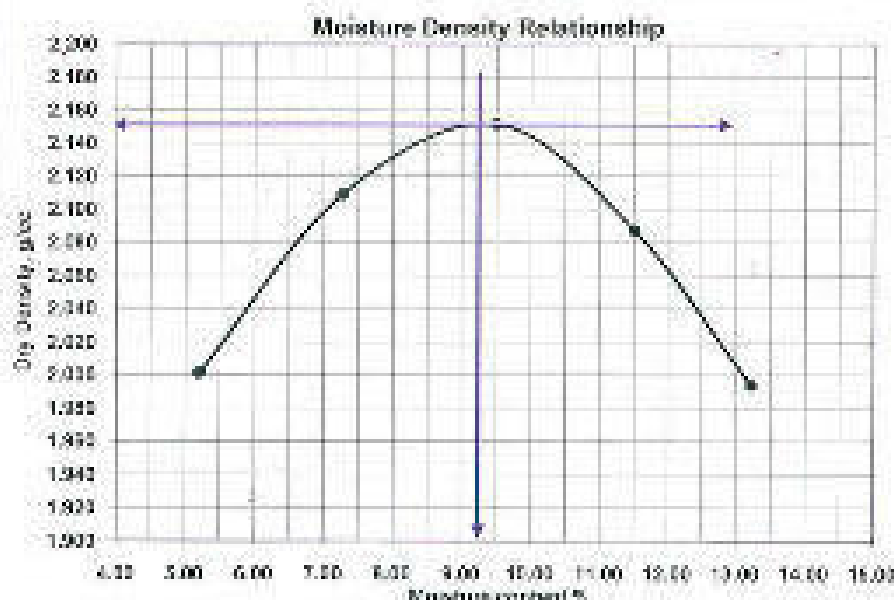
Contract No.:	Contractor:	Road No: PR 1534
Lab No.:	Sample No.:	Date Test: 20/09/16
Location: 45+000 (RHS) 1.5m	Date Sample: 17/09/16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.07m
Weight of Rammer: 4.581 kg, Free fall height = 447 mm, with a flat circular base of dia: 50.8 mm		

**Determination of Density**

Trial No.			I	II	III	IV	V
$W_1$	Wt. of wet compacted material+mould	g	13125.0	11481.0	10691.0	10630.0	12450.0
$W_2$	Wt. of Mould+Base Plot	g	5624.0	5624.0	5624.0	5624.0	5624.0
$W_3$	Wt. of wet compacted materials ( $W_1 - W_2$ )	g	4501	4036	3036	4976	4826
$V_m$	Volume of Mould (by filling water)	cc	2135.00	2135.00	2135.00	2135.00	2135.00
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	2.105	2.262	2.365	2.327	2.257
$\gamma_{d,d}$	Dry Density = $\gamma_{wet} / (1 + m_w / 100)$	g/cc	2.001	2.109	2.151	2.087	1.994

**Determination of Moisture Content :**

Can Nos.			B3	B13	B29	B40	B34
$m$	Wt. of weight material+ Can	g	340.46	344.30	299.50	278.30	330.20
$m_1$	Wt. of dry material + Can	g	320.26	323.10	276.20	253.00	296.50
$m_2$	Weight of water = ( $m - m_1$ )	g	15.20	21.20	23.30	25.30	34.70
$m_3$	Weight of can	g	33.04	31.30	30.66	31.34	33.21
$m_4$	Weight of dry material = ( $m_1 - m_3$ )	g	287.18	291.80	245.55	221.66	263.29
$m_5$	Moisture Content = ( $m_2 / m_4$ ) x 100	%	6.20	7.27	9.50	11.52	13.20



**MDD = 2.152 g/cc**

**OMC = 9.30 %**

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vutha  
Lab Technician

Meas Sophanny  
Lab Technician

Chuan Sokcheek  
Material Engineer

Date:

Date:

Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Sieve Analysis of Fine and Coarse Aggregate**

Control No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.:	Date Test :23-09-16
Location: 45+000 RHS 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.07m
Test Method : AASHTO T-27/T-88		Trial : 01

Weight of dry soil + weight of can:	4845.5	g	Weight of can:	100.5	g
Weight of dry soil:	4745.0	g	Test Method:		

ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Confirm Specification Grade
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00						
3/4"	19.00						
1 1/2"	12.50						
3/8"	9.50	113.1	113.1	2.38	97.62	98	
#4	4.75						
#4							
#8	2.360						
#10	2.000	2140.80	2261.80	47.67	52.33	62	
#16	1.180						
#30	0.600						
#40	0.425	816.7	3078.60	64.85	35.12	35	
#50	0.300						
#60	0.250						
#100	0.150						
#200	0.075	482	3560.60	74.82	25.18	25	
Pan	-0.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

\_\_\_\_\_  
Saing Vanna  
Lab Technician  
Date:

\_\_\_\_\_  
Mass Sophany  
Lab Technician  
Date:

\_\_\_\_\_  
Chhon Sokcheak  
Material Engineer  
Date:

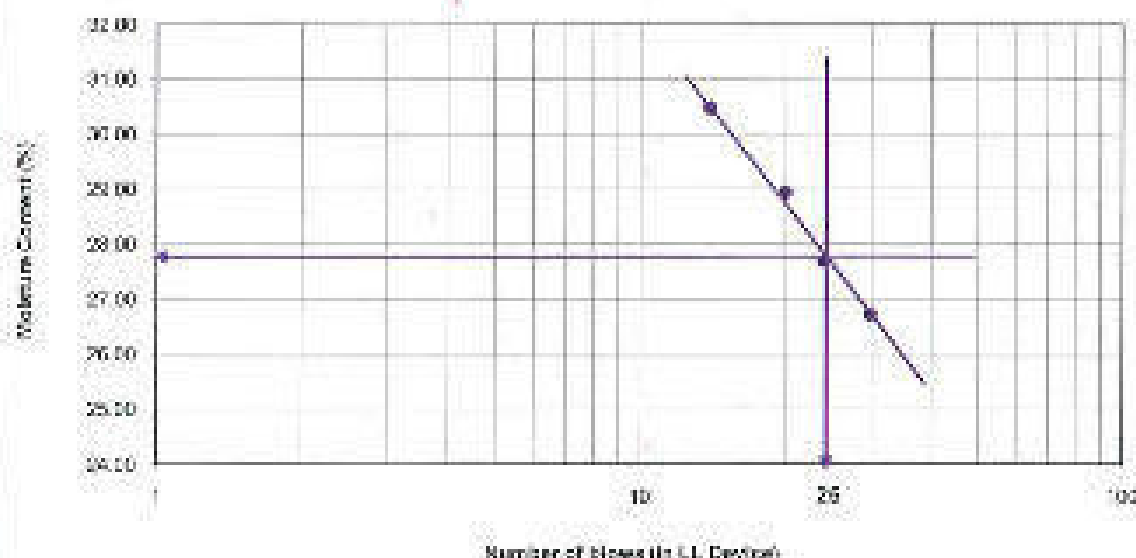
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Contract No.:	Contractor:	Road No: PR-153A
Lab. No.:	Sampled No.:	Date Test: 23-09-16
Location: 45+000 RHS 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.07m
Test Method: AASHTO T-89 and T-90		
Data Sheet		

Liquid Limit (LL)							Plastic Limit (PL)		
Symbol	Description	No of blows T in No Jol	14	20	24	30			
			S25	S13	S20	S28	S32	S5	
$W_1$	Weight of can + Wet soil	g	29.77	29.46	29.74	30.07	29.46	29.47	
$W_2$	Weight of can + Dry soil	g	26.12	26.39	26.75	27.74	23.52	23.35	
$W_3$	Weight of can	g	18.12	18.79	18.21	18.78	18.75	18.25	
$W_4$	Weight of water = ( $W_1 - W_3$ )	g	3.65	3.07	3.03	2.33	1.14	1.11	
$W_5$	Weight of dry soil = ( $W_2 - W_3$ )	g	10.73	10.50	10.57	10.86	5.06	6.36	
$W_6$	Moisture content = ( $W_4/W_5 \times 100$ )	%	30.40	28.25	27.72	20.74	17.28	17.40	
LL	Liquid Limit (from graph)	%	27.80				17.39		
PI	Plastic Index	%	10.41						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Valha  
Lab Technician  
Date:

Meas Saphanny  
Lab Technician  
Date:

Chhun Sokhaek  
Material Engineer  
Date:



**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Summary of test Result (Embankment Material)**

<b>1. Description</b>							
Consultant	KCI Engineering Co., Ltd / #ECC/SBK/SAWAC	Contractor	GUYKANG-VSC JV				
Lab No.	T53-54	Date of sampling	05-01-2015				
Sample No.	S-125	Date completed of testing	25-01-2015				
Description	Silly Clayey S&Sand For Embankment Materials	Location	Borrow Pit PK: 18+500(RHS) 400m, PR_150B-W/50m(60x50x3.5)m				
<b>2. Test Result</b>							
Item	1. Shale (%)	2. Atterberg Limit			4. Proctor		5. CBR (%)
	# 0.075mm	LL ( % )	PL ( % )	PI	MOU ( g/cc )	OMC ( % )	( 90% of MOU )
Test Result	25.38	27.80	17.39	10.41	2.152	9.30	30.00
Specification	-	-	-	-	-	-	≥ 4
Decision	-	-	-	-	-	-	Accept
<b>3. Engineer's Comment</b>							
<b>4. Certification</b>							
Item	Name	Position	Date	Signature			
Tested By		Lab Technician					
Checked By		Material Engineer					
Reviewed By		Int. Material Engineer					
Approved By		Resident Engineer					

## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

#### CBR Penetration Test (AASHTO T-193): Result Summary

Control No.:	Contractor:	Road No: PR.1534
Lap No.:	Sampled No.: S-01	Date Test: 29-08-18
Location: 801000 LHS_1.5m	Date Sample: 17-09-18	Donor Pit: 1
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.10m
Soaking started on: 26-09-18	CBR Testing Date:	24-08-18
MDD(g/cc): 2.160	g/cc	OMC(%): 8.80 %

#### DATA SHEET

#### CBR CALCULATIONS

No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	30.60	50.31	43.47	48.11
30	37.62	57.17	53.31	63.02
65	40.41	68.03	57.42	63.84

$$\text{CBR} = \text{Corrected Unit Load} / \text{Standard Unit Load} * 100$$

Standard Unit Load at 2.54 mm penetration level = 70.38 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 105 Kg/cm<sup>2</sup>

#### CBR Reporting:

CBR (%)	At % of Specified Dry Density (AASHTO T-193)	Moisture Content (MC) at Molding (%)
44.00	90	8.35
60.02	95	8.35
	99	
	100	

#### Remarks:

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Mees Sopanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

Kingdom of Cambodia  
Ministry of Public Works and Transportation  
Project Management Unit 3

Provincial Roads Improvement Project  
ADB Loan No. 2939-CAM (SF)  
ADB Loan No. 5254-CAM

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

Moisture-Density Relationship for Different Blows in CBR Test(T-193)							
Contract No.:		Contractor:		Road No. PR.150B			
Lab. No.:		Sampled No. S-01		Date Test : 20-05-18			
Location: PH-001 LHS, 1.5m		Date Sample: 17-05-18		Borrow Pit:			
Description: Existing Road (Laterite)		Sampled By: ME		Depth: C.U. 0.15m			
DETERMINATION OF DENSITY							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Mould No.		A1		A2		A3	
Wt. of compacted wet materials +Mould	g	11350		11720		11850	
Wt of Mould+Base Plat	g	6866		6861		6830	
Wt of wet compacted materials in mould	g	4484		4859		5020	
Volume of Mould	cc	2137		2129		2130	
Wet Density = Wt of wet compacted materials/Volume of mould	g/cc	2.098		2.292		2.357	
Moisture Content	%	8.41		8.37		8.28	
Dry Density=Wet Density/(1+mc/100)	g/cc	1.935		2.106		2.177	
MOISTURE DETERMINATION							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B17	B37	B1	B28	B16	B9
Wet of Can+Wet Materials	g	351.70	367.60	345.60	355.60	348.60	346.60
Wt of can +Dry Materials	g	325.40	328.70	320.60	330.70	324.40	324.60
Wt of Moisture	g	26.30	38.90	24.90	24.90	24.20	21.90
Wt of can	g	31.14	32.30	31.23	33.10	31.18	32.76
Wt of dry materials	g	294.26	300.31	289.47	297.67	293.22	292.02
Moisture content	%	8.97	12.95	8.67	8.37	8.25	7.50
Average Moisture Content	%	8.41		8.37		8.26	
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Tested by Contractor</p>     <p>_____ Saing Vattha Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Witnessed by Consultant</p>     <p>_____ Meas Sophanny Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Checked by Consultant</p>     <p>_____ Chhor Soknheak Material Engineer Date:</p> </div> </div>							

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

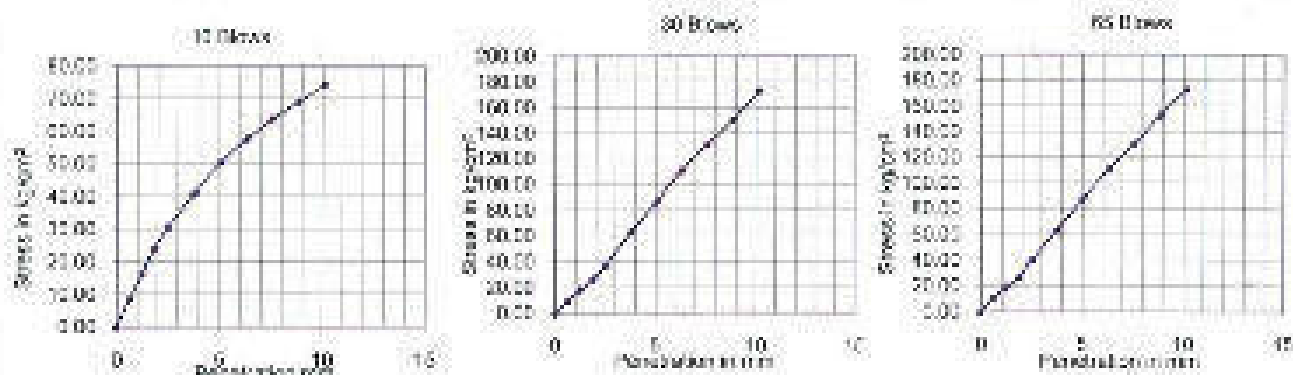
**Determination of California Bearing Ratio(CBR) | AASHTO T-193**

Control No.:	Contractor:	Road No: PR-1534
Lab. No.:	Sampled No.: S-01	Date Test: 20-09-16
Location: 80+000 LHS_1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.18m
Soaking started on: 20-09-16	CBR Testing Date: 24-09-16	MDD(g/cc): 2.160      OM(C%): 5.80

**CBR Test (T193): Swell and Penetration Data**

SWELL DATA			Surcharge Weights: 4.581 kg								
Date	Time	Remarks	Mold No.1	H(mm) =	9885	Mold No.2	H(mm) =	9885	Mold No.3	H(mm) =	9885
			Reading in mm			Swell %	Reading in mm			Swell %	Reading in mm
20-09-16	2:00	Start	0		0	0		0	0		0
21-09-16	8:00		2		0.02	3		0.03	3		0.03
22-09-16	9:00		3		0.02	4		0.04	4		0.04
23-09-16	9:00		2		0.02	4		0.04	4		0.04
24-09-16	9:00	Ended	2		0.02	4		0.04	4		0.04

Penetration		Proving Ring Reading and Stress								
		Mould No.A1 (10 Blows)			Mould No.A2 (30 Blows)			Mould No.A3 (95 Blows)		
inch	mm	Dist Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dist Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dist Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0.0	0.0000	0.000	0.0	0.0000	0.000	0.0	0.0000	0.000
0.020	0.51	32.0	1.8440	5.852	34.0	1.8892	5.874	38.0	2.1372	6.257
0.050	1.27	33.0	5.1235	16.402	35.0	3.0072	10.473	39.0	3.7094	11.627
0.075	1.91	34.0	4.6522	24.246	36.0	3.0864	26.843	40.0	3.1512	27.437
0.100	2.54	35.0	5.4055	30.506	40.0	7.1249	37.523	43.0	7.8025	41.489
0.150	3.81	43.0	7.7817	40.846	50.0	12.1176	53.789	55.0	15.3364	64.366
0.200	5.08	55.0	5.5222	50.511	55.0	15.5455	57.155	60.0	15.7140	68.024
0.250	6.35	70.0	10.9600	67.727	60.0	21.0560	111.126	65.0	21.0560	111.126
0.300	7.62	82.0	12.1896	54.577	65.0	34.8340	131.590	65.0	34.8340	131.590
0.350	8.89	240.0	13.1500	59.273	50.0	26.0634	100.967	65.0	20.0440	75.973
0.400	10.17	250.0	14.1500	72.456	50.0	32.8125	123.102	65.0	32.8125	123.102



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date

Meas Sophanny  
Lab Technician  
Date

Chuan Sokcheak  
Material Engineer  
Date

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Determination of California Bearing Ratio(CBR) | AASHTO T-193|**

Contract No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No: S-01	Date Test: 20-08-18
Location: 50+000 LHS 1.5m	Date Sample: 17-09-18	Borrow Pit: 1
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.15m

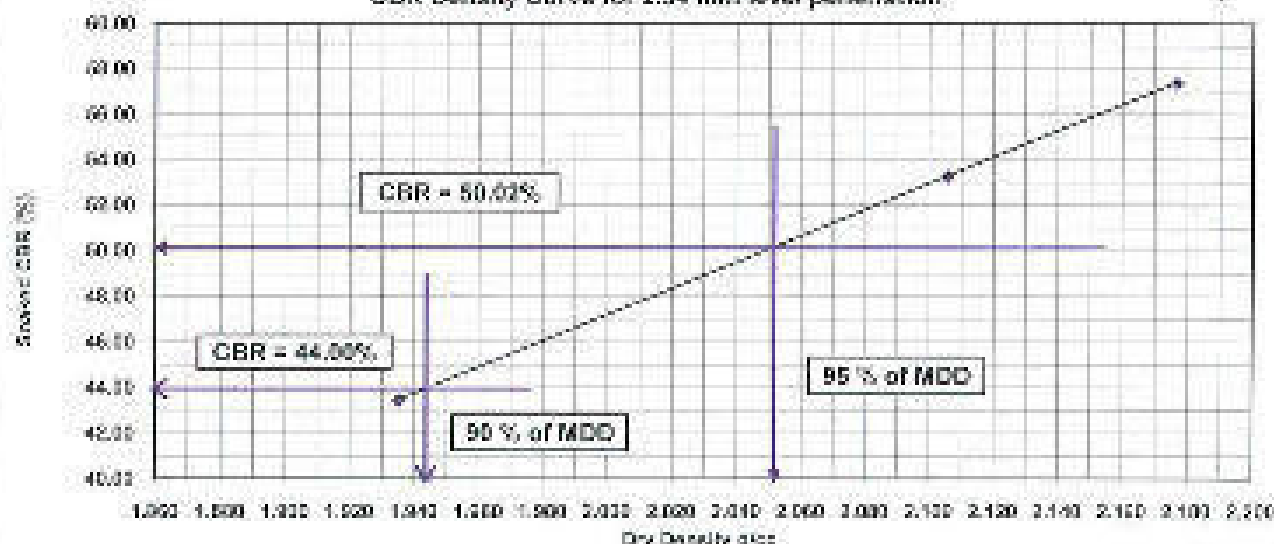
**CBR Test (AASHTO T-193)**

CBR Calculation :	10 Blows	30 Blows	65 Blows
CBR Calculations from corrected load values of Form No. 9A graphs	Stress at 2.54mm = 30.00 kg/cm <sup>2</sup>	Stress at 2.54mm = 37.62 kg/cm <sup>2</sup>	Stress at 2.54 mm = 40.41 kg/cm <sup>2</sup>
	CBR = 43.47 %	CBR = 53.31 %	CBR = 57.42 %
	Stress at 5.08mm = 50.51 kg/cm <sup>2</sup>	Stress at 5.08mm = 87.17 kg/cm <sup>2</sup>	Stress at 5.08mm = 88.00 kg/cm <sup>2</sup>
	CBR = 48.11 %	CBR = 85.07 %	CBR = 83.54 %

Moisture-Density Data from sheet " CBR MDD "	243.8	269.5	279.7	85
	327.2	1.936	2.106	2.177
Corresponding CBR from 2.54 mm penetration level	Corrected CBR ( % )	43.47	53.31	57.42

Plotting value for 90% of Maximum Dry Density (MDD)	1.944	g/cc
Plotting value for 95% of Maximum Dry Density (MDD)	2.052	g/cc

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Sang Vathia  
Lab Technician  
Date:

Meas Soanmany  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

#### Sieve Analysis of Fine and Coarse Aggregate

Control No.:	Contractor:	Road No. PR 153A
Lab. No.	Sampled No. S-01	Date Test: 23-09-18
Location: 80+000 LHS_1.5m	Date Sample: 17-09-18	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.18m
Test Method : AASHTO T-27/T-88		Trial : 01

Weight of dry soil + weight of can	8305.5	g	Weight of can	100.5	g
Weight of dry soil:	8205.0	g	Test Method:		

ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Confirm Specification Grade
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00	62.8	62.8	0.65	99.32	99	
3/4"	19.00						
1/2"	12.50						
3/8"	10.00	1136.4	1199.2	13.02	86.08	87	
#4	4.75						
#4							
#8	2.360						
#10	2.000	5706.40	4904.80	59.28	40.72	41	
#18	1.180						
#30	0.850						
#40	0.425	1300.0	6204.80	57.41	32.59	33	
#50	0.300						
#60	0.250						
#100	0.150						
#200	0.075	800.4	7005.20	76.65	23.35	23	
Pan	0.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophaany  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

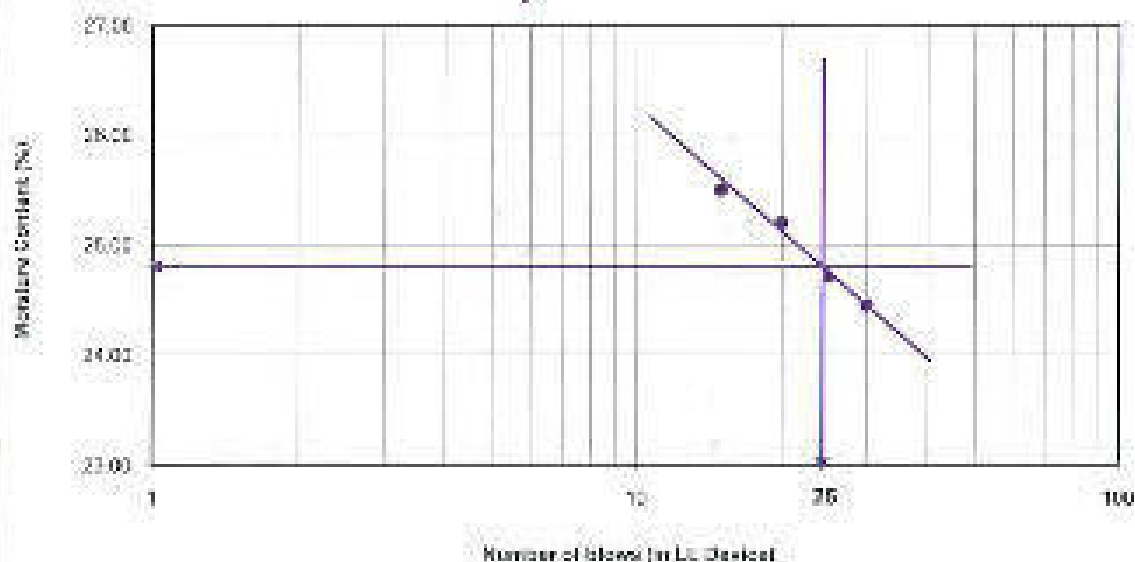
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Control No.:	Contractor:	Road No. PR 1534
Lab. No.:	Sampled No.: S-01	Date Test 23-09-16
Location: 504050 (11B) 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: MC	Depth: 0.0 - 0.15m
Test Method: AASHTO T-89 and T-90		
Data Sheet		

Liquid Limit (LL)							Plastic Limit (PL)		
Symbol	Description	No of blows 25 mm No. Unit	16	20	26	30			
			640	537	514	539	535	56	
$W_1$	Weight of can + Wet soil	g	29.72	29.34	29.11	29.85	29.27	29.05	
$W_2$	Weight of can + Dry soil	g	25.25	25.85	27.15	26.46	24.41	24.44	
$W_3$	Weight of can	g	15.14	15.15	15.29	16.23	16.55	15.93	
$W_4$	Weight of water = ( $W_1 - W_2$ )	g	2.76	2.09	2.70	2.57	1.26	1.24	
$W_5$	Weight of dry soil = ( $W_2 - W_3$ )	g	10.11	10.67	11.87	10.23	7.86	7.84	
$W_6$	Moisture content = ( $W_4/W_5 \times 100$ )	%	25.51	25.21	24.73	24.48	16.05	15.84	
LL	Liquid Limit (from graph)	%	24.50				15.96		
PI	Plastic Index	%	8.54						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vattha  
Lab Technician  
Date:

Meas Sopphany  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

Kingdom of Cambodia  
Ministry of Public Works and Transportation  
Project Management Unit 3

Provincial Roads Improvement Project  
ADB Loan No. 2839-CAM (SF)  
ADB Loan No. 5254-CAM

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship AASHTO T-160 for CBR Test**

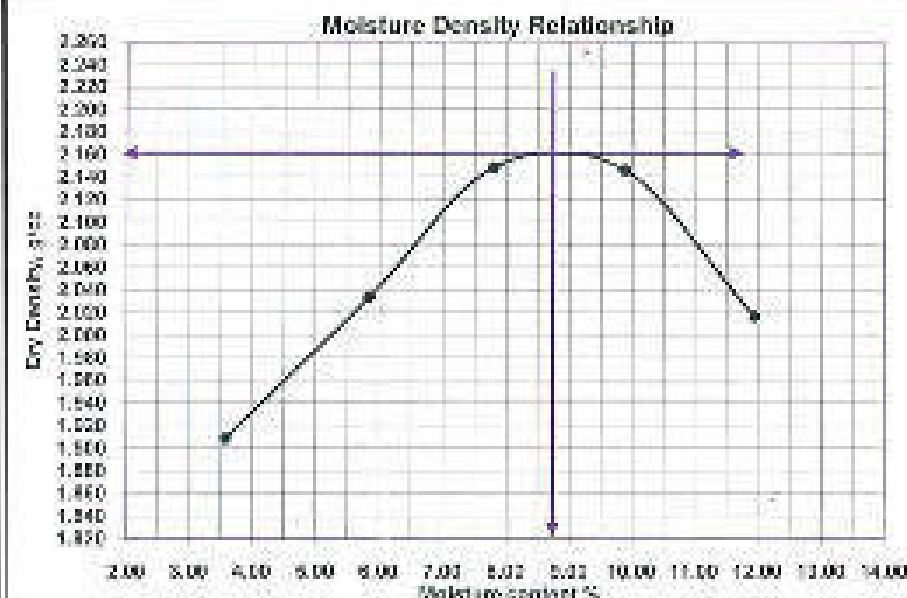
Contract No.:	Contractor:	Road No: PR 153A
Lab. No:	Sampled No.: S-01	Date Test: 20-09-16
Location: 50+000 LHS 1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road (Laterite)	Sampled By: ME	Depth: 0.0 - 0.18m
Weight of Rammer: <u>4,501 kg</u> / free fall height = <u>447 mm</u> with a fall circular size of dia: <u>50.8 mm</u>		

**Determination of Density**

Trial No.			I	II	III	IV	V
$W_1$	Wt. of wet compacted material in mould	g	8563.0	10225.0	10573.0	10633.0	10460.0
$W_2$	Wt. of Mould+Base Plat	g	6524.0	6524.0	6524.0	6524.0	6524.0
$W_3$	Wt. of wet compacted materials ( $W_1 - W_2$ )	g	4226	4601	4651	5041	4826
$V_m$	Volume of Mould by filling water	cc	2138.00	2138.00	2138.00	2138.00	2138.00
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	1.977	2.152	2.318	2.358	2.257
$\gamma_{d,d}$	Dry Density = $\gamma_{wet} / (1 + w / 100)$	g/cc	1.908	2.033	2.148	2.148	2.016

**Determination of Moisture Content :**

Can Nos.			B16	B14	B36	B18	B28
$m$	Wt. of weight material+ Can	g	415.40	422.70	339.90	314.80	363.70
$m_1$	Wt. of dry material + Can	g	402.20	401.70	317.70	280.20	316.80
$m_2$	Weight of water = ( $m - m_1$ )	g	13.20	21.00	22.20	35.80	35.80
$m_c$	Weight of can	g	33.30	31.32	33.12	30.05	33.13
$m_d$	Weight of dry material = ( $m_1 - m_c$ )	g	368.90	369.75	284.58	250.15	283.57
$m_1$	Moisture Content = ( $m_2 / m_d$ ) x 100	%	3.58	5.84	7.80	9.88	11.95



MDD = 2.160 g/cc

OMC = 8.80 %

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Seing Vatha  
Lab Technician  
Date:

Mass Sathany  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:



**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

<b>Summary of test Result (Embankment Material)</b>							
<b>1. Description</b>							
Consultant	KC Engineering Co., Ltd / MEDD/SEK/SAWAC		Contractor		EUMKANG-VSC JV		
Lab No.	153-64		Date of sampling		05-01-2015		
Sample No.	S.125		Date completed of testing		25-01-2015		
Description	Silty Clayey SSand For Embankment Materials		Location		Borrow Pit PK- 11+600/RI15_550m, PR_150B-W, Size(60x60x1.3)m		
<b>2. Test Result</b>							
Item	1.Sieve (%)	2.Atterberg Limit			4.Proctor		5 CBR (%)
	# 0.075mm	LL ( % )	PL ( % )	PI	MDD ( g/cc )	OMC ( % )	( 90% of MDD )
Test Result	25.35	24.60	15.96	8.64	2.160	8.80	44.00
Specification	-	-	-	-	-	-	≥ 4
Decision	-	-	-	-	-	-	Accept
<b>3. Engineer's Comment</b>							
<b>4. Certification</b>							
Item	Name	Position	Date	Signature			
Tested By		Lab Technician					
Checked By		Material Engineer					
Reviewed By		Int. Material Engineer					
Approved By		Resident Engineer					

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

CBR Penetration Test (AASHTO T-193): Result Summary				
Contract No:		Contractor:		Road No: PR.1534
Lab. No.:		Sampled No.: S-01		Date Test: 25-09-16
Location: 05+000 U-15_1.0m		Date Sample: 17-08-16		Borrow Pit:
Description: Existing Subgrade below sterile		Sampled By: ML		Depth: 0.18 ~ 0.50m
Soaking started on: 25-08-16		CBR Testing Date:		29-09-16
MDD(g/cc): 2.150		g/cc		OMC(%): 7.25 %
<b>DATA SHEET</b>				
<b>CBR CALCULATIONS</b>				
No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	5.23	11.08	7.43	10.55
30	9.41	36.80	13.37	36.06
60	10.97	37.84	15.46	36.86
CBR= Corrected Unit Load/Standard Unit Load * 100 Standard Unit Load at 2.54 mm penetration level = 70.36 Kg/cm <sup>2</sup> Standard Unit Load at 5.08 mm penetration level = 105 Kg/cm <sup>2</sup>				
<b>CBR Reporting:</b>				
CBR (%)	At % of Specified Dry Density (AASHTO T-193)		Moisture Content (MC) or Moisture (w)	
7.60	90		6.43	
11.50	95		6.43	
	90			
	100			
<b>Remarks:</b>				
Tested by Contractor		Witnessed by Consultant		Checked by Consultant
_____ Saing Vafha Lab Technician Date:		_____ Nosa Sophanny Lab Technician Date:		_____ Chuen Sorcheak Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship for Different Blows in CBR Test(T-193)**

Control No.:	Contractor:	Road No. PR.1534
Lab. No.:	Sampled No. S-01	Date Test: 21-05-16
Location: 05+000 LHS, 1.5m	Date Sample: 17-03-16	Borrow Pit:1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.50m

**DETERMINATION OF DENSITY**

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		A1	A2	A3
Wt. of compacted wet materials +Mould	g	11210	11410	11940
Wt of Mould+Base Pan	g	6768	6517	6775
Wt of wet compacted materials in mould	g	4442	4893	5165
Volume of Mould	cc	2165	2169	2170
Wet Density = Wt.of wet compacted materials/volume of mould	g/cc	2.052	2.256	2.380
Moisture Content	%	6.31	6.33	6.65
Dry Density=Wet Density/(1+m <sub>c</sub> /100)	g/cc	1.930	2.122	2.232

**MOISTURE DETERMINATION**

No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B15	B31	B13	B3	B10	B30
Wet of Can+Wet Materials	g	302.80	324.75	302.70	342.20	343.45	365.70
Wt of can +Dry Materials	g	315.30	307.25	314.70	327.80	325.90	395.30
Wt of Moisture	g	17.50	17.50	18.00	15.61	19.50	20.20
Wt of can	g	33.30	33.21	31.30	33.04	31.55	33.42
Wt of dry materials	g	282.00	274.04	283.40	294.76	294.35	361.88
Moisture content	%	6.24	6.38	6.35	6.31	6.62	6.56
Average Moisture Content	%	6.31		6.33		6.65	

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Sang Vatha  
Lab Technician  
Date:

Mass Sophany  
Lab Technician  
Date:

Chuan Sokchek  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

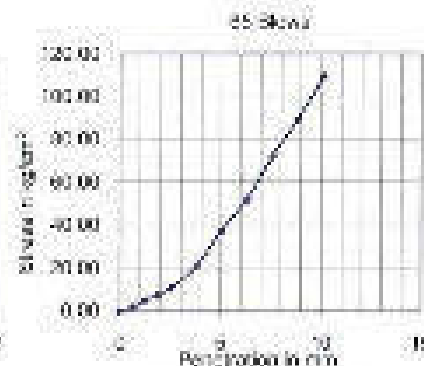
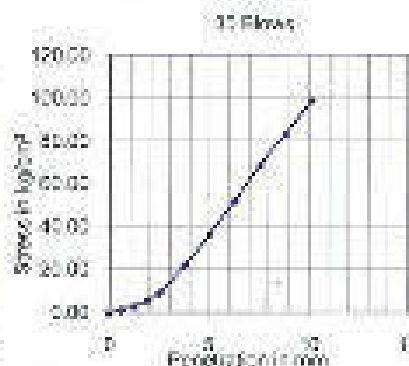
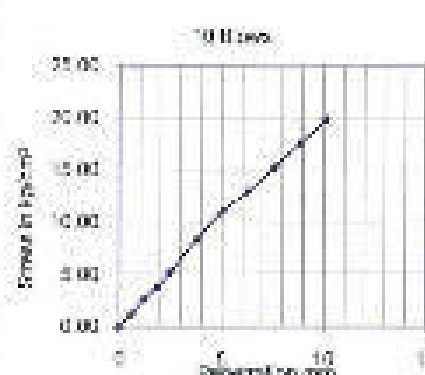
**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No.	Contractor	Road No: PR.153A
Lab. No.:	Sampled No.: S-01	Date Test: 25-09-16
Location: 05+000 LHS 1.5m	Date Sample: 17-09-16	Borrow Pit:1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.50m
Soaking started on: 25-09-16	CBR Testing Date: 29-09-16	WDM(g/cc): 2.150      OMC(%): 7.25

**CBR Test (T193): Swell and Penetration Data**

SWELL DATA			Surcharge Weight: 4.581 kg					
Date	Time	Remarks	Mold No.1   H(mm) = 9585 Reading in mm	Swell %	Mold No.2   H(mm) = 9585 Reading in mm	Swell %	Mold No.3   H(mm) = 9585 Reading in mm	Swell %
25-09-16	5.00	Start	51	0	52	0	504	0
26-09-16	8.00		51	0.00	52	0.00	505	0.04
27-09-16	8.00		51	0.00	52	0.00	511	0.07
28-09-16	8.00		51	0.00	52	0.00	512	0.08
29-09-16	8.00	Ended	51	0.00	52	0.00	514	0.10

Penetration		Proving Ring Reading and Stress								
		Mold No. A1 (10 Blows)			Mold No. A2 (30 Blows)			Mold No. A3 (65 Blows)		
inch	mm	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Dial Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0.0	0.0000	0.000	0.0	0.0000	0.000	0.0	0.0000	0.000
0.025	0.64	0.0	0.2382	1.260	0.0	0.2770	1.464	0.0	0.3176	1.518
0.050	1.27	0.0	0.4664	2.510	0.0	0.5525	3.007	0.0	0.6325	3.220
0.075	1.91	0.0	0.7146	3.764	0.0	1.1115	5.855	0.0	1.4659	7.237
0.100	2.54	25.0	0.9935	5.250	15.0	1.7355	8.910	32.0	2.0544	10.070
0.150	3.81	40.0	1.5682	8.364	32.0	4.2470	22.374	100.0	3.3700	20.910
0.200	5.08	55.0	2.1041	11.032	47.0	5.9372	30.802	155.0	7.0400	37.690
0.250	6.35	65.0	2.4614	12.614	55.0	6.9750	37.706	200.0	8.9700	47.206
0.300	7.62	75.0	2.8087	15.285	65.0	13.1010	67.004	245.0	13.5086	72.141
0.350	8.89	85.0	3.3049	17.355	75.0	16.6800	86.642	290.0	17.0710	89.910
0.400	10.16	95.0	3.7716	19.825	85.0	18.8575	98.324	325.0	20.1425	102.725



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR63 and PR151B Project**

**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No.	Contractor	Road No. PR.153A
Lab. No.:	Sampled No.: S-01	Date Test: 26-09-16
Location: 05+000 U-S_1.5m	Date Sample: 17-09-16	Omoko Pk.1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.53m

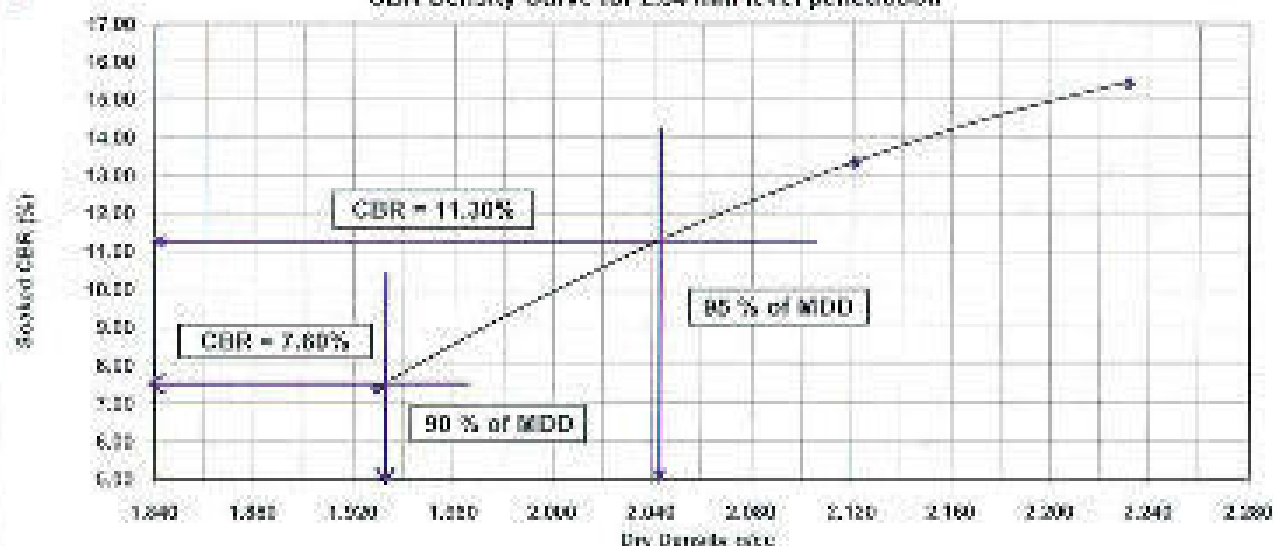
**CBR Test (AASHTO T-193)**

CBR Calculation:	15 Blows	30 Blows	65 Blows
CBR Calculations from corrected load / plots of Form No. 5A graphs	Stress at 2.54mm= 5.23 kg/cm <sup>2</sup>	Stress at 2.54mm= 9.41 kg/cm <sup>2</sup>	Stress at 2.54 mm= 19.87 kg/cm <sup>2</sup>
	CBR = 7.43 %	CBR = 13.37 %	CBR = 15.45 %
	Stress at 5.08mm= 11.08 kg/cm <sup>2</sup>	Stress at 5.08mm= 36.50 kg/cm <sup>2</sup>	Stress at 5.08mm= 37.64 kg/cm <sup>2</sup>
	CBR = 10.65 %	CBR = 30.06 %	CBR = 35.85 %

Moisture-Density Data from sheet " CBR MD "	543.9	269.5	279.7	05.
	327.2	1.910	2.122	2.232
Corresponding CBR from 2.54 mm penetration level:	Corrected CBR ( % )	7.43	13.37	15.45

Plotting value for 50% of Maximum Dry Density (MDD)	1.935	g/cc
Plotting value for 95% of Maximum Dry Density (MDD)	2.043	g/cc

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor	Witnessed by Consultant	Checked by Consultant
Saing Vatha Lab Technician Date:	Meas Sophanny Lab Technician Date:	Chhun Sakheak Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship AASHTO T-180 for CBR Test**

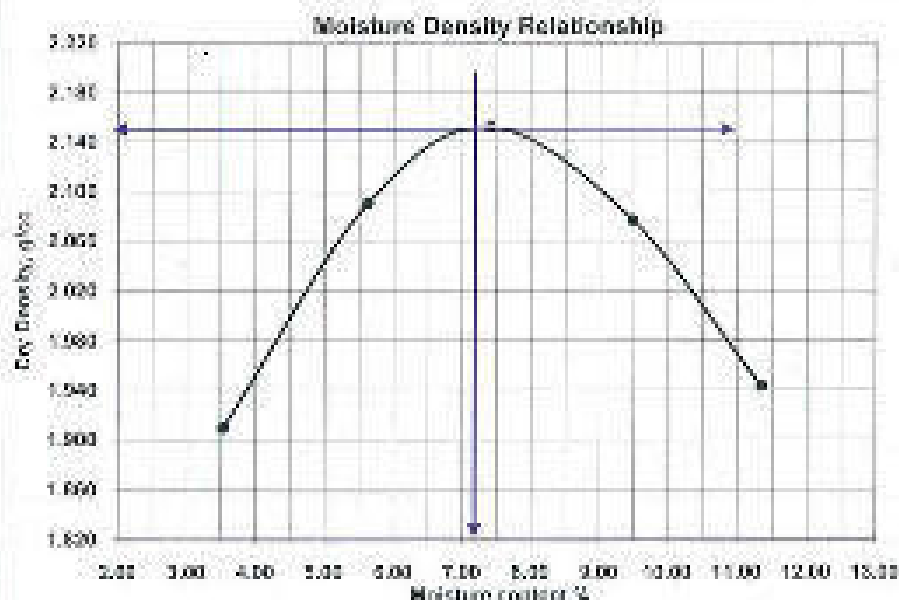
Contract No.:	Contractor:	Road No. PR 1534
Lab. No.:	Sampled No.: S-011	Date Test: 21-09-18
Location: 26+000 LHS 1.5m	Date Sample: 17-09-18	Survey Plot:
Description: Existing Road	Sampled By: ME	Depth: 0.10 - 0.50m
Weight of Rammer: <u>4.531 kg</u> , Free fall height = <u>457 mm</u> , with a flat circular base of dia: <u>50.8 mm</u>		

**Determination of Density**

Trial No.			I	II	III	IV	V
$W_1$	Wt. of wet compacted material (mould)	g	5030.0	10345.0	10565.0	10405.0	10750.0
$W_2$	Wt. of Mould+Base Plat	g	5024.0	5024.0	5024.0	5024.0	5024.0
$W_3$	Wt. of wet compacted materials ( $W_1 - W_2$ )	g	4226	4721	4941	4381	4026
$V_m$	Volume of Mould (by filling water)	cc	2138.00	2138.00	2138.00	2138.00	2138.00
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	1.977	2.208	2.311	2.274	2.164
$\gamma_{d}$	Dry Density = $\gamma_{wet} / (1 + m_s / 100)$	g/cc	1.909	2.090	2.152	2.077	1.943

**Determination of Moisture Content :**

Can Nos.			B10	B25	B31	B15	B9
$m$	Wt. of weight material+ Can	g	320.50	310.70	295.50	294.10	405.80
$m_1$	Wt. of dry material + Can	g	310.70	295.50	281.50	271.50	367.60
$m_2$	Weight of water = ( $m - m_1$ )	g	9.80	14.90	18.40	22.60	38.20
$m_3$	Weight of can	g	33.11	31.50	31.31	30.00	30.97
$m_4$	Weight of dry material = ( $m_1 - m_3$ )	g	277.59	254.00	240.29	230.20	336.63
$m_5$	Moisture Content = $(m_2 / m_4) \times 100$	%	3.53	5.83	7.41	9.49	11.35



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Sang Mather  
Lab Technician  
Date:

Mess Sophanny  
Lab Technician  
Date:

Chhun Sokdech  
Material Engineer  
Date:

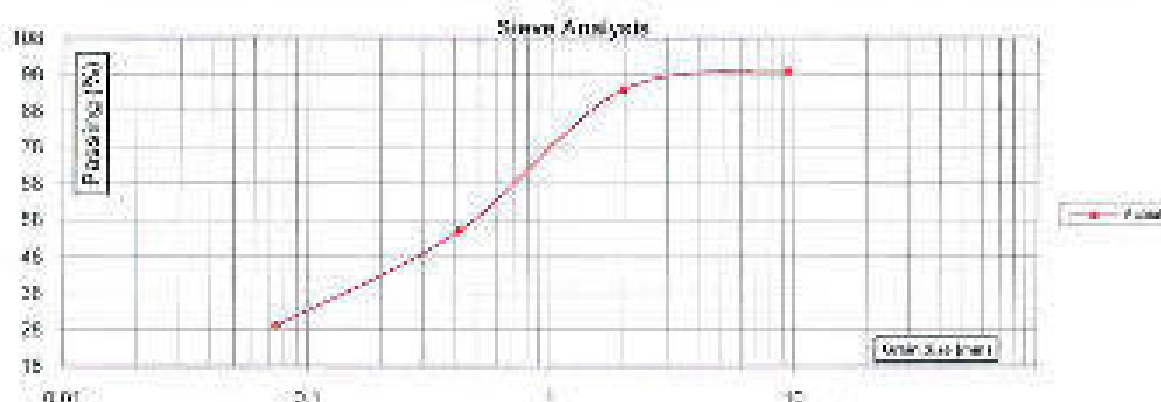
**Korea Consultant International**  
**Improvement of PR150B, NR63 and PR151B Project**

**Sieve Analysis of Fine and Coarse Aggregate**

Control No.:	Contractor:	Road No: PR.153A
Lab. No.:	Sampled No.: G-01	Date Test: 21-08-16
Location: 00+000 LHS 1.5m	Date Sample: 17-09-15	Borrow Pit: 1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.50m
Test Method : AASHTO T-27/T-88		Trial : 01

Weight of dry soil + weight of can:	3715.5	g	Weight of can:	100.0	g
Weight of dry soil:	3615.0	g	Test Method:		

ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentages (%)		Confirm Specification Grade-
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00						
3/4"	19.00						
1/2"	12.50						
3/8"	9.50	36.0	36.0	1.00	99.00	99	
# 4	4.75						
# 4							
# 5	2.360						
# 10	2.000	170.10	214.10	5.82	94.06	94	
# 16	1.180						
# 30	0.600						
# 40	0.425	1404.9	1619.00	44.76	55.24	55	
# 50	0.300						
# 50	0.180						
# 100	0.150						
# 200	0.075	627.5	2546.50	70.44	29.55	30	
Pass	<0.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophany  
Lab Technician  
Date:

Chhun Sokchann  
Material Engineer  
Date:

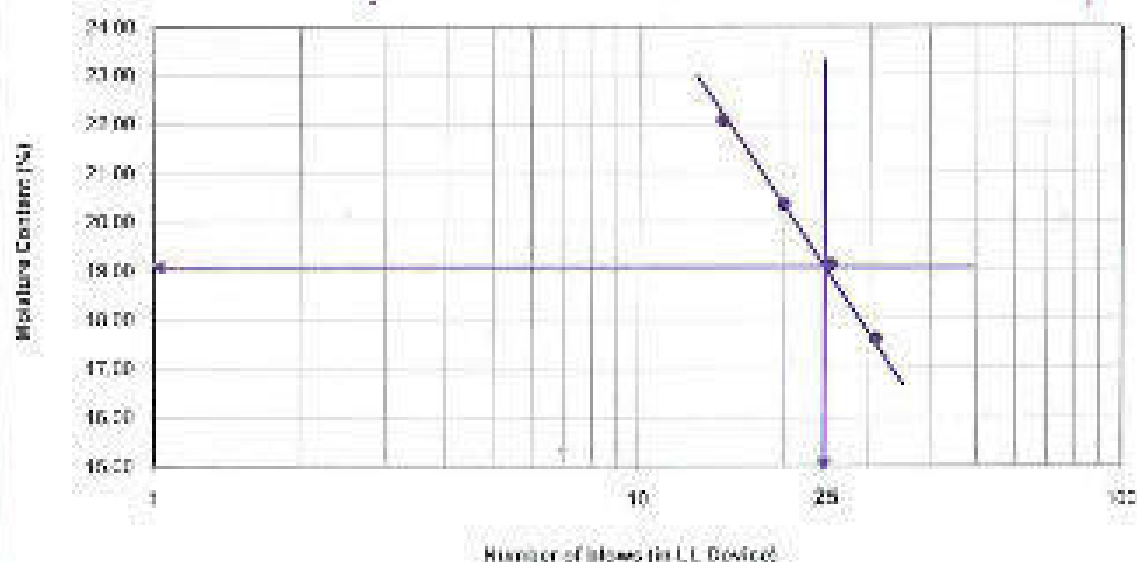
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Contract No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.: S-01	Date Test: 23-08-18
Location: 054000 LHS 1.5m	Date Sample: 17-08-18	Barrow PR 1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.50m
Test Method : AASHTO T-89 and T-90		
Data Sheet		

Liquid Limit (LL)							Plastic Limit (PI)		
Symbol	Description	No. of blows in No. 25	15	20	25	31			
			510	529	537	58	52	56	
W <sub>1</sub>	Weight of can + Wet soil	g	29.84	29.50	29.57	29.74	24.30	24.30	
W <sub>2</sub>	Weight of can + Dry soil	g	27.27	27.50	27.76	27.25	23.20	23.40	
W <sub>3</sub>	Weight of can	g	16.54	16.21	15.38	15.34	13.67	13.55	
W <sub>4</sub>	Weight of water = (W <sub>1</sub> - W <sub>2</sub> )	g	2.57	2.20	2.12	2.49	0.92	0.82	
W <sub>5</sub>	Weight of dry soil = (W <sub>2</sub> - W <sub>3</sub> )	g	10.73	11.29	11.57	12.67	7.71	6.85	
W <sub>6</sub>	Moisture content = (W <sub>4</sub> /W <sub>5</sub> * 100)	%	22.15	20.37	18.35	17.67	11.85	11.57	
LL	Liquid Limit (from graph)	%	19.10				11.95		
PI	Plastic Index	%	7.15						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:



**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

<b>Summary of test Result (Embankment Material)</b>							
<b>1. Description</b>							
Consultant	KCI Engineering Co.,Ltd / MFCCQ5BK95AWAC	Contractor	GUMKANG-VSC JV				
Lab No.	T53-54	Date of sampling	05-01-2015				
Sample No.	S.125	Date completed of testing	25-01-2015				
Description	Silty Clayey Sand For Embankment Materials	Location	Borrow Pit PK: 18+500(RHS: 650m, PR: 150B-W, Size 50x50x3.3)m				
<b>2. Test Result</b>							
Item	1. Sieve (%)	2. Atterberg Limit			4. Proctor		5. CBR (%)
	# 0.075mm	LL (%)	PL (%)	PI	MDD ( g/cc )	OMC ( % )	( 90% of MDD )
Test Result	29.66	19.10	11.96	7.16	2.150	7.25	7.60
Specification	--	--	--	--	--	--	≥ 4
Decision	--	--	--	--	--	--	Accept
<b>3. Engineer's Comment</b>							
<b>4. Certification</b>							
Item	Name	Position	Date	Signature			
Tested By		Lab Technician					
Checked By		Material Engineer					
Reviewed By		Int. Material Engineer					
Approved By		Resident Engineer					

## Korea Consultant International

### Improvement of PR150B, NR53 and PR151B Project

### CBR Penetration Test (AASHTO T-193): Result Summary

Contract No.:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.:	Date Test: 21-09-16
Location: 45+000 RHS_1.5m	Date Sample: 17-08-16	Borrow Pit:
Description: Existing Subgrade below shade	Sampled By: ME	Depth: 0.07 - 0.38m
Soaking started on: 21-09-16	CBR Testing Date:	25-09-16
MDD(g/cc): 1.143	g/cc	OMC(%): 7.50 %

## DATA SHEET

## CORRELATIONS

No. of Blows per layer	Corrected Unit Load ( $\text{kg}/\text{cm}^2$ )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	12.96	17.77	16.42	16.53
30	19.82	41.82	26.74	39.03
85	23.42	49.50	33.28	47.20

$$CEI = \text{Corrected Unit Load} / \text{Standard Unit Load} \times 100$$
Standard Unit Load at 2.54 mm penetration level = 70.38 Kg/cm<sup>2</sup>

Standard Unit Load at 5.08 mm penetration level = 105 Kpa/cm<sup>2</sup>

CBR Recordings

CHR (%)	A: % of Specified Dry Density (AASHTO T-153)	Moisture Content (MC) at Moulding (%)
20.00	90	6.59
26.20	95	6.59
	98	
	100	

## Remarks:

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saig Valha  
Lab Technician  
Date:

Mass Spectrometry  
Lab Technician  
Date:

Chukri Zukhsak,  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

<b>Moisture-Density Relationship for Different Blows in CBR Test(T-193)</b>							
Control No.:		Contractor:		Road No.: PR 150B			
Lab. No.:		Sampled No.:		Date Test : 21-09-18			
Location: 45+000 RHE 1.5m		Date Sample: 17-09-18		Borrow Pit:			
Description: Existing Road		Sampled By: ME		Depth: 0.07 - 0.30m			
<b>DETERMINATION OF DENSITY</b>							
No. of Blows per layer		10 Blows		30 Blows		65 Blows	
Mould No.		C1		C2		C3	
Wt. of compacted wet materials +Mould	g	11235		11740		11860	
Wt of Mould+Base Plat	g	6845		6826		6802	
Wt of wet compacted materials in mould	g	4387		4914		5058	
Volume of Mould	cc	2181		2262		2181	
Wet Density = Wt of wet compacted materials/Volume of mould	g/cc	2.030		2.182		2.341	
Moisture Content	%	8.53		8.70		8.53	
Dry Density=Wet Density*(1-m <sub>w</sub> /100)	g/cc	1.908		2.045		2.197	
<b>MOISTURE DETERMINATION</b>							
No. of blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B28	B10	B4	B25	B27	B32
Wet of Can+Wet Materials	g	325.02	324.90	308.70	311.00	303.60	302.61
Wt of can +Dry Materials	g	303.90	307.70	289.40	293.40	286.40	303.00
Wt of Moisture	g	16.10	17.20	17.30	17.60	17.20	17.60
Wt of can	g	34.25	35.11	36.24	34.75	35.17	34.32
Wt of dry materials	g	275.80	273.59	252.04	258.11	251.29	271.70
Moisture content	%	6.57	6.50	6.88	6.71	6.85	6.48
Average Moisture Content	%	6.53		6.70		6.53	
<div style="display: flex; justify-content: space-between; margin-bottom: 20px;"> <div style="width: 30%;"> <p>Tested by Contractor</p>     <p>Seing Vatha Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Witnessed by Consultant</p>     <p>Meas Sophanny Lab Technician Date:</p> </div> <div style="width: 30%;"> <p>Checked by Consultant</p>     <p>Chhun Sokhneak Material Engineer Date:</p> </div> </div>							

Chuan Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR63 and PR151B Project**

**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No.	Contractor	Road No. PR 153d
Lab. No.	Sampled No.:	Date Test : 21-09-16
Location 45+000 R15_1.6m	Date Sample: 17-09-16	Borrow Pit
Description: Existing Road	Sampled By: ME	Depth: 0.07 - 0.38m

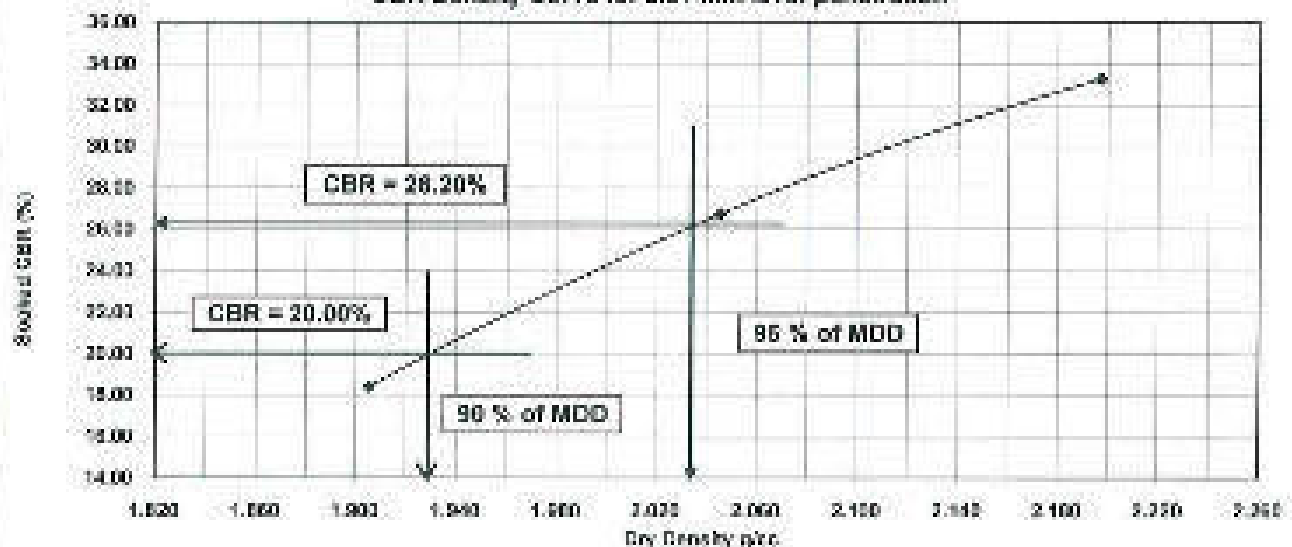
**CBR Test (AASHTO T-193)**

CBR Calculation :	10 Blows		50 Blows		65 Blows	
	Stress at 2.54mm	12.08 kg/cm <sup>2</sup>	Stress at 2.54mm	14.82 kg/cm <sup>2</sup>	Stress at 2.54 mm	23.42 kg/cm <sup>2</sup>
	CBR =	15.42 %	CBR =	28.74 %	CBR =	33.26 %
	Stress at 5.08mm	17.37 kg/cm <sup>2</sup>	Stress at 5.08mm	41.82 kg/cm <sup>2</sup>	Stress at 5.08mm	40.56 kg/cm <sup>2</sup>
CBR Calculations from corrected load / stress of Form No. 9A graphs	CBR =	16.03 %	CBR =	39.85 %	CBR =	47.00 %

Maximum-Density Data from sheet # CBR MD	143.9	256.5	275.7	65	
	927.2	1,900	2,046	2,197	
Corresponding CBR from 2.54 mm penetration level	Corrected CBR ( %)	15.40	28.74	33.26	

Picking value for 90% of Maximum Dry Density (MDD)	1.828	g/cc	
Picking value for 95% of Maximum Dry Density (MDD)	2.036	g/cc	

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor	Witnessed by Consultant	Checked by Consultant
Saing Vathia Lab Technician Date:	Meas Soummy Lab Technician Date:	Chuan Sokthek Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship AASHTO T-190 for CBR Test**

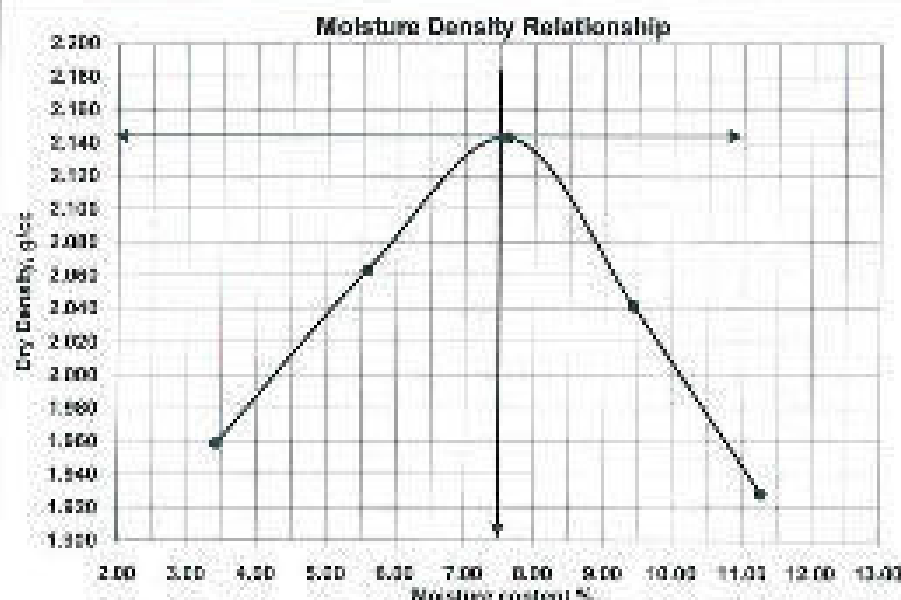
Contract No.	Contractor	Road No. PR.1534
Lab. No.	Sampled No.	Date Test: 21-08-16
Location: 46+000 RH5 1.5m	Date Sample: 17-08-16	Borrow Pit
Description: Existing Road	Sampled By: ME	Depth: 0.07 - 0.35m
Weight of Hammer: 4.531 kg, Free fall height = 447 mm, with a flat circular face of dia: 50.8 mm		

**Determination of Density**

Trial No.		I	II	III	IV	V
$W_1$	Wt. of wet compacted material/mould	g	8905.0	10200.0	10505.0	10490.0
$W_2$	Wt. of Mould Base Plat	g	6624.0	6624.0	6624.0	6624.0
$W_3$	Wt. of wet compacted materials( $W_1 - W_2$ )	g	4331	4656	4831	4658
$V_m$	Volume of Mould (by filling water)	cc	2138.00	2138.00	2138.00	2138.00
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	2.026	2.176	2.266	2.145
$\gamma_{dd}$	Dry Density = $\gamma_{wet} / (1 + m_p / 100)$	g/cc	1.959	2.063	2.143	1.928

**Determination of Moisture Content :**

Can Nos.			B36	B34	B14	B29	B8
m	Wt. of weight material + Can	g	320.59	332.80	259.89	318.10	325.30
m <sub>1</sub>	Wt. of dry material + Can	g	320.49	318.80	280.89	291.50	295.50
m <sub>2</sub>	Weight of water = (m-m <sub>1</sub> )	g	10.10	15.80	18.00	24.60	23.80
m <sub>3</sub>	Weight of can	g	25.29	33.21	31.32	33.05	31.0
m <sub>4</sub>	Weight of dry material = (m <sub>1</sub> -m <sub>3</sub> )	g	295.11	285.59	249.57	258.45	264.49
m <sub>5</sub>	Moisture Content = (m <sub>2</sub> / m <sub>4</sub> ) x100	%	3.42	5.57	7.62	9.44	11.27



**MDD = 2.143 g/cc**

**OMC = 7.50 %**

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

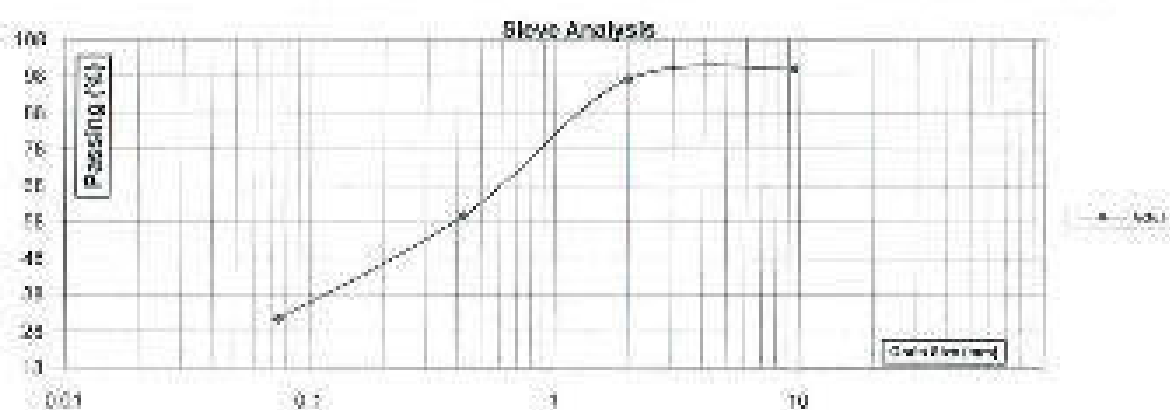
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Sieve Analysis of Fine and Coarse Aggregate**

Control No:	Contractor:	Road No: PR.1534
Lab. No.:	Sampled No.:	Date Test: 23-09-16
Location: 45+000 RHS_1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road	Sampled By: ME	Depth: 0.07 - 0.38m
Test Method : AASHTO T-27/T-88		Trial : 01

Weight of dry soil + weight of can:	3535.5	g	Weight of can:	100.5	g
Weight of dry soil:	3435.0	g	Test Method:		

ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Confirm Specification Grade:-
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00						
3/4"	19.00						
1/2"	12.50						
3/8"	9.50	0.0	0.0	0.00	100.00	100	
#4	4.75						
#10	2.00						
#15	1.180	90.20	90.20	2.60	97.20	97	
#30	0.600						
#40	0.425	1282.2	1372.40	40.13	59.87	60	
#60	0.300						
#80	0.180						
#100	0.150						
#200	0.075	570.1	2352.50	68.53	31.37	31	
Pan	40.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Seing Vatha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

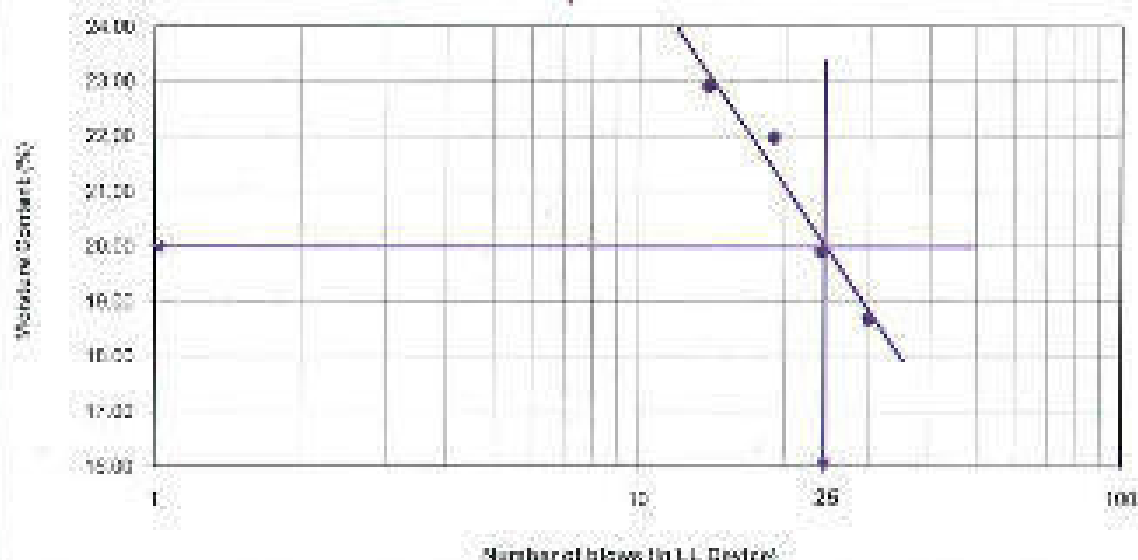
**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Contract No.	Contractor	Road No. PR.1534
Lab. No.	Sampled No.	Date Test: 23-08-18
Location: 43+000 R/IS_1.6m	Date Sample: 17-08-18	Borrow Pit:
Description: Existing Road	Sampled By: ME	Depth: 0.07 - 0.38m
Test Method: AASHTO T-89 and T-90		
Data Sheet		

Liquid Limit (LL)							Plastic Limit (PL)		
Symbol	Description	No of blows in No. 10 =	14	19	24	30			
			\$36	\$14	\$35	\$13	\$32	\$5	
$W_1$	Weight of can + Wet soil	g	26.66	26.79	26.44	26.75	26.90	26.02	
$W_2$	Weight of can + Dry soil	g	27.15	27.26	27.20	27.55	27.22	26.16	
$W_3$	Weight of can	g	18.25	18.28	18.58	18.43	18.76	18.16	
$W_4$	Weight of water = ( $W_1 - W_2$ )	g	2.93	2.44	2.14	2.20	0.68	0.82	
$W_5$	Weight of dry soil = ( $W_2 - W_3$ )	g	10.80	11.08	10.74	11.72	6.46	8.12	
$W_6$	Moisture content = ( $W_4/W_5 \times 100$ )	%	22.54	22.00	19.82	18.68	11.56	11.31	
L.L.	Liquid Limit (from graph)	%	20.00				11.46		
PI	Plastic Index	%	8.54						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Soing Vattha  
Lab Technician  
Date:

Mosa Sophanny  
Lab Technician  
Date:

Chhun Sakthear  
Material Engineer  
Date:



**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

Summary of test Result (Embankment Material)							
<b>1. Description</b>							
Consultant	KCI Engineering Co., Ltd / MECC/GBK/SAWAC	Contractor	GUMKANG VSC JV				
Lab No.	TG3-54	Date of sampling	05-01-2015				
Sample No.	S-125	Date completed of testing	25-01-2015				
Description	Silly Clayey ASand For Embankment Materials	Location	Banow Pt PK: 18+500 (RHS) 650m PR_150B-W, Size(50x50x3.3)m				
<b>2. Test Result</b>							
Item	1.Sieve (%)	2.Atersberg Limit			4.Proctor		5.CBR (%)
	A 0.075mm	LL (%)	PL (%)	PI	MDD (g/cc)	OMC (%)	( 80% of MDD )
Test Result	31.37	20.00	11.46	8.54	2.143	7.50	20.00
Specification	-	-	-	-	-	-	≥ 4
Decision	-	-	-	-	-	-	Accept.
<b>3. Engineer's Comment</b>							
<b>4. Certification</b>							
Item	Name	Position	Date	Signature			
Tested By		Lab Technician					
Checked By		Malatya Engineer					
Reviewed By		Int. Material Engineer					
Approved By		Resident Engineer					

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**CBR Penetration Test (AASHTO T-193): Result Summary**

Contract No : PRIP-CW-GHCB-2013-01	Contractor: GNC-VSC JV	Road No: PR-1534
Lab. No.:	Sampled No.: S-01	Date Test: 21-09-16
Location: 60+000 LHS_1.5m	Date Sample: 17-09-16	Borrow Pit: 1
Description: Existing Road	Sampled By: ML	Depth: 0.15 - 0.5m
Soaking started on: 21-09-16	CBR Testing Date:	25-09-16
MDD(g/cc): 1.933	g/cc	OMC(%): 11.85 %

**DATA SHEET**

**CBR CALCULATIONS**

No. of Blows per layer	Corrected Unit Load(Kg/cm <sup>2</sup> )		CBR (%)	
	2.54mm	5.08mm	2.54mm	5.08mm
10	0.84	1.25	1.19	1.19
30	2.09	3.14	2.97	2.99
60	3.55	7.11	5.05	6.77

CBR= Corrected Unit Load/Standard Unit Load \* 100  
Standard Unit Load at 2.54 mm penetration level = 70.96 Kg/cm<sup>2</sup>  
Standard Unit Load at 5.08 mm penetration level = 105 Kg/cm<sup>2</sup>

**CBR Reporting:**

CBR (%)	At % of Specified Dry Density (AASHTO T-193)	Moisture Content (MC) at Moulding (%)
2.40	90	10.87
4.30	95	10.87
	98	
	100	

**Remarks:**

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Seang Vanna  
Lab Technician  
Date:

Masa Sophanny  
Lab Technician  
Date:

Chuan Sokchea  
Material Engineer  
Date:

Kingdom of Cambodia  
Ministry of Public Works and Transportation  
Project Management Unit 2

Provincial Roads Improvement Project  
ADB Loan No. 2839-CAM (SI)  
ADB Loan No. 8264-CAM

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship for Different Blows in CBR Test(T-193)**

Control No.: PRIP-CMA-CIB-2013-01	Contractor: GKC-VSC JV	Road No: PR153A
Lab. No.:	Sampled No.: S-01	Date Test: 21-03-16
Location: 60+000 LHS 1.5m	Date Sample: 17-03-16	Borrow Pit: 1
Description: Existing Road	Sampled By: ME	Depth: 0.15 - 0.5m

**DETERMINATION OF DENSITY**

No. of Blows per layer		10 Blows	30 Blows	65 Blows
Mould No.		B11	B24	B3
Wt. of compacted wet materials +Mould	g	10800	11165	11340
Wt of Mould+Base Plat	g	6805	6853	6902
Wt of wet compacted materials in mould	g	3995	4307	4538
Volume of Mould	cc	2194	2174	2194
Wet Density = Wt.of wet compacted materials/Volume of mould	g/cc	1.821	1.981	2.068
Moisture Content	%	10.30	11.73	10.68
Dry Density=Wet Density/(1+ m <sub>p</sub> /100)	g/cc	1.661	1.773	1.870

**MOISTURE DETERMINATION**

No. of blows per layer		10 Blows		30 Blows		65 Blows	
Moisture Can No.		B34	B35	B6	B29	B40	B14
Wet of Can+Wet Materials	g	325.50	329.70	355.70	328.40	338.40	346.40
Wt of can +Dry Materials	g	311.00	301.00	321.00	301.30	303.50	311.00
Wt of Moisture	g	14.50	28.70	34.70	27.10	34.90	35.40
Wt of can	g	33.21	33.25	34.31	30.65	31.34	31.32
Wt of dry materials	g	277.79	275.74	305.69	301.05	275.16	275.68
Moisture content	%	10.19	10.41	10.24	10.22	10.67	10.29
Average Moisture Content	%	10.30		11.73		10.68	

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Valha  
Lab Technician  
Date:

Maas Sochaney  
Lab Technician  
Date:

Chuen Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

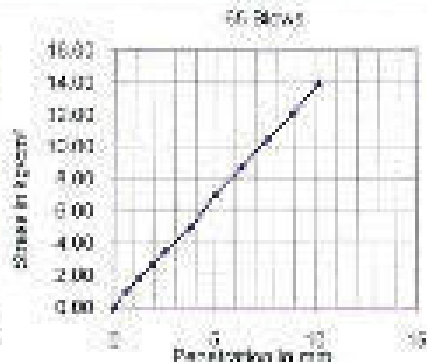
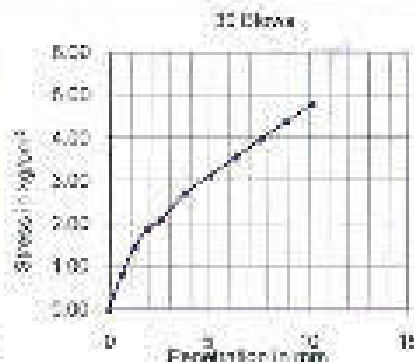
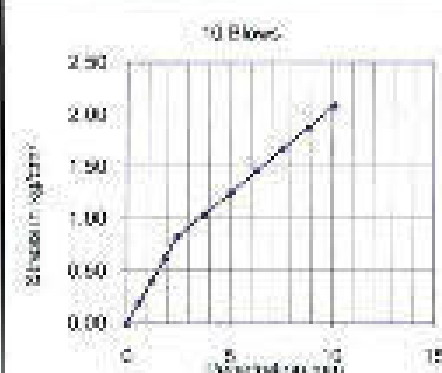
**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Contract No. PRIP/CW-G/CR-2013-01	Contractor: GKC VSC JV	Road No. PR 153A
Lab. No.	Sampled No.: S-01	Date Test: 21-09-16
Location: 60+000 LHS_1.5m	Date Sample: 17-09-16	Remarks: R01
Description: Existing Road	Sampled By: ME	Depth: 0.18 - 0.5m
Soaking started on: 21-09-16	CBR Testing Date: 25-09-16	MBD(g/cc): 1.933      OMC(%): 11.85

**CBR Test (T193): Swell and Penetration Data**

SWELL DATA			Surcharge Weights				4.5kN kg				
Date	Time	Remarks	Mold No.1	H(mm) =	SW05	Mold No.2	H(mm) =	SW05	Mold No.3	H(mm) =	SW05
			Reading in mm		Swell %	Reading in mm		Swell %	Reading in mm		Swell %
21-09-18	8.30	Start	300		0	274		0	27		0
22-09-16	8.00		341		3.62	332		1.62	1698		16.92
23-09-18	8.00		360		3.81	325		2.62	232		1.70
24-09-16	8.00		361		3.62	305		2.73	234		1.83
25-09-16	8.00	Ended	352		3.85	341		2.76	230		1.84

Penetration		Pneumatic Ring Bearing and Stress								
		Mold No. A1 (10 Blows)			Mold No. A2 (30 Blows)			Mold No. A3 (60 Blows)		
inch	mm	Ring Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Ring Reading	Load in kN	Stress in kg/cm <sup>2</sup>	Ring Reading	Load in kN	Stress in kg/cm <sup>2</sup>
0.000	0.00	0.0	0.0000	0.000	0.0	0.0000	0.000	0.0	0.0000	0.000
0.025	0.64	1.0	0.0057	0.203	4.0	0.1556	0.606	5.0	0.1906	1.036
0.050	1.27	2.0	0.0224	0.818	7.0	0.2779	1.464	10.0	0.3573	1.882
0.075	1.91	3.0	0.1191	0.627	9.0	0.3573	1.662	15.0	0.5161	2.718
0.100	2.54	4.0	0.1543	0.696	10.0	0.3575	2.091	20.0	0.6749	3.565
0.150	3.81	5.0	0.1985	1.048	18.0	0.5151	2.718	24.0	0.9528	5.018
0.200	5.08	6.0	0.2302	1.266	15.0	0.5575	3.437	30.0	1.3456	7.110
0.250	6.35	7.0	0.2773	1.464	18.0	0.6745	3.555	40.0	1.8574	8.762
0.300	7.62	8.0	0.3176	1.673	19.0	0.7543	3.875	50.0	1.9859	10.455
0.350	8.89	8.0	0.2673	1.082	20.0	0.8337	4.391	55.0	2.3025	12.128
0.400	10.16	15.0	0.3970	2.101	23.0	0.9321	4.559	60.0	2.6512	14.012



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vathie  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokchea  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR63 and PR151B Project**

**Determination of California Bearing Ratio(CBR) ( AASHTO T-193)**

Control No. PRIP-CW4C-ICB-2013-01	Contractor GKC-VSC JV	Road No. PR.1534
Lab. No.:	Sampled No.: S-01	Date Test: 21-09-16
Location: 60+000 U-S_1.5m	Date Sample: 17-09-16	Borrow Pit:1
Description: Existing Road	Sampled By: ME	Depth: 0.10 - 0.5m

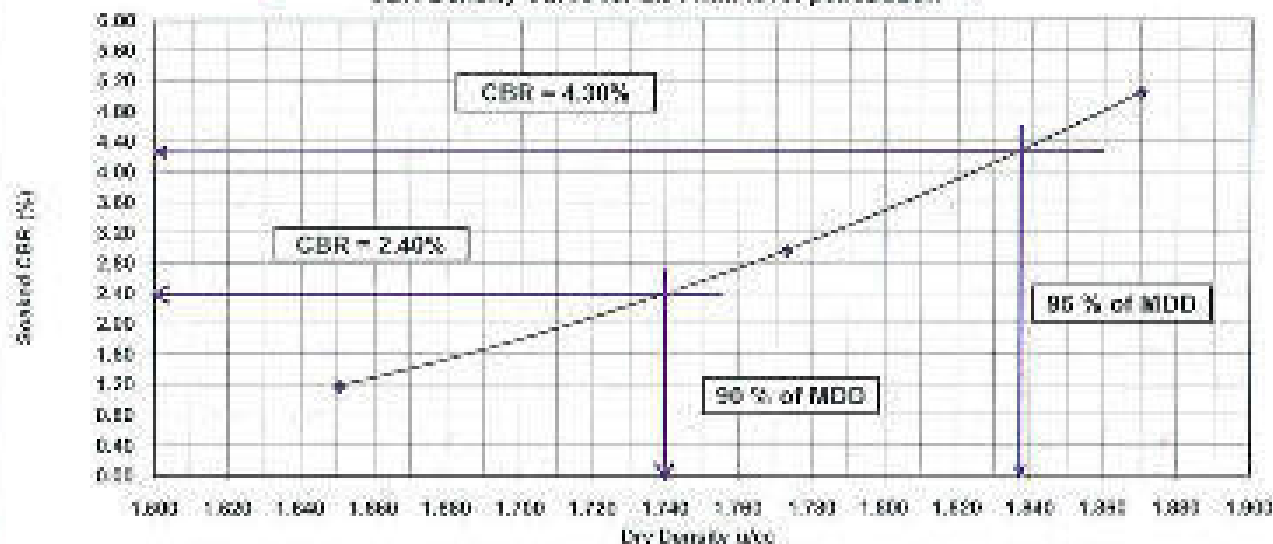
**CBR Test (AASHTO T-193)**

CBR Calculation :	15 Blows	30 Blows	65 Blows
CBR Calculations from corrected load stress of Form No. 5A graphs	Stress at 2.54mm= 0.24 kg/cm <sup>2</sup>	Stress at 2.54mm= 2.00 kg/cm <sup>2</sup>	Stress at 2.54 mm= 3.55 kg/cm <sup>2</sup>
	CBR = 1.19 %	CBR = 2.97 %	CBR = 5.05 %
	Stress at 5.08mm= 1.25 kg/cm <sup>2</sup>	Stress at 5.08mm= 3.14 kg/cm <sup>2</sup>	Stress at 5.08mm= 7.11 kg/cm <sup>2</sup>
	CBR = 1.19 %	CBR = 2.99 %	CBR = 6.77 %

Moisture-Density Data from sheet " CBR MD "	343.9	288.5	279.7	85
	327.2	1.661	1.773	1.375
Corresponding CBR from 2.54 mm penetration level	Corrected CBR ( % )	1.19	2.97	5.05

Plotting value for 99% of Maximum Dry Density (MDD)	1.740	g/cc
Plotting value for 95% of Maximum Dry Density (MDD)	1.836	g/cc

**CBR Density Curve for 2.54 mm level penetration**



Tested by Contractor	Witnessed by Consultant	Checked by Consultant
Saing Vatna Lab Technician Date:	Meas Sophanny Lab Technician Date:	Chhun Sakcheak Material Engineer Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Moisture-Density Relationship AASHTO T-100 for CBR Test**

Contract No. FRP/OW/C/IGB/2013-01

Contractor: CRCAVSC JV

Road No: PR150B

Lab. No.:

Sampled No.: 25-01

Date Test: 21-06-18

Location: 60+000 LHS - 1.5m

Date Sample: 17-09-16

Borrow Pit:

Description: Existing Road

Sampled By: ME

Depth: 0.15 - 0.3m

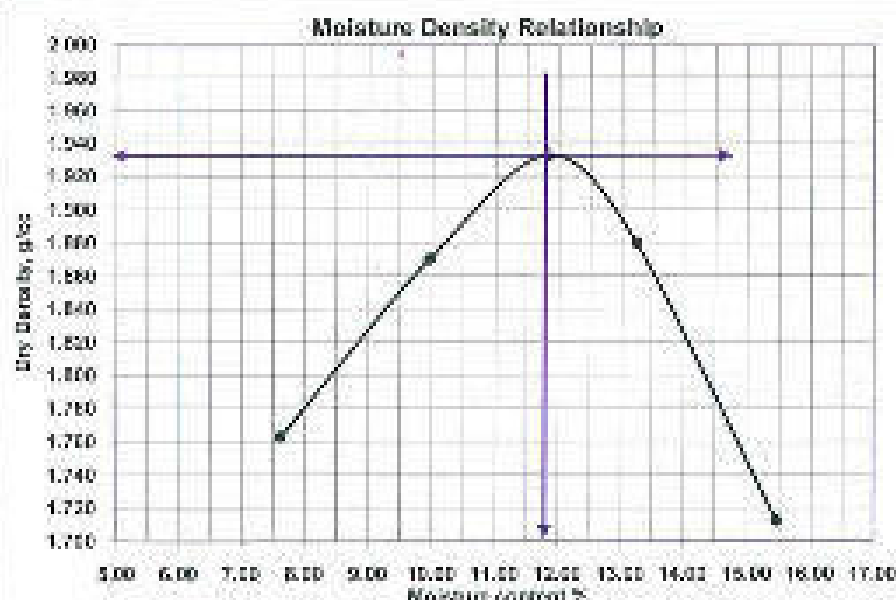
Weight of Rammer: **4.581 kg**, Free fall height = **447 mm**, with a flat circular base of dia: **50.8 mm**

**Determination of Density**

Trial No.			I	II	III	IV	V
$W_1$	Wt. of wet compacted material+Mould	g	8090.0	10020.0	11045.0	10125.0	9090.0
$W_2$	Wt. of Mould+Base Plate	g	5624.0	5624.0	5624.0	5624.0	5624.0
$W_3$	Wt. of wet compacted materials( $W_1 - W_2$ )	g	4066	4396	4621	4501	4225
$V_m$	Volume of Mould(by filling water)	cc	2135.00	2135.00	2135.00	2135.00	2135.00
$\gamma_{wet}$	Wet Density = $W_3 / V_m$	g/cc	1.897	2.058	2.161	2.120	1.977
$\gamma_{d,d}$	Dry Density = $\gamma_{wet} / (1 + m_w / 100)$	g/cc	1.763	1.870	1.933	1.880	1.742

**Determination of Moisture Content :**

Can Nos.			B25	B3	B40	B13	B23
$m$	Wt. of weight material+ Can	g	320.90	325.60	297.90	282.70	306.50
$m_1$	Wt. of dry material + Can	g	280.00	283.10	269.90	253.30	264.40
$m_2$	Weight of water = $(m - m_1)$	g	20.90	28.50	28.00	25.40	36.10
$m_3$	Weight of can	g	31.29	33.04	33.34	31.90	30.97
$m_4$	Weight of dry material = $(m_1 - m_3)$	g	250.71	250.06	236.56	222.00	233.43
$m_5$	Moisture Content = $(m_2 / m_4) \times 100$	%	7.63	9.56	11.84	13.24	15.47



**MDD = 1.933 g/cc**

**OMC = 11.85 %**

Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Seing Vatha  
Lab Technician  
Date:

Mea Sophanny  
Lab Technician  
Date:

Chhun Sokchek  
Material Engineer  
Date:

Kingdom of Cambodia  
Ministry of Public Works and Transportation  
Project Management Unit 3

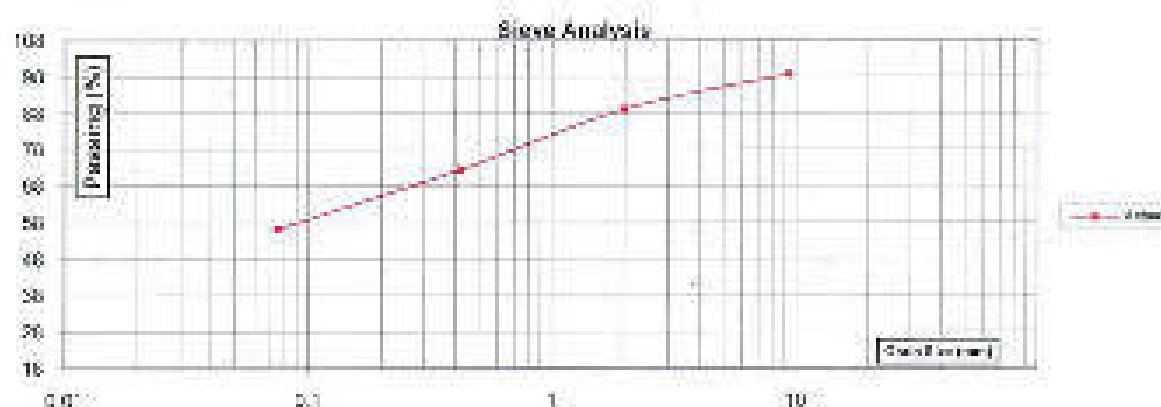
Provincial Roads Improvement Project  
ADB Loan No. 2839-CAM (SF)  
ADB Loan No. 8254-CAM

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Sieve Analysis of Fine and Coarse Aggregate**

Control No: PRIP-CW-C-IGB-2013-01	Contractor: SKC-VSD JV	Road No: PR 1534
Lab. No:	Sampled No.: S-01	Date Test: 23-09-16
Location: 80+000 LHS_1.5m	Date Sample: 17-09-16	Borrow Pit:
Description: Existing Road	Sampled By: ME	Depth: 0.18 - 0.5m
Test Method : AASHTO T-27/T-88	Trial : 01	

Weight of dry soil + weight of can		3580.5	g	Weight of can	100.5	g	
Weight of dry soil		3480.0	g	Test Method:			
ASTM Sieve	Size (mm)	Weight Retained(g)	Cumulative weight retained (g)	Cumulative retained (%)	Passing Percentage (%)		Confirm Specification Grade
					Observation	Report	
3"	75.00						
2"	50.00						
1 1/2"	37.50						
1"	25.00						
3/4"	19.00						
1/2"	12.50						
3/8"	10.00	35.3	35.3	1.01	98.98	99	
N#4	4.75						
N#4							
N#8	2.360						
N#10	2.000	328.90	372.50	10.96	89.34	89	
N#16	1.180						
N#30	0.600						
N#40	0.425	580.0	952.50	27.38	72.72	73	
N#50	0.300						
N#60	0.250						
N#100	0.150						
N#200	0.075	569	1521.20	43.58	56.41	56	
Pan	0.075	0.0					



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Soing Vathia  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:

**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Plasticity Index Test AASHTO T-89 and T-90**

Control No.: PRP-CM-C-IGB-2013-01

Contractor: GKC-VSC JV

Road No: PR 150B

Lab. No.:

Sampled No.: S-01

Date Test 23-09-18

Location: C0+000 LHS\_1.6m

Date Sample: 17-09-18

Borrow Pit:

Description: Existing Road

Sampled By: ME

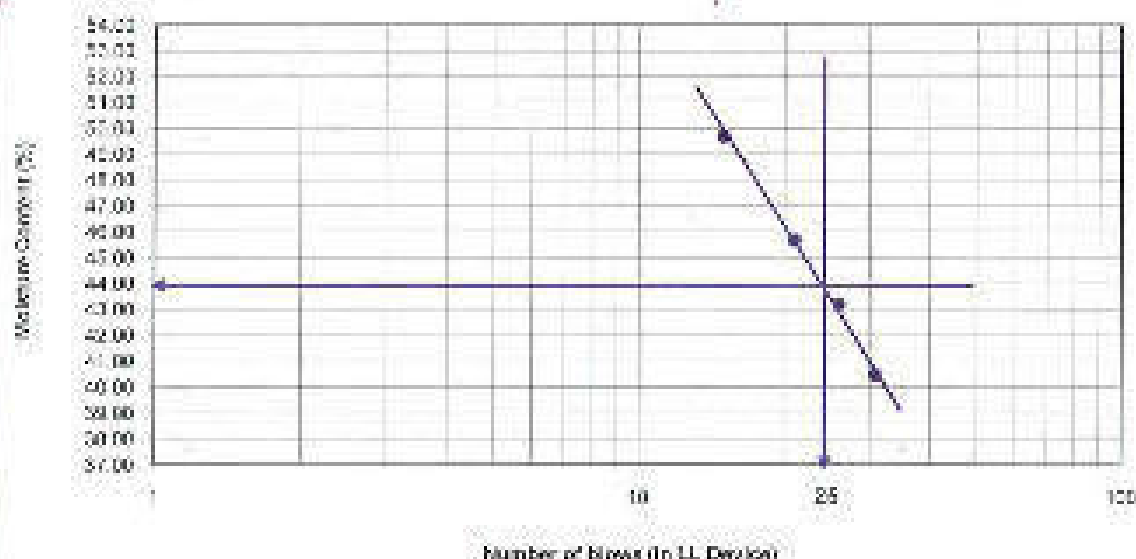
Depth: 0.18 - 0.5m

Test Method: AASHTO T-89 and T-60

Data Sheet

Liquid Limit (LL)							Plastic Limit (PL)		
Symbol	Description	No. of blows 25 No. Limit	15	21	25	31			
			838	820	827	811	825	821	
$W_1$	Weight of can + Wet soil	g	25.03	25.03	25.03	25.01	25.05	25.03	
$W_2$	Weight of can + Dry soil	g	25.10	25.26	25.06	25.37	25.15	25.40	
$W_3$	Weight of can	g	18.19	18.64	18.56	18.15	18.17	18.90	
$W_4$	Weight of water = ( $W_1 - W_3$ )	g	6.83	6.37	6.37	6.84	6.87	6.12	
$W_5$	Weight of dry soil = ( $W_2 - W_3$ )	g	6.91	6.62	6.41	7.22	6.98	6.50	
$W_6$	Moisture content = ( $W_4/W_5 \times 100$ )	%	48.32	46.72	43.22	48.51	48.31	46.00	
L.L.	Liquid Limit (from graph)	%	44.00				16.15		
PI	Plastic Index	%	27.85						

**Atterberg Limit**



Tested by Contractor

Witnessed by Consultant

Checked by Consultant

Saing Vatha  
Lab Technician  
Date:

Meas Sophanny  
Lab Technician  
Date:

Chhun Sokcheak  
Material Engineer  
Date:



**Korea Consultant International**  
**Improvement of PR150B, NR53 and PR151B Project**

**Summary of test Result (Embankment Material)**

**1. Description**

Consultant	KCI Engineering Co., Ltd / MECC/BBK/SAWAC	Contractor	GUMKANG-VSC JV
Lab No.	T53-54	Date of sampling	05-01-2015
Sample No.	S. 125	Date completed of testing	20-01-2015
Description	Silty Clayey & Sand For Embankment Materials	Location	Borrow Pit PK: 18+500(RHS) 550m, PR. 150B-W, Size 90x50x3.3m

**2. Test Result**

Item	1. Sieve (%)	2. Atterberg Limit			4. Proctor		5. CBR (%)
	A 0.075mm	LL (%)	PL (%)	PI	MDD (g/cc)	OMC (%)	( 90% of MDD )
Test Result	55.41	44.00	16.15	27.85	1.933	11.85	2.40
Specification	-	-	-	-	-	-	≥ 4
Decision	-	-	-	-	-	-	Accept

**3. Engineer's Comment**

--

**4. Certification**

Item	Name	Position	Date	Signature
Tested By		Lab Technician		
Checked By		Material Engineer		
Reviewed By		Int. Material Engineer		
Approved By		Resident Engineer		