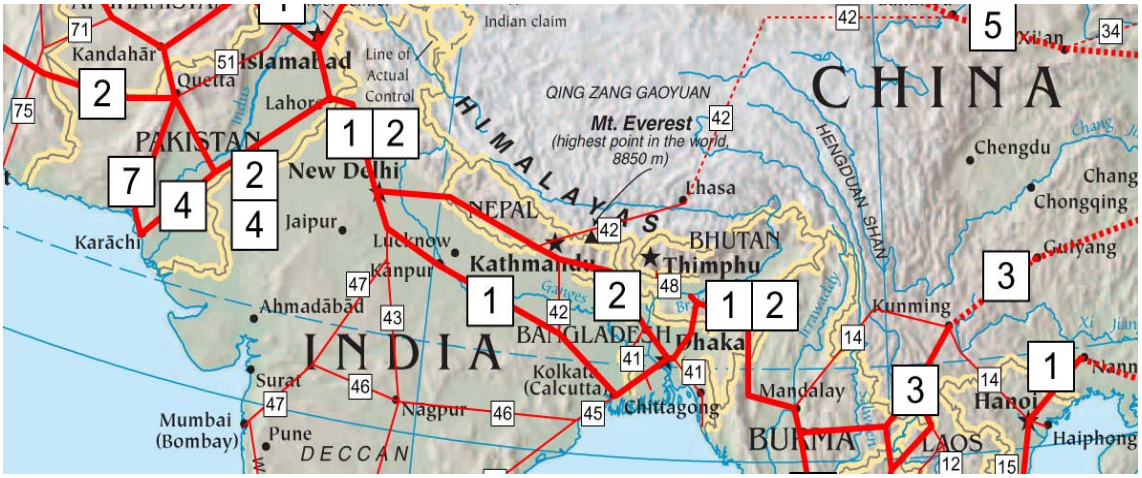
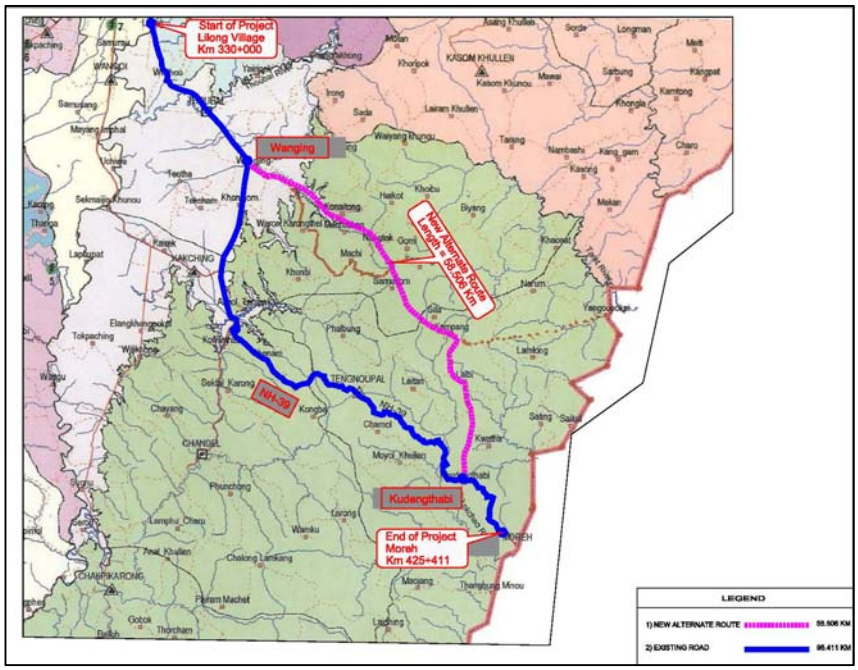
ADB TA No. 8116-IND

INDO MYANMAR ROAD SECTION FROM IMPHAL TO MOREH ON NH-39





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Detailed Project Report

Volume - III Material Report

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SHELADIA Associates Inc. USA

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Abbreviations

AASHTO	American Association of State Highway Transport Officials
ADB	Asian Development Bank
ASTM	American Standard Testing Methods
BC	Bituminous Concrete
BOQ	Bill of Quantities
BS	British Standards
CBR	California Bearing Ratio
DPR	Detailed Project Report
GSB	Granular Sub Base
IRC	Indian Roads Congress
NH	National Highway
PWRD	Public Works (Roads) Department
QAP	Quality Assurance Program
QAR	Quality Assurance Reviewer
SH	State Highway
SHELADIA	Sheladia Associates Inc
TOR	Terms of Reference

Chapter 1.0 Introduction

1.1 Project Background

Manipur is one of the eight North Eastern States in India. The geographical area of the state 22.327 sq km constitutes less than 0.70% of the entire country. It lies between latitude of 23°83'N – 25°68'N and longitude of 93°03'E – 94°78'E. the State capital, Imphal is located at an elevation of 790 m above mean sea level. Geographically the state is bounded on all sides by ranges of hills and particularly land blocked.

The total population of the state is 27, 21, 756 as per 2011 census. Of the total area, only 17 % is in valley and balance in hills and hilly/mountain terrain. The state border totals 854 km of which 352 km is international border with Myanmar to the east and south east. The remaining 502 km separate Manipur to rest of India. The road transport infrastructure in the state of Manipur is far below the all India Standards in terms of road length per sq.km. It is imperative to improve the road transport infrastructure in the state.

The national highway corridors namely NH 53, NH 39 and NH 150 are linking the state with the other parts of the country. The NH 39 (recently renamed as NH 102) Imphal Moreh is linking India and Myanmar. Surfaced road in hill districts are mainly limited to National Highways, State Highways and Major District Roads. Majority of the other district roads and village roads are not surfaced. The existing road system suffer from various types of deficiencies such as inadequate crust thickness, inadequate cross drainage works, weak and narrow bridges and pavement failures etc.

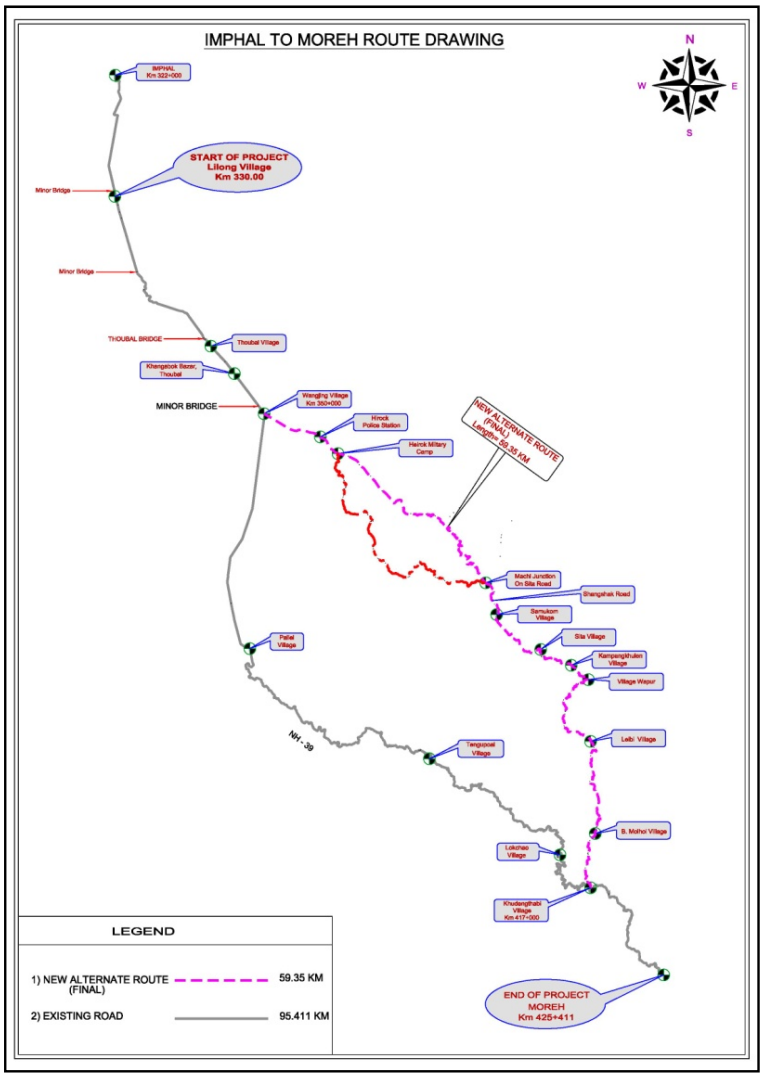
The present study section, Imphal – Moreh is part of Asian Highway AH1 in Manipur state in India. AH 1 is the longest route of the Asian Highway Network (see figure on next page), running 12,845 miles (20,557 km) from Tokyo, Japan via Korea, China, Southeast Asia, India, Pakistan, Afghanistan and Iran to the border between Turkey and Bulgaria west of Istanbul where it joins end-on with European route E80. In India AH 1 passes through Numaligarh - Golaghat - Garampani - Barpathar - Naojan - Bokajan - Dimapur - Kohima - Tadubi - Senapati - Kangpokpi - Imphal - Thoubal - Tengnoupal – Moreh (Myanmar border).

The present project is aimed to widen and improve about 95+411 km of existing national highway into 2/4 lane configuration between Imphal and Moreh (NH-39) in the state of Manipur. The road stretch is a critical section of the UNESCAP Asian Highway No. 01 (AH01), paving the way for India and other South Asian countries to Myanmar, and further to ASEAN countries.

1.2 Project Location and Corridor Description

The Project Road start in Imphal city, first 10 km section has already been undertaken by MORTH for upgrading to 4 lane carriageway and 6 km from start is already upgraded and remaining 4 km section has been sanctioned for upgradation to 4-lane and is in advance stage of Implementation. Hence the project start has been considered as km 330+000. The project concerns upgrading about 95+411 kilometers of existing National Highway 39 in the State of Manipur. The project corridor starts from Lilong village at its Km 330+000 and ends at Moreh (Myanmar Border) at its km 425+411. The road run through plain terrain up to Pallel (36 kms) and remaining road section passes through hilly/rolling terrain (from Pallel to Moreh). The corridor traverses through agriculturally rich area for first 30 kilometers length but with fair to poor surface condition (refer *Figure 1.1 – Index Map*).

Figure1.1: Index Map



1.3 ScopeThis Materials Report contains the method and analysis of the field and laboratory investigations made on the subgrade soil, the existing pavement layers and construction materials. It also provides the details of the explorations and investigations on the available construction material sources in the project and in the vicinity areas. The investigations are carried out based on the field investigations and laboratory testing as well as through field visual observations. Finally, the report summarizes the findings with the interpretations and recommendations about the subgrade and construction material for the various uses in the pavement structures.
The scope of the investigations includes:

- Conduct soil survey and detailed investigation of the subgrade soil
- Carry out road condition survey, evaluate the existing pavement structure, identify road distress and probable causes;
- Identification of construction material that includes borrow areas, quarry sites, sand and water sources
- Conducting field Investigation and laboratory testing
- Recommendations

Chapter 2.0 Field Investigation

2.1 General

The Project Road start in Imphal city, first 10 km section has already been undertaken by MORTH for upgrading to 4 lane carriageway and 6 km from start is already upgraded and remaining 4 km section has been sanctioned for upgradation to 4-lane and is in advance stage of Implementation. Hence the project start has been considered as km 330+000. The project concerns upgrading about 95+411 kilometers of existing National Highway 39 in the State of Manipur. The project corridor starts from Lilong village at its Km 330+000 and ends at Moreh (Myanmar Border) at its km 425+411. The road run through plain terrain up to Pallel (36 kms) and remaining road section passes through hilly/rolling terrain (from Pallel to Moreh).

2.1.1 Scope of Work for Pavement Investigations

The following investigations have been undertaken on the project road corridors covering pavement and materials:

- Pavement Condition Survey
- Pavement Investigations
  i. Pavement Composition
  ii. Subgrade Investigations
  iii. Alignment Soils
  iv. Benkelman Beam Deflection Survey
- Construction material investigations

For the purpose of presentation of findings of various survey and investigations both project road corridors have been divided in to numbers of homogeneous section which are mostly in synchronization with Traffic Homogeneous Sections.

The project road section has been divided into 4 subsections and these are:

i) Lilong village –Thoubal junction (km 330+000 to km 342+600)
ii) Thoubal Junction to Pallell Junction (km 342+600 to km 365+900)
iii) Pallell Junction to Khudengthabi (km 365+900 to km 417+00)
iv) Khudengthabi to Moreh(Barma Border) (km 417+000 to km 430+400)

2.1.2 Pavement Condition Survey

The visual condition survey has been carried out recording the data every 100 m intervals. This included information on visible deficiencies in terms of pavement deterioration, riding quality, cracking, rutting, incidence of potholes and patches, edge break, raveling, shoulder materials, embankment conditions etc. and ongoing/recent improvements; the visual condition survey represents the state

of the pavement and has some bearing on the decision on type of rehabilitation to be adopted. The condition survey has been prepared by considering the following details:

1. Length of the section : Minimum of 100 m section
2. Surfacing Description : BT/CC/GR/ER
3. Rut Depth : in mm
4. Cracks : % of Area
5. % Area Covered by : Potholes, Raveling, Patching
6. Shoulder Condition : Good/Fair/Poor/Very Poor
7. Remarks : If any

Cracking: Visual distresses in the form of cracks have been recorded on every 100 m interval, with the % area.
Raveling: Raveling which indicates disintegration of the pavement from the surface downward due to the loss of aggregate particles has been noticed.
Rutting: Rutting is the deformation of pavement layers under the movement of loads along the wheel path.
The criteria considered for classification of pavement sections is according to IRC 81-1997 as, no cracking or rutting less than 10 mm is classified as Good, rutting observed between 10 mm to 20 mm is classified as Fair, and rutting more than 20 mm or cracking exceeding 20 percent is treated as Poor.

The pavement condition survey was conducted in July 2013 for NH 39 the summary of overall pavement condition is presented in Table2.1.

Table 2.1Overall Pavement condition along NH 39

Pavement Condition	Length (m)	Percentage of Length
Good	23900	24
Fair	44600	45
Poor	31900	31

2.2 Subgrade Soil Investigation

2.2.1 Pavement Composition and Layer Thickness

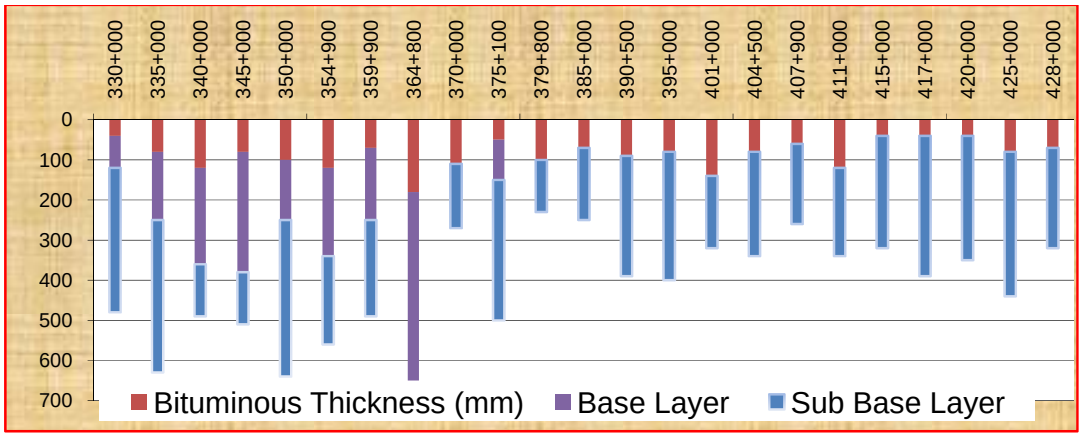
For each test pit, the following information was recorded

- Test pit reference (Identification number and location):
- Pavement compaction (material type and thickness)
- Subgrade type (textural classification) and condition(dry, wet)

Broad variation in pavement thickness was observed along the project road. However the pavement composition of the existing pavement is generally same composed of bituminous layers, WMM or WBM base and Sub-base. The Bituminous layer various from 40 mm to 180 mm: Base course various from 80

mm to 470 mm and sub-base various from 130 mm to 390 mm. The pavement composition and thickness are presented in Figure2.1. From the pavement composition it is clear that there is no drainage layer in plain/low laying areas.

Figure 2.1- Pavement Composition of Existing Road



2.2.2 Test Pits and Subgrade Sampling

The Samples collected from the subgrade and material survey were tested in the Civil Engineering Laboratory of the Consultants. Material preparation and testing strictly followed the IS, IRC, AASHTO and ASTM standards as relevant.

Test pits of size 1.0x1.0 m are carried out at every km interval, in addition to the recording the pavement composition the following activities / investigations are carried out:

1) Field compaction and moisture content at sub grade level
2) In situ CBR at sub grade level by DCP in all test pits
3) Gradation Characteristics of base and sub base layers (carried out only at 5 km interval)
4) Collection of sub grade samples to carry out the following laboratory studies
   a. Gradation and Classification
   b. Liquid and Plastic Limit
   c. MDD and OMC
   d. CBR for un-soaked and 4 day soaked condition at 3 energy levels
   e. Free Swell Index

2.2.3 In-situ density and Moisture Content

Sand Replacement method was adopted for obtaining the field density. Representative soil samples were also taken from the pit to establish moisture content. Table 2.2 shows the test result of field density and field moisture

content. The field density and moisture content various from 1.578 gm/cc to 1.867gm/cc and 8.54% to 21.41% respectively.

Table 2.2 Field Dry Density and Moisture Content

S.No	Chainage	Side	Field Bulk density(gm/cc)	Field Moisture content (%)	Field Dry density (gm/cc)
1	329+000	RHS	1.880	14.670	1.639
2	335+000	LHS	1.932	12.890	1.711
3	340+000	RHS	2.089	11.930	1.867
4	345+000	LHS	1.847	10.250	1.675
5	350+000	RHS	1.950	13.210	1.723
6	354+900	LHS	1.944	14.330	1.700
7	359+900	RHS	2.090	15.390	1.811
8	364+800	RHS	Test not done due old BT surface encountered at subgrade level		
9	370+000	LHS	1.955	12.380	1.740
10	375+100	RHS	2.062	11.670	1.846
11	379+800	RHS	Test not done due to seepage of water		
12	385+000	LHS	1.894	12.150	1.689
13	390+500	LHS	1.977	8.540	1.822
14	395+000	RHS	2.040	17.430	1.737
15	401+000	LHS	1.911	21.100	1.578
16	404+500	RHS	1.982	21.410	1.632
17	407+900	RHS	1.962	18.240	1.659
18	411+000	RHS	1.972	19.650	1.648
19	415+000	LHS	Test not done due to seepage of water		
20	417+000	RHS	1.956	16.210	1.683
21	420+000	RHS	1.947	14.540	1.700
22	425+000	LHS	1.951	13.220	1.723
23	428+000	RHS	1.945	15.320	1.687

2.2.4 Field CBR using Dynamic Cone Penetration Test

Dynamic Cone Penetration tests were conducted at the bottom of the test pits i.e., on top of the sub-grade to assess in-situ CBR of existing sub-grade layer.

The CBR value was calculated based on different layers encountered below the top of sub-grade level. The slope change in the graph (Penetration Vs Number of Blows) indicates the interface of two layers of different penetration resistance. From the graph, thickness of layer and slope (penetration mm/blow) were calculated. The following ASTM-D6951-09 equation has been used to calculate the layer DCP-CBR value for each layer:

log10 (CBR) = 2.465 - 1.120 * log10 (mm/blow)

These layered CBR values have been converted to overall CBR value using Japanese formula for the purpose:

$$\text{Overall CBR} = \frac{\lceil \Sigma (\text{Layer thickness (DCP-CBR)}^{1/n}) \rceil^n}{\Sigma (\text{Layer thickness})}$$

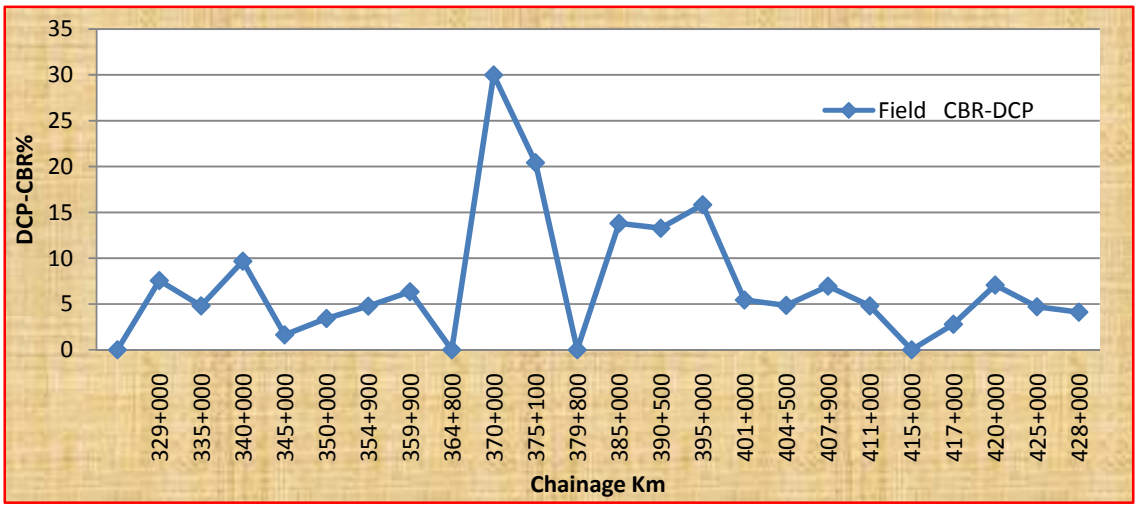
The minimum, maximum and average values of in-situ DCP-CBR values have been found to be 1.63%, 29.9% and 8.61%.The field CBR values obtained from DCP tests are given in Table 2.3.

Table 2.3 Field CBR values obtained from DCP Test

S No	Chainage	Side	Field CBR (%)				
			Layer-1	Layer-2	Layer-3	Layer-4	Combined
1	329.000	RHS	8.02	7.13			7.55
2	335.000	LHS	5.91	4.11			4.79
3	340.000	RHS	15.49	9.39	7.19		9.67
4	345.000	LHS	1.63				1.63
5	350.000	RHS	3.42				3.42
6	354.900	LHS	4.68	4.85			4.77
7	359.900	RHS	6.65	5.90			6.34
8	364.800	RHS	Not Done				
9	370.000	LHS	24.90	66.39			29.99
10	375.100	RHS	18.04	19.40	21.39	22.08	20.43
11	379.800	RHS	Not Done				
12	385.000	LHS	13.31	11.82	14.80		13.80
13	390.500	LHS	13.27				13.27
14	395.000	RHS	14.88	16.70	17.44		15.83
15	401.000	LHS	5.27	5.64			5.44
16	404.500	RHS	4.68	4.98			4.85
17	407.900	RHS	6.78	8.40	6.23		6.95
18	411.000	LHS	4.79				4.79
19	415.000	LHS	Not Done				
20	417+000	RHS	2.79				2.79
21	420.000	RHS	8.30	5.89			7.07
22	425.000	LHS	5.23	4.38			4.70
23	428.000	RHS	3.75	4.42			4.11

Average CBR observed is 8.61 but the maximum CBR of 20 and 29 observed at locations at km 370 and km 375 respectively. Graphical representation of DCP-CBR values for test pit samples are shown in Figure-2.2.

Figure 2.2Graphical representation of In-Situ CBR using DCP.



2.3Construction Material Survey

The material investigation for road construction has been carried out to identify the potential sources of construction material and to assess their general availability, properties and quantities. This is one of the most important factors for stable, economical and successful implementation of the road program within the stipulated time. For improvement work as well as for new carriageway/Alternative routes, the lists of material include the following.

- Grading V and VI crushed stone aggregate for sub-base-cum-drainage layer and crushed aggregates for base, surfacing & cement concrete works.
- Sand for filter material, concrete works, sub-base and filling material
- Borrow material for embankment, sub grade and shoulders
- Manufactured material like cement, steel, bitumen, geotextile, road appearances.

The following information on material sources was sought:

- Source location, indicating places, kilometerage, availability and the status whether in operation or new source
- Access to source, indicating the direction and nature of the access road i.e. left/right of project road, approximate lead distance from the centre and type of access road.
- Ownership of land/quarries, either government or private.
- Test results, indicating the quality of materials along with their classification in details.

Probable uses indicating the likely use of materials at various stages of construction work i.e. fill materials, sub-grade, sub-base, and wearing course and cross drainage structures.

- During the processes of investigation, due consideration has been given to the locally available material for reducing the cost of construction. The samples from various identified sources have been collected for laboratory testing as per IRC/MORT&H/BIS standards.

The availability and quality of material as coarse and fine aggregate was explored and samples were taken from the quarry where large quantities of stone aggregates (boulders) were available.

Chapter 3.0 Laboratory Investigations

3.1 General

The collected subgrade samples are tested in the laboratory as per the method of testing given below:

Table 3.1: Type and Method of Testing for Subgrade Material

Sl. No.	Type of Samples	Sampling Criteria	Testing Criteria	
			Description of Test	**Standard Code Applicable**
i)	Subgrade soil samples from the test pits excavated along the project road	At least three subgrade soil samples were obtained for every 10 km or three samples for each soil type encountered, whichever is more.	In-situ Density	IS 2720(Part 29)
			In-situ Moisture Content	IS 2720(Part 2)
			Dynamic Cone Penetration Test	ASTM D6951–09
			Soil Classification	IS 1498
			Sieve Analysis	IS 2720 (Part 4)
			Atterberg Limits	IS 2720 (Part 5)
			Laboratory Moisture – Density Characteristics	Modified AASHTO Compaction
			4-day soaked CBR at 3 energy levels corresponding to 10, 30 & 65 blows of heavy compaction rammer on selected samples	AASHTO (T193-93)

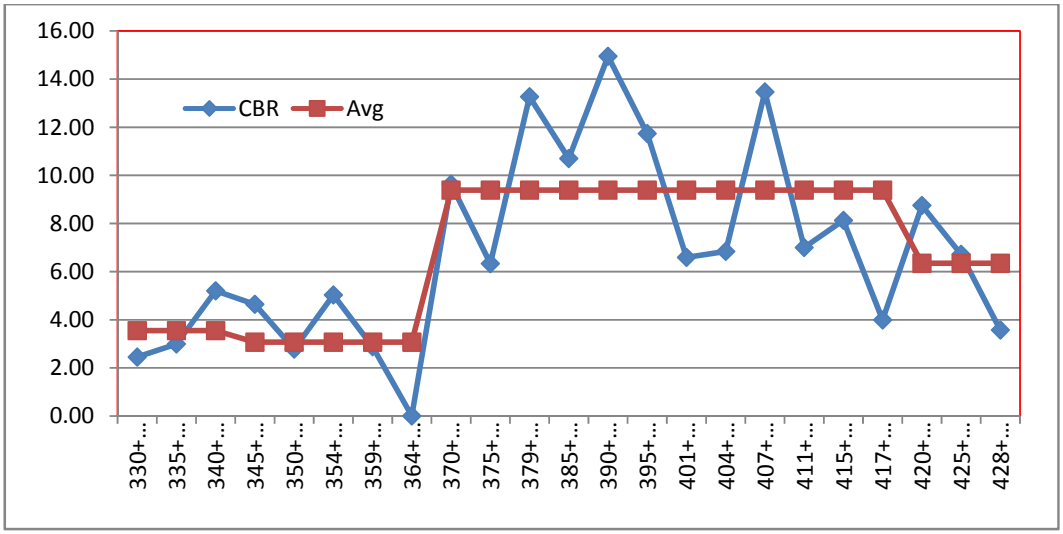
3.1.1 Subgrade Investigations

The Summary of laboratory test results for subgrade is given in Table 5-20. The Consultants have collected base and sub base samples at an interval of 10 km to study the gradation and plasticity characteristics of the same. The collected samples further tested for Gradation and Atterberg Limits and it is found that all the collected samples gradations are out of envelope on finer fraction.

The laboratory investigations of subgrade indicate that the existing subgrade varies and generally consists of SM, SC, MH, MI and ML along the road. The percentage of gravel, sand, silt and clay are in the range from 0.30% to 19.25%, 2.25% to 67.66% and 19.1% to 96.98% respectively. The liquid limit varies from 24.32% to 61.76% and plastic limit

varies from 11.22% to 24.77%.The optimum moisture content and dry density varies from 9.2% to 23.2% and 1.675 gm/cc to 2.17gm/cc respectively. The soaked CBR values of existing Sub-grade varies from 2.45% to 14.95% at 97% of MDD. The average CBR for four homogenous sections are in the order of 3.55, 3.07, 9.39 and 6.35 respectively. Graphical representation of CBR is given below.

Figure 3.1 Graphical representation of 4 days Soaked CBR.



In case of section from Km 330+000 to 346+000, the Subgrade CBR values are very low and in hilly terrain the CBR value range up to 13% @ 97% MDD.

3.2 Construction Material

The availability and quality of material as coarse and fine aggregate was explored and samples were taken from the quarry where large quantities of stone aggregates (boulders) were available. The details are given below.

Table 3.2Details of Test Results of Stone aggregate quarries

Source	Apparent Specific Gravity	Water Absorption (%)	Combined Flakiness and Elongation Index (%)	Aggregate Impact Value (%) **	Suitability for Various Layers
Santosh Stone Crusher at km 307 on left side	2.66	1.07	30.50	12.39	1. Crusher set-up has to be adjusted to meet the Gradation requirements. 2. Suitable for all the layers

Source	Apparent Specific Gravity	Water Absorption (%)	Combined Flakiness and Elongation Index (%)	Aggregate Impact Value (%) **	Suitability for Various Layers
Imphal River Boulders from km 309 with a lead of 1.0 km.	2.70	0.66	0	13.35	1. Suitable for all layers
Quarry Material (Machi Village)	2.63	0.52		11.44	Suitable for all the Layers

Sufficient quantity of river boulders is available in the Imphal River at Km. 309+000 RHS and lead is 1.0 km. Representative samples from the above stone crusher samples were collected for testing in the laboratory. The following tests have been conducted on the samples collected.

Aggregate Impact value	As per IS:2386(Part-6)
Combined flakiness and elongation indices	As per IS:2386(Part-7)
Water absorption	As per IS:2386(Part-3)

MORT&H requirement of stone aggregates for their use in base / surfacing course of pavement are as follws:

- Aggregate Impact value <30%
- Combined flakiness and elongation indices <30%
- Water absorption <2%

Only one source for fine aggregate has been identified which is near Yaripok village at km 342+200 on LHS and lead is about 18 km in length. The source of river sand is not suitable for cement concrete and masonry construction work due to the lab test results is out of specification limit as for IS codes. The details of quarry and properties are given in Table 3.3.

Table 3.3 Details of Natural Sand Quarries.

Source	Gradation Zone	Apparent Specific Gravity	Water Absorption	Fineness Modulus	Silt Content by weight	Bulk Density	Suitability for Works
Thoubal River	II	2.96	3.5	2.88	5.9	1.699	Not Suitable

All the laboratory test results are given in **Annexures** as:
Annexure-1 Test Pit Investigations
Annexure-2 Coarse and Fine Aggregates

Chapter 4.0 Conclusions and Recommendation

4.1 General

The consultants have carried out extensive investigations for both borrow areas (fill/subgrade), other material investigations (aggregates for civil and structural works) and the sand. While carrying out the investigations the following aspects have been kept in mind:

- Ownership of sources (private/Government)
- Suitabile and good quality materials are available
- Economical Lead for the project both along the project road and off the project,
- Type of access to the sources
- Assessing quantum of material available at each source by means of engineering judgment and the local practice in the source areas

4.2 Subgrade

Design CBR will be considered as CBR of 7% and 10% for Lilong to Pallel (HS 1& HS 2) and from Pallel to Moreh (HS-3 & HS-4) recommended respectively. A minimum 10% CBR has been recommended for the alternative alignment.

4.3 Construction Materials

4.3.1 Borrow Materials

Borrow material for the construction of embankments could be obtained from drain cuttings and borrow areas. The majority of native soils identified are suited for embankment construction as confirmed by the subgrade soil test results.

4.3.2 Quarry Source

Based on the laboratory test results presented in chapter 3, all the sources identified and tested are suitable for the works.

4.3.3 Water

The main sources of water for construction of the project road are perennial rivers and streams crossing the road alignment and water at reasonably economical hauling distance are available.

ANNEXURE-1

(Volume – III)

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 329+000 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

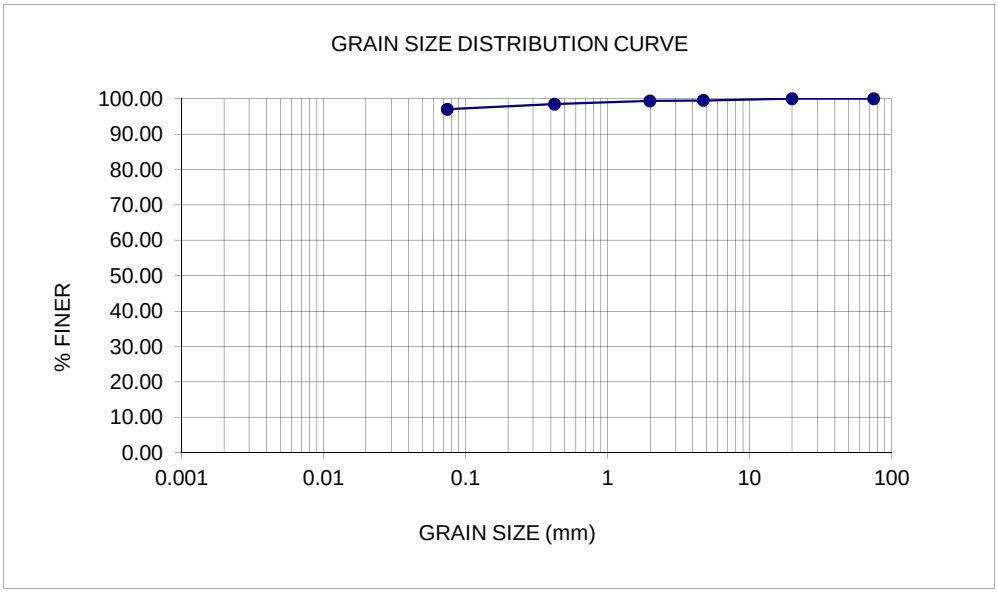
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	5.14	0.51	0.51	99.49
2 mm	2	1.38	0.14	0.65	99.35
425 m	0.425	9.11	0.91	1.56	98.44
75 m	0.075	14.59	1.46	3.02	96.98
Pan		969.78	96.98	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	0.51
Sand (%)	2.51
Fines (%)	96.98



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

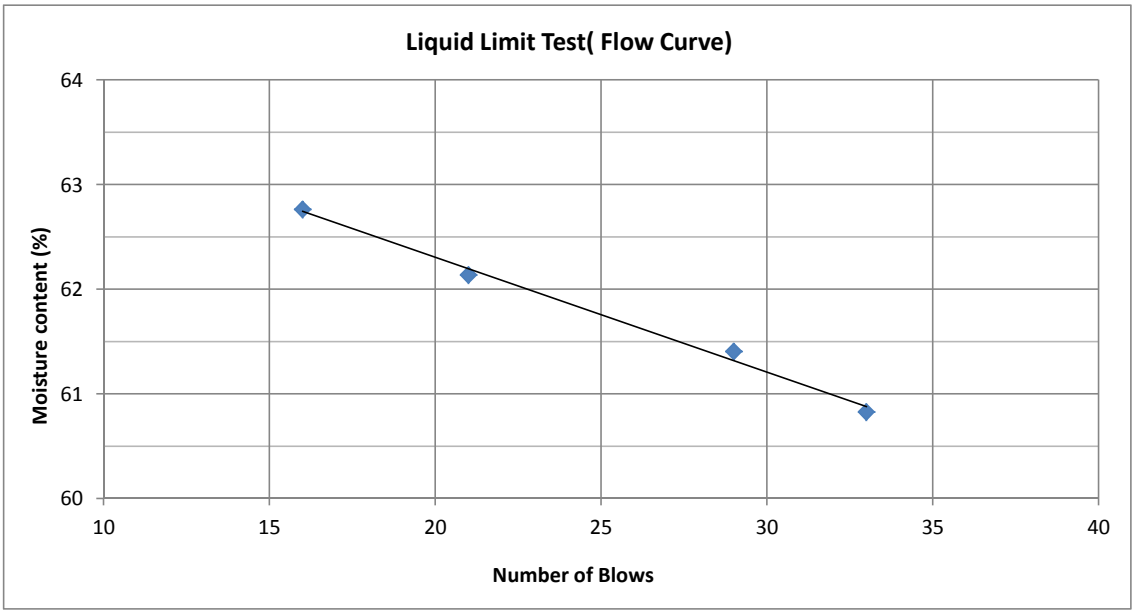
Sample Location: 329+000 RHS

Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	16	21	29	33		
2	Container No.	252	117	184	213	18	P16
3	Mass of Container (gm)	33.9	33.49	33.72	35.29	38.97	57.27
4	Mass of Wet Soil + Container (gm)	66.42	65.82	64.71	66.33	59.69	78.32
5	Mass of Oven Dry Soil + Container (gm)	53.88	53.43	52.92	54.59	54.13	72.6
6	Mass of Water=(4-5) (gm)	12.54	12.39	11.79	11.74	5.56	5.72
7	Mass of Oven Dry Soil =(5-3) (gm)	19.98	19.94	19.2	19.3	15.16	15.33
8	Water Content (w=6/7*100) (%)	62.76	62.14	61.41	60.83	36.68	37.31

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 61.76 %

Plastic Limit 36.99 %

Platicity Index 24.77 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 329+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :19.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	12.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	20.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 329+000 RHS

Source of Materials: Test Pit

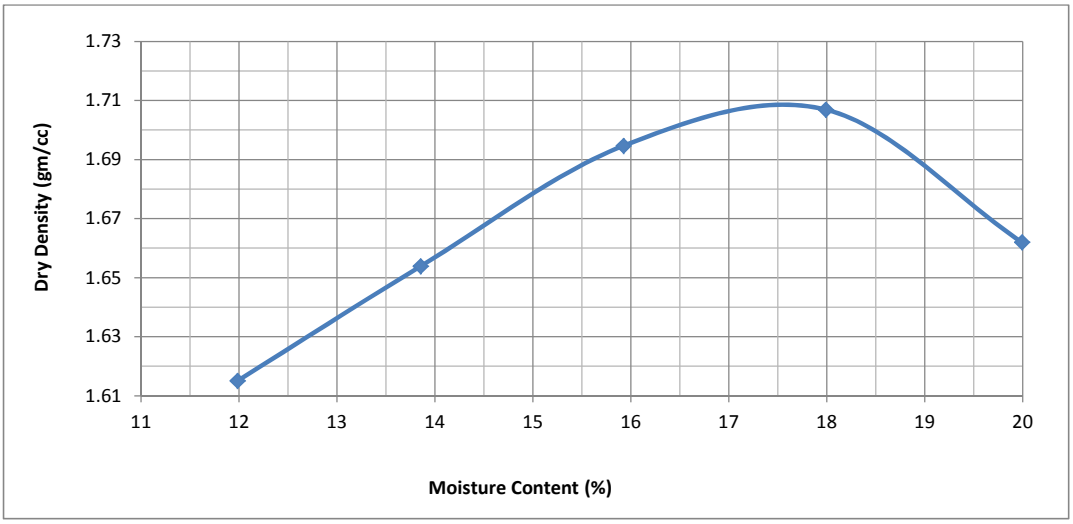
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	12	14	16	18	20
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11758	11916	12089	12194	12152
Mass of Compacted Soil(M3=M2-M1) gm	3840	3998	4171	4276	4234
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1808.6	1883.1	1964.5	2014.0	1994.2
Container No.	300	135	299	157	193
Mass of Container (gm)	36.96	35.9	34.11	33.15	33.63
Mass of Wet Soil+Container (gm)	137.96	111.33	122.26	104.57	105.17
Mass of Oven Dry Soil +Container (gm)	127.15	102.15	110.15	93.68	93.25
Mass of Water (gm)	10.81	9.18	12.11	10.89	11.92
Water Content (%)	11.99	13.86	15.93	17.99	19.99
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.615	1.654	1.695	1.707	1.662

Remarks:



From Graph

Maximum Dry Density	1.710	gm/cc
Optimum Moisture Content	17.60	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 329+000 RHS

Source of Materials: Test Pit — Date of Casting : 14.09.13

MDD (gm/cc) 1.710 — Date of Testing : 18.09.13

OMC (%) 17.60 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	30	30	48	48	62	62
Weight of Mould, W1 (gm)	7540	7540	7506	7506	6530	6530
Weight of Mould + Soil, W2 (gm)	11625	11712	11798	11881	11102	11176
Weight of Soil, W = W2 - W1 (gm)	4085	4172	4292	4375	4572	4646
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.816	1.854	1.908	1.944	2.032	2.065
Container No.	227	130	200	271	205	104
Weight of Container W_c (gm)	32.17	34.68	33.86	38.43	32.34	35.95
Weight of Container + Wet Soil, $W3_{(gm)}$	118.65	108.81	113.66	122.99	125.32	108.61
Weight of Container + Dry Soil, $W4_{(gm)}$	105.65	96.25	101.86	109.05	111.56	96.78
Weight of Water W_w = W3 - W4 (gm)	13.00	12.56	11.80	13.94	13.76	11.83
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	73.48	61.57	68.00	70.62	79.22	60.83
Water Content, Wm (%)	17.69	20.40	17.35	19.74	17.37	19.45
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.543	1.540	1.625	1.624	1.731	1.729

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	1.5	2.2	3.0
CBR of Specimen at 5 mm Penetration	1.5	2.0	3.0
CBR of Specimen in Percent	**1.49**	**2.23**	**2.98**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 329+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.710
OMC (%) 17.60
Compaction (Type) Dynamic

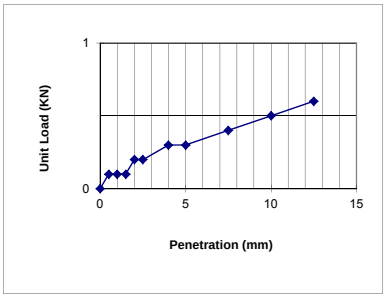
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.2	13.44	1.49
5.0	0.3	20.16	1.49

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.1		1.5
2.0	0.2		2.0
2.5	0.2	0.2	2.5
4.0	0.3		4.0
5.0	0.3	0.3	5.0
7.5	0.4		7.5
10.0	0.5		10.0
12.5	0.6		12.5

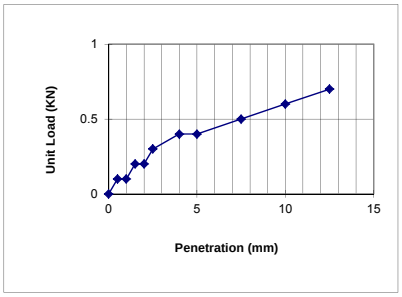


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.4	20.16	1.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.2		1.5
2.0	0.2		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.4	0.4	5.0
7.5	0.5		7.5
10.0	0.6		10.0
12.5	0.7		12.5

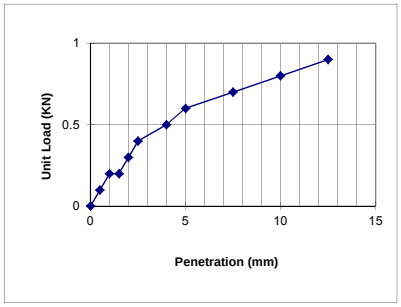


Sample-3

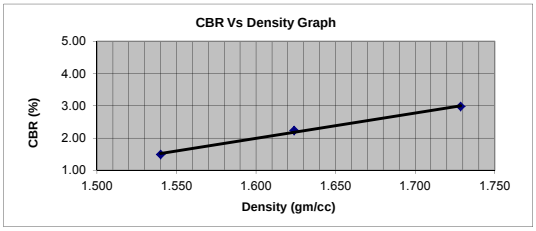
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.6	20.16	2.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.5		4.0
5.0	0.6	0.6	5.0
7.5	0.7		7.5
10.0	0.8		10.0
12.5	0.9		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.540	1.624	1.729
CBR (%)	1.49	2.23	2.98



97 % of Max Dry Density = 1.659
CBR corresponding to 97 % of Dry Density = 2.45

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 329+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.710
OMC (%) 17.60
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

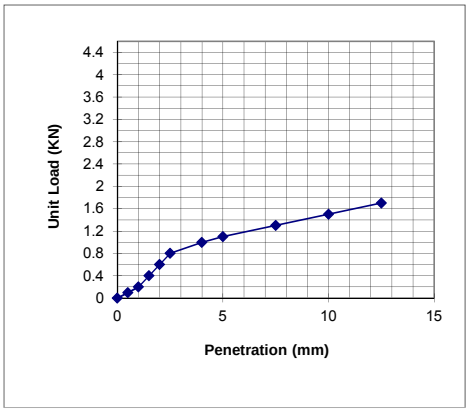
Soaking	Unsoaked
No.of Blows	55
Mould No.	30
Weight of Mould, W1 (gm)	7540
Weight of Mould + Soil, W2 (gm)	12065
Weight of Soil, W = W2 - W1 (gm)	4525
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.011
Container No.	39
Weight of Container W_c (gm)	40.94
Weight of Container + Wet Soil, W3 (gm)	126.56
Weight of Container + Dry Soil, W4 (gm)	113.76
Weight of Water W_w = W3 - W4 (gm)	12.80
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	72.82
Water Content, Wm (%)	17.58
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.710

CBR of Specimen at 2.5 mm Penetration	5.95
CBR of Specimen at 5 mm Penetration	5.46
CBR of Specimen in Percent	**5.95**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.1	20.16	5.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.4		1.5
2.0	0.6		2.0
2.5	0.8	0.8	2.5
4.0	1		4.0
5.0	1.1	1.1	5.0
7.5	1.3		7.5
10.0	1.5		10.0
12.5	1.7		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 335+000 LHS

Source of Materials: Test Pit Date of Testing :15.09.13

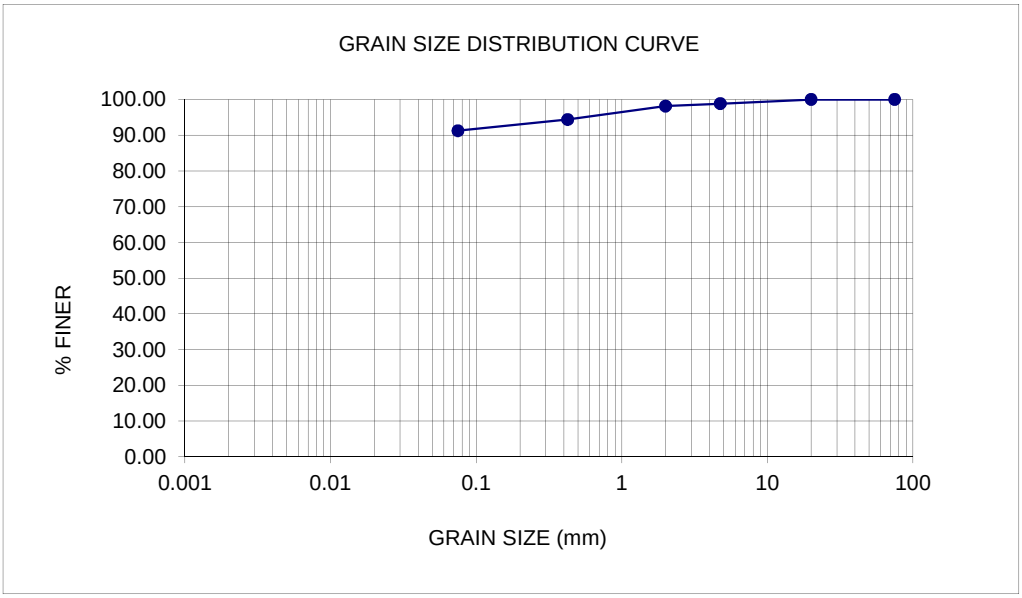
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	11.73	1.17	1.17	98.83
2 mm	2	6.4	0.64	1.81	98.19
425 m	0.425	37.72	3.77	5.59	94.42
75 m	0.075	31.73	3.17	8.76	91.24
Pan		912.42	91.24	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	1.17
Sand (%)	7.59
Fines (%)	91.24



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

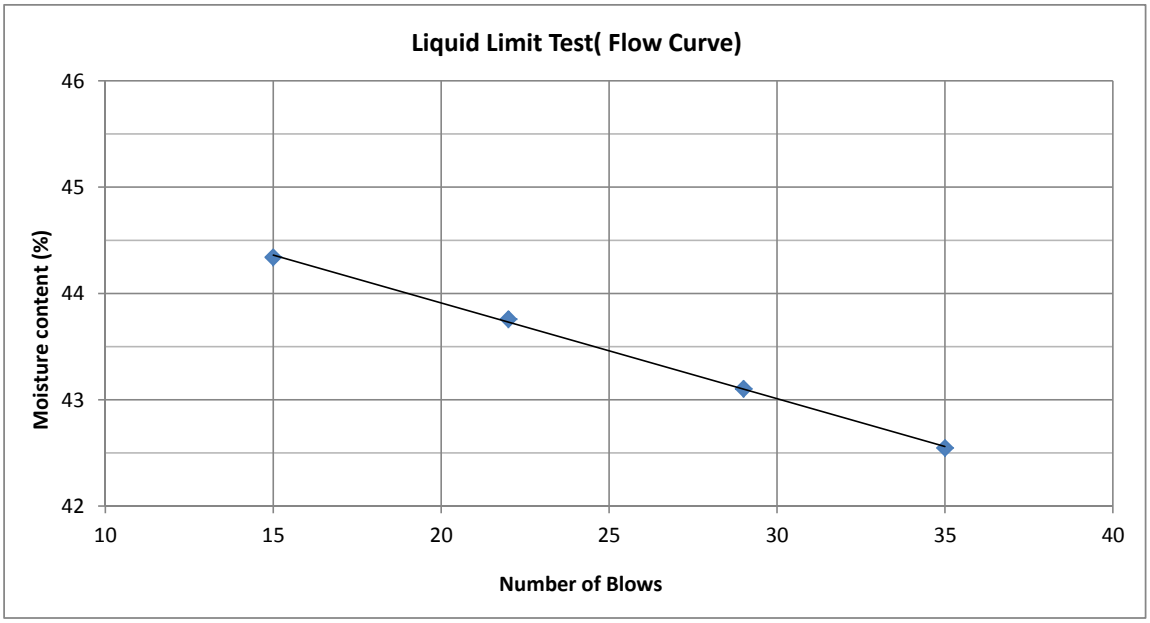
Sample Location: 335+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	22	29	35		
2	Container No.	117	162	88	252	P9	272
3	Mass of Container (gm)	33.49	25.2	33.37	33.9	58.82	42.37
4	Mass of Wet Soil + Container (gm)	64.61	55.26	64.81	60.87	79.29	64.64
5	Mass of Oven Dry Soil + Container (gm)	55.05	46.11	55.34	52.82	74.62	59.41
6	Mass of Water=(4-5) (gm)	9.56	9.15	9.47	8.05	4.67	5.23
7	Mass of Oven Dry Soil =(5-3) (gm)	21.56	20.91	21.97	18.92	15.8	17.04
8	Water Content (w=6/7*100) (%)	44.34	43.76	43.10	42.55	29.56	30.69

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit	43.46	%
Plastic Limit	30.12	%
Platicity Index	13.34	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 335+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :15.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	12.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	20.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 335+000 LHS

Source of Materials: Test Pit

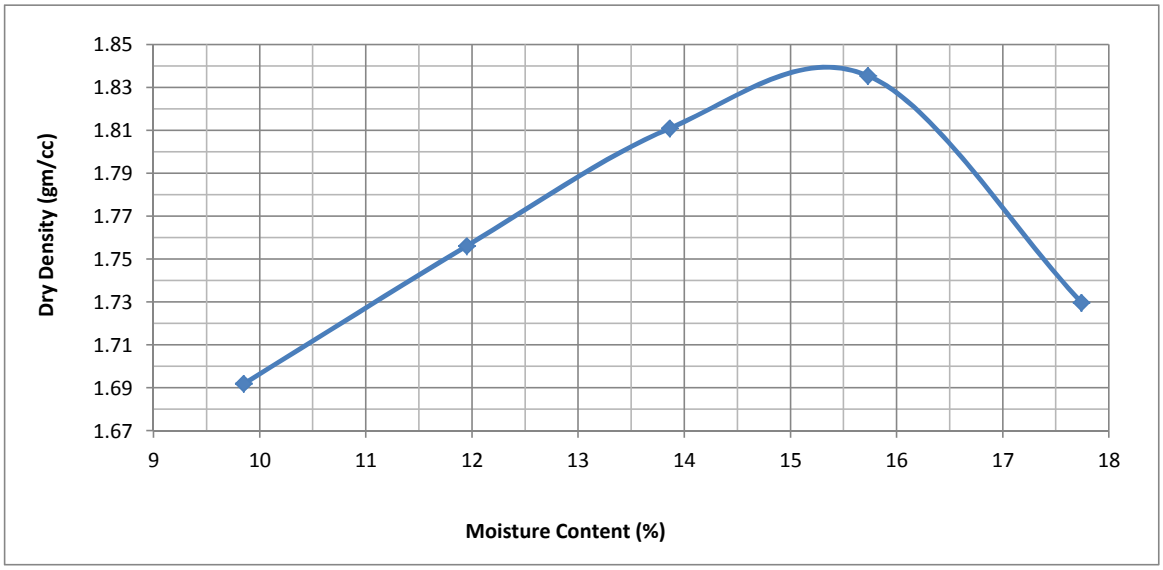
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11864	12092	12296	12428	12242
Mass of Compacted Soil(M3=M2-M1) gm	3946	4174	4378	4510	4324
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1858.6	1966.0	2062.0	2124.2	2036.6
Container No.	209	253	187	228	52
Mass of Container (gm)	31.98	35.9	32.79	33.74	33.83
Mass of Wet Soil+Container (gm)	118.4	145.97	110.16	102.31	118.31
Mass of Oven Dry Soil +Container (gm)	110.65	134.22	100.74	92.99	105.58
Mass of Water (gm)	7.75	11.75	9.42	9.32	12.73
Water Content (%)	9.85	11.95	13.86	15.73	17.74
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.692	1.756	1.811	1.835	1.730

Remarks:



From Graph

Maximum Dry Density 1.840 gm/cc

Optimum Moisture Content 15.30 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 335+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.84

OMC (%) 15.30

Compaction (Type) Dynamic

Date of Casting : 16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	45	45	28	28	7	7
Weight of Mould, W1 (gm)	7436	7436	7270	7270	7460	7460
Weight of Mould + Soil, W2 (gm)	11757	11835	11816	11891	12276	12358
Weight of Soil, W = W2 - W1 (gm)	4321	4399	4546	4621	4816	4898
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.920	1.955	2.020	2.054	2.140	2.177
Container No.	228	130	225	197	31	140
Weight of Container W_c (gm)	33.74	34.68	33.37	35.18	45.21	32.20
Weight of Container + Wet Soil, $W3_{(gm)}$	121.41	122.79	108.12	108.28	158.27	100.33
Weight of Container + Dry Soil, $W4_{(gm)}$	109.76	109.65	98.25	97.55	143.41	90.35
Weight of Water W_w = W3 - W4 (gm)	11.65	13.14	9.87	10.73	14.86	9.98
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	76.02	74.97	64.88	62.37	98.20	58.15
Water Content, Wm (%)	15.32	17.53	15.21	17.20	15.13	17.16
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.665	1.664	1.754	1.752	1.859	1.858
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	1.5	2.2	3.7			
CBR of Specimen at 5 mm Penetration	1.5	2.5	4.0			
CBR of Specimen in Percent	**1.49**	**2.48**	**3.97**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 335+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.840
OMC (%) 15.30
Compaction (Type) Dynamic

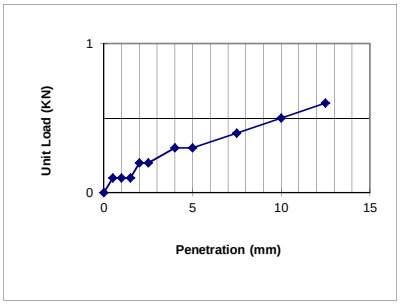
Date of Casting : 16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.2	13.44	1.49
5.0	0.3	20.16	1.49

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.1		1.5
2.0	0.2		2.0
2.5	0.2	0.2	2.5
4.0	0.3		4.0
5.0	0.3	0.3	5.0
7.5	0.4		7.5
10.0	0.5		10.0
12.5	0.6		12.5

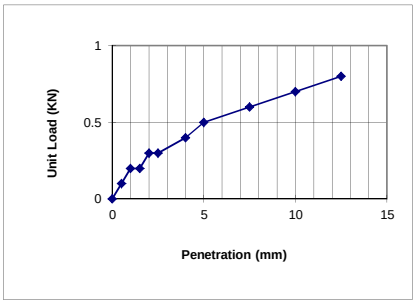


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

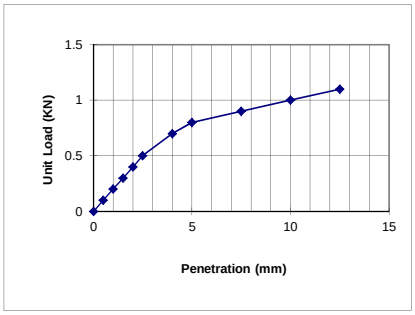


Sample-3

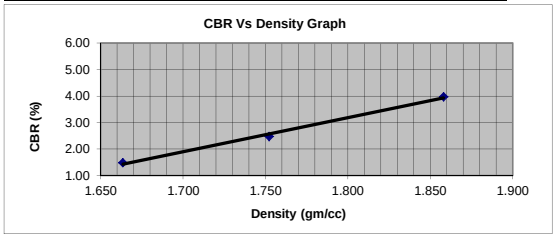
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	0.8	20.16	3.97

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.4		2.0
2.5	0.5	0.5	2.5
4.0	0.7		4.0
5.0	0.8	0.8	5.0
7.5	0.9		7.5
10.0	1		10.0
12.5	1.1		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.664	1.752	1.858
CBR (%)	1.49	2.48	3.97



97 % of Max Dry Density = 1.785
CBR corresponding to 97 % of Dry Density = 2.99

Geo-Technical LaboratorySheladia Associates Inc.USA.,Plot No-28, Jaibharat Housing Co-operative Colony,Dairy Farm Road, Lal Bazar,Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 335+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.840
OMC (%) 15.30
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

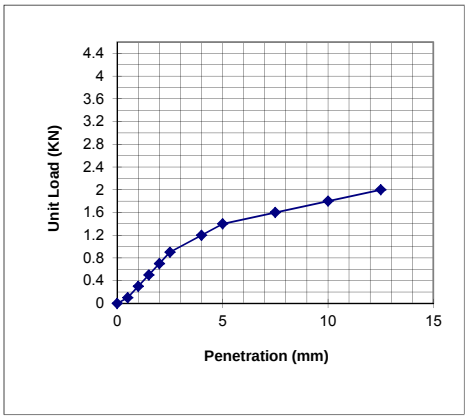
Soaking	Unsoaked
No.of Blows	55
Mould No.	45
Weight of Mould, W1 (gm)	7436
Weight of Mould + Soil, W2 (gm)	12201
Weight of Soil, W = W2 - W1 (gm)	4765
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.118
Container No.	25
Weight of Container W_c (gm)	39.24
Weight of Container + Wet Soil, W3 (gm)	145.69
Weight of Container + Dry Soil, W4 (gm)	131.56
Weight of Water W_w = W3 - W4 (gm)	14.13
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	92.32
Water Content, Wm (%)	15.31
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.837

CBR of Specimen at 2.5 mm Penetration	6.70
CBR of Specimen at 5 mm Penetration	6.94
CBR of Specimen in Percent	**6.94**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.4	20.16	6.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.9	0.9	2.5
4.0	1.2		4.0
5.0	1.4	1.4	5.0
7.5	1.6		7.5
10.0	1.8		10.0
12.5	2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 340+000 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

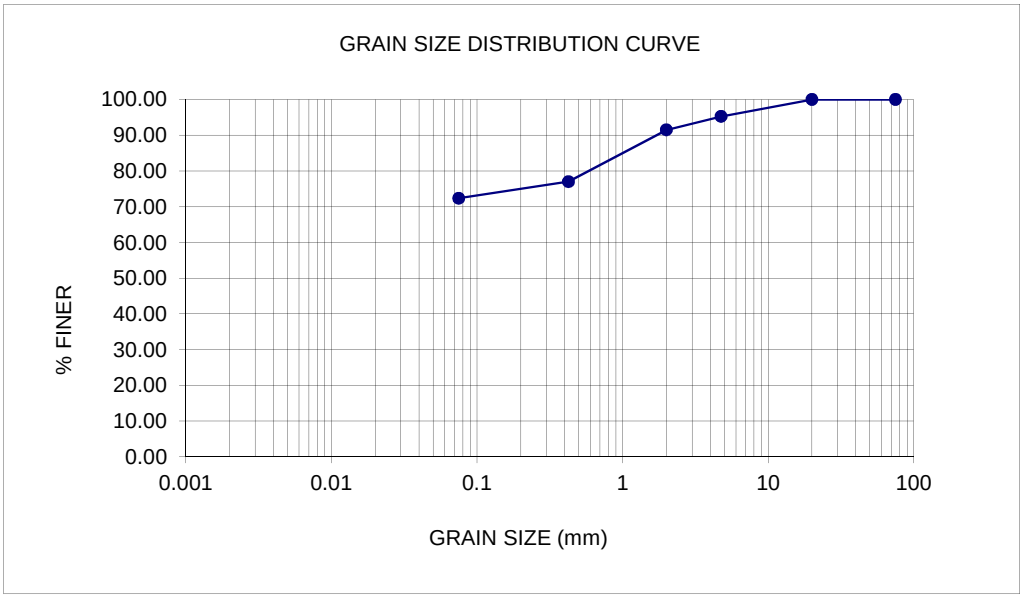
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	47.38	4.74	4.74	95.26
2 mm	2	37.75	3.78	8.51	91.49
425 m	0.425	144.49	14.45	22.96	77.04
75 m	0.075	46.85	4.69	27.65	72.35
Pan		723.53	72.35	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	4.74
Sand (%)	22.91
Fines (%)	72.35



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 340+000 RHS

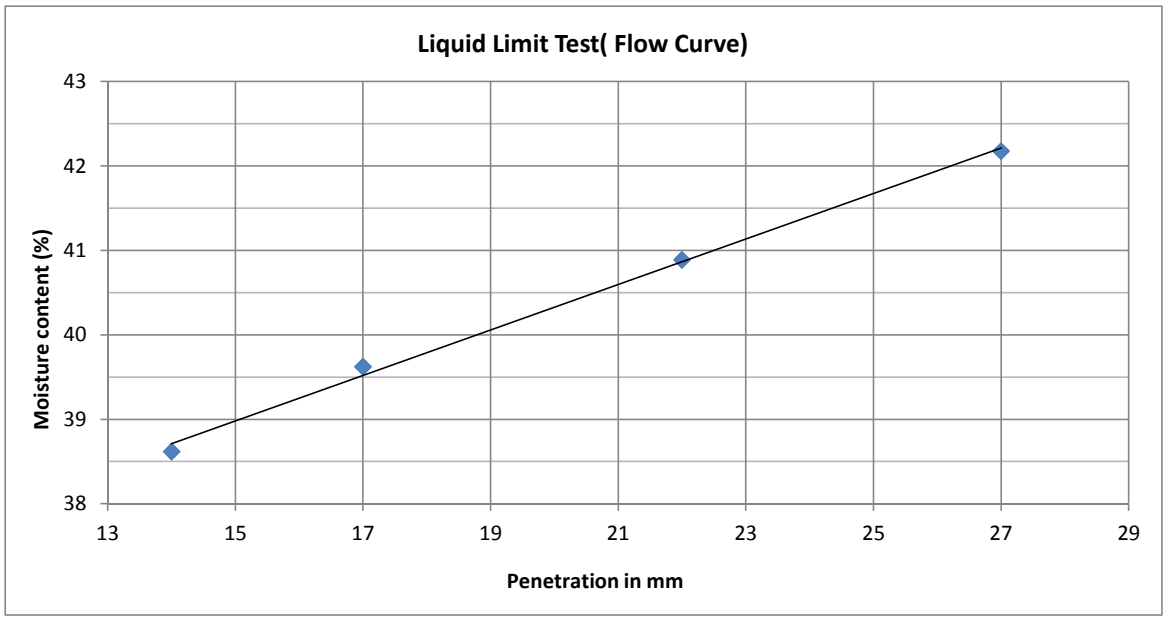
Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	14	17	22	27		
2	Container No.	20	131	49	114		
3	Mass of Container (gm)	36.77	32.74	27.44	34.71		
4	Mass of Wet Soil + Container (gm)	72.52	60.26	46.15	74.42		
5	Mass of Oven Dry Soil + Container (gm)	62.56	52.45	40.72	62.64	Non Plastic	
6	Mass of Water=(4-5) (gm)	9.96	7.81	5.43	11.78		
7	Mass of Oven Dry Soil =(5-3) (gm)	25.79	19.71	13.28	27.93		
8	Water Content (w=6/7*100) (%)	38.62	39.62	40.89	42.18		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 40.33 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 340+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 340+000 RHS

Source of Materials: Test Pit

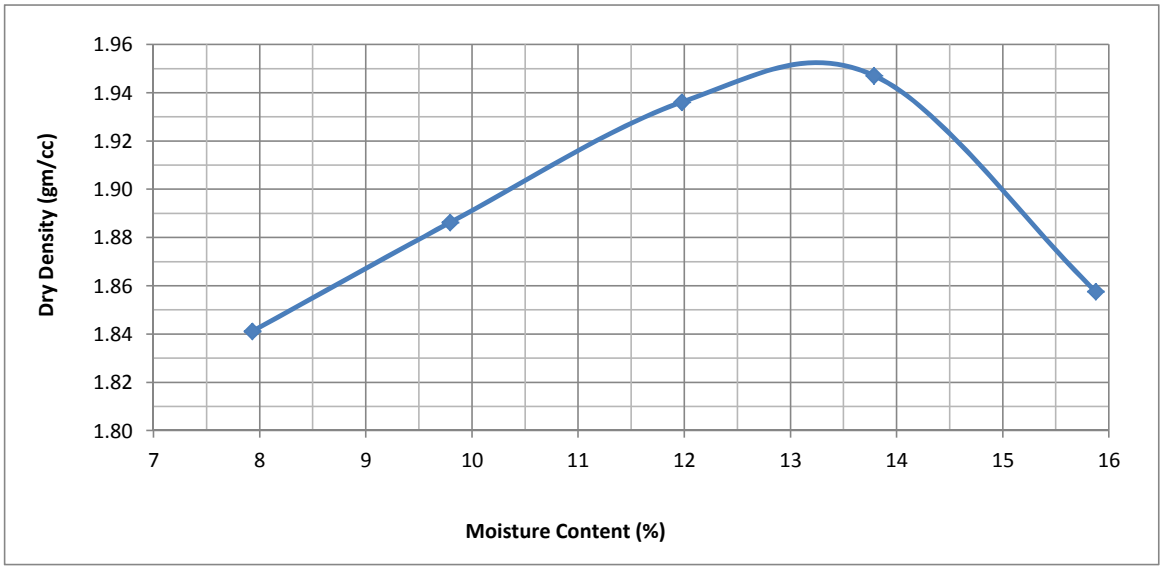
Type of Compation : Dynamic Date of Testing : 16.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	12137	12315	12521	12622	12488
Mass of Compacted Soil(M3=M2-M1) gm	4219	4397	4603	4704	4570
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1987.1	2071.0	2168.0	2215.6	2152.5
Container No.	180	219	109	151	124
Mass of Container (gm)	32.7	35.06	34.17	32.49	32.44
Mass of Wet Soil+Container (gm)	121.29	118.23	117.38	117.41	113.31
Mass of Oven Dry Soil +Container (gm)	114.78	110.81	108.48	107.12	102.23
Mass of Water (gm)	6.51	7.42	8.9	10.29	11.08
Water Content (%)	7.93	9.80	11.98	13.79	15.88
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.841	1.886	1.936	1.947	1.858

Remarks:



From Graph

Maximum Dry Density	1.952	gm/cc
Optimum Moisture Content	13.30	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 340+000 RHS

Source of Materials: Test Pit — Date of Casting : 17.09.13

MDD (gm/cc) 1.952 — Date of Testing : 21.09.13

OMC (%) 13.30 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	13	13	73	73	40	40
Weight of Mould, W1 (gm)	7424	7424	6654	6654	7124	7124
Weight of Mould + Soil, W2 (gm)	11918	11979	11396	11456	12146	12215
Weight of Soil, W = W2 - W1 (gm)	4494	4555	4742	4802	5022	5091
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.997	2.024	2.108	2.134	2.232	2.263
Container No.	299	123	15	119	70	56
Weight of Container W_c (gm)	34.11	39.35	42.19	32.97	31.44	35.58
Weight of Container + Wet Soil, $W3_{(gm)}$	116.19	146.83	140.09	137.34	111.47	138.46
Weight of Container + Dry Soil, $W4_{(gm)}$	106.54	132.57	128.59	123.67	102.15	125.18
Weight of Water W_w = W3 - W4 (gm)	9.65	14.26	11.50	13.67	9.32	13.28
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	72.43	93.22	86.40	90.70	70.71	89.60
Water Content, Wm (%)	13.32	15.30	13.31	15.07	13.18	14.82
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.763	1.756	1.860	1.855	1.972	1.971

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	2.2	4.5	6.7
CBR of Specimen at 5 mm Penetration	2.5	4.0	6.4
CBR of Specimen in Percent	**2.48**	**4.46**	**6.70**

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 340+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.952
OMC (%) 13.30
Compaction (Type) Dynamic

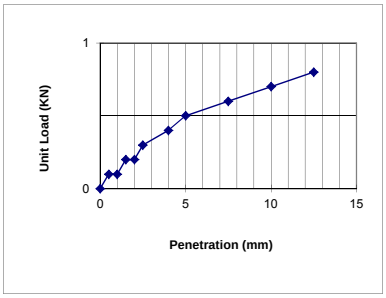
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.2		1.5
2.0	0.2		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

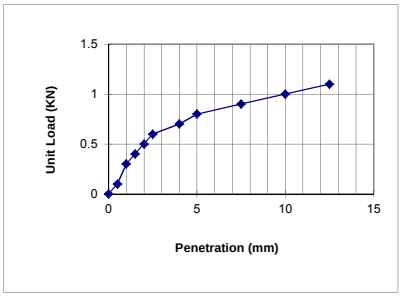


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.6	13.44	4.46
5.0	0.8	20.16	3.97

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.4		1.5
2.0	0.5		2.0
2.5	0.6	0.6	2.5
4.0	0.7		4.0
5.0	0.8	0.8	5.0
7.5	0.9		7.5
10.0	1		10.0
12.5	1.1		12.5

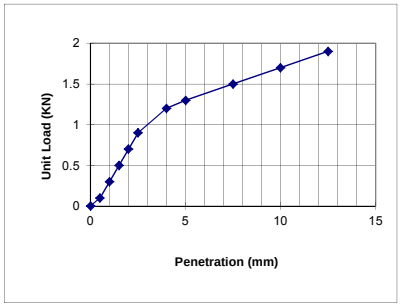


Sample-3

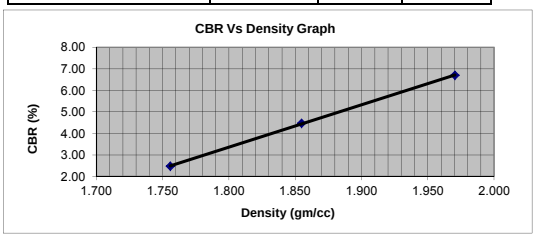
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.3	20.16	6.45

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.9	0.9	2.5
4.0	1.2		4.0
5.0	1.3	1.3	5.0
7.5	1.5		7.5
10.0	1.7		10.0
12.5	1.9		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.756	1.855	1.971
CBR (%)	2.48	4.46	6.70



97 % of Max Dry Density = 1.893
CBR corresponding to 97 % of Dry Density = 5.20

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 340+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.952
OMC (%) 13.30
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

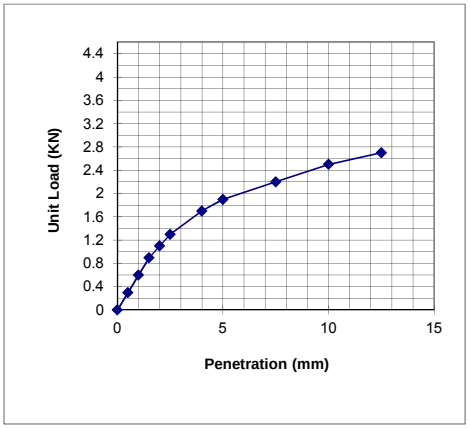
Soaking	Unsoaked
No.of Blows	55
Mould No.	40
Weight of Mould, W1 (gm)	7124
Weight of Mould + Soil, W2 (gm)	12101
Weight of Soil, W = W2 - W1 (gm)	4977
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.212
Container No.	236
Weight of Container W_c (gm)	33.51
Weight of Container + Wet Soil, W3 (gm)	132.82
Weight of Container + Dry Soil, W4 (gm)	120.95
Weight of Water W_w = W3 - W4 (gm)	11.87
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	87.44
Water Content, Wm (%)	13.58
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.948

CBR of Specimen at 2.5 mm Penetration	9.67
CBR of Specimen at 5 mm Penetration	9.42
CBR of Specimen in Percent	**9.67**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.3	13.44	9.67
5.0	1.9	20.16	9.42

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	0.9		1.5
2.0	1.1		2.0
2.5	1.3	1.3	2.5
4.0	1.7		4.0
5.0	1.9	1.9	5.0
7.5	2.2		7.5
10.0	2.5		10.0
12.5	2.7		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 345+000 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

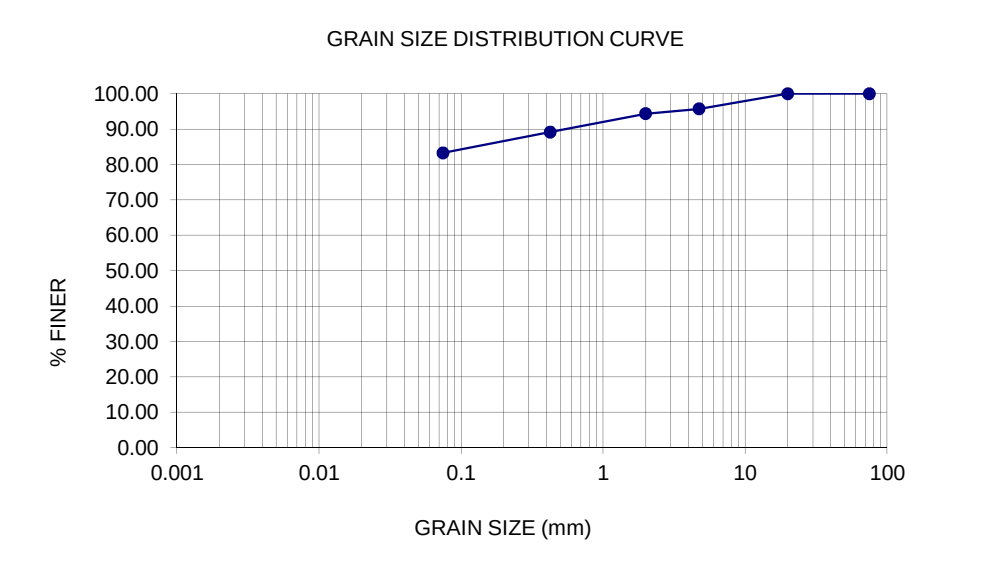
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	43.23	4.32	4.32	95.68
2 mm	2	13.32	1.33	5.66	94.35
425 m	0.425	52.13	5.21	10.87	89.13
75 m	0.075	58.99	5.90	16.77	83.23
Pan		832.33	83.23	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	4.32
Sand (%)	12.44
Fines (%)	83.23



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

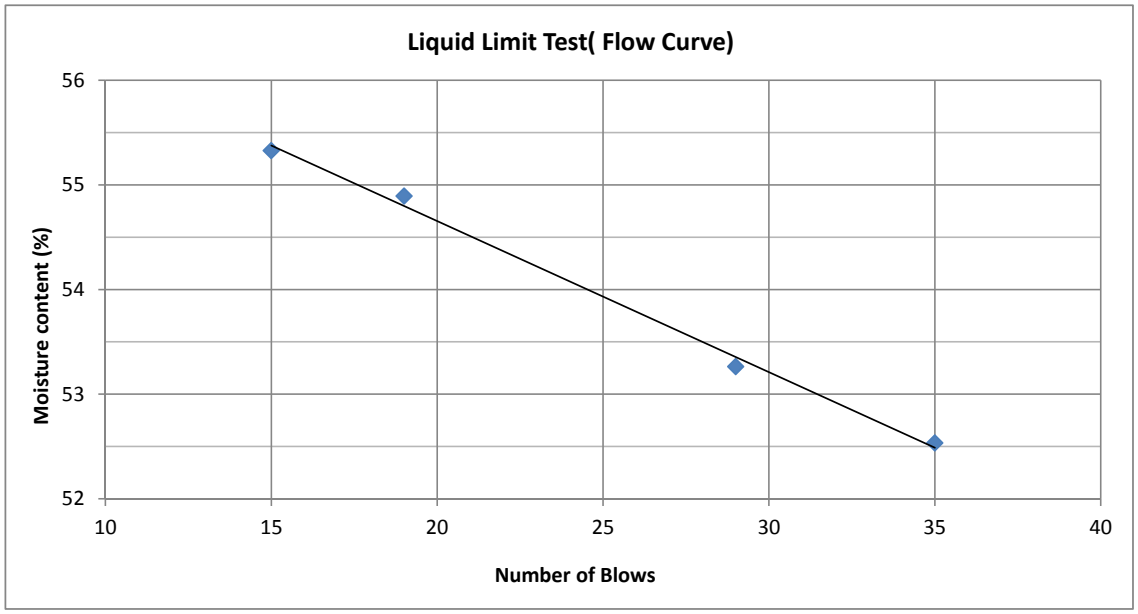
Sample Location: 345+000 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	19	29	35		
2	Container No.	128	247	29	266	304	123
3	Mass of Container (gm)	31.03	33.26	41.33	41.54	44.21	39.35
4	Mass of Wet Soil + Container (gm)	61.35	67.77	71.63	72.84	60.15	58.02
5	Mass of Oven Dry Soil + Container (gm)	50.55	55.54	61.1	62.06	56.1	53.26
6	Mass of Water=(4-5) (gm)	10.8	12.23	10.53	10.78	4.05	4.76
7	Mass of Oven Dry Soil =(5-3) (gm)	19.52	22.28	19.77	20.52	11.89	13.91
8	Water Content (w=6/7*100) (%)	55.33	54.89	53.26	52.53	34.06	34.22

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit	53.93	%
Plastic Limit	34.14	%
Platicity Index	19.79	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 345+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	12.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	20.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 345+000 LHS

Source of Materials: Test Pit

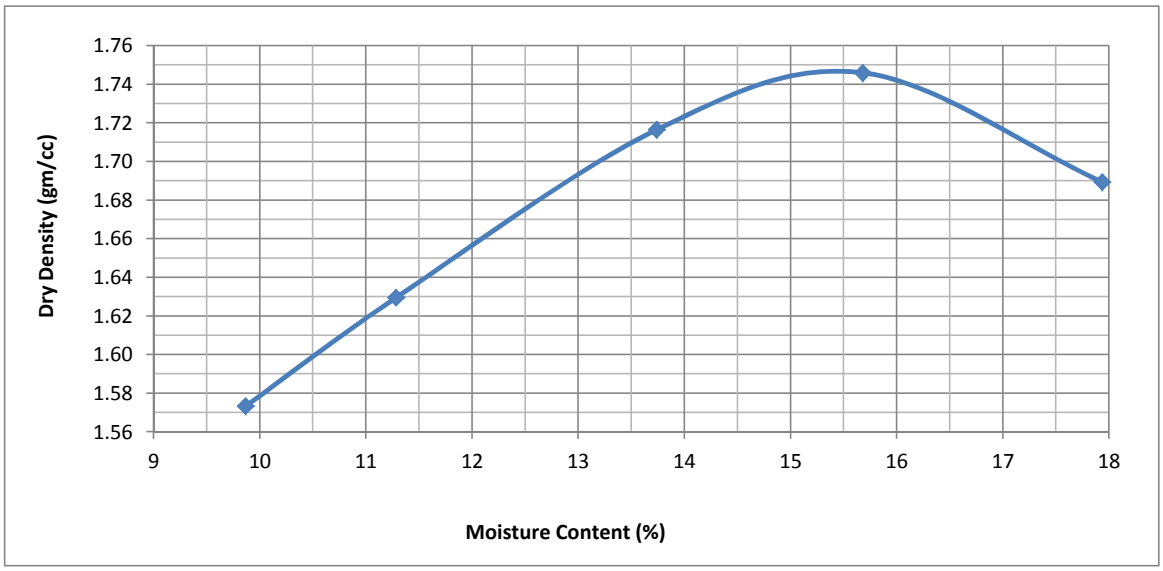
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11588	11768	12063	12206	12148
Mass of Compacted Soil(M3=M2-M1) gm	3670	3850	4145	4288	4230
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1728.6	1813.4	1952.3	2019.6	1992.3
Container No.	153	75	246	220	63
Mass of Container (gm)	32.95	35.9	31.17	33.23	34.81
Mass of Wet Soil+Container (gm)	125.24	127.6	119.99	109.29	112.86
Mass of Oven Dry Soil +Container (gm)	116.95	118.3	109.26	98.98	100.99
Mass of Water (gm)	8.29	9.3	10.73	10.31	11.87
Water Content (%)	9.87	11.29	13.74	15.68	17.94
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.573	1.629	1.716	1.746	1.689

Remarks:



From Graph

Maximum Dry Density	1.748	gm/cc
Optimum Moisture Content	15.50	%

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 345+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.748

OMC (%) 15.50

Compaction (Type) Dynamic

Date of Casting : 16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	36	36	44	44	38	38
Weight of Mould, W1 (gm)	7540	7540	7466	7466	7490	7490
Weight of Mould + Soil, W2 (gm)	11632	11705	11789	11844	12089	12146
Weight of Soil, W = W2 - W1 (gm)	4092	4165	4323	4378	4599	4656
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.819	1.851	1.921	1.946	2.044	2.069
Container No.	1	213	195	158	74	88
Weight of Container W_c (gm)	43.27	35.29	30.88	30.26	30.65	33.37
Weight of Container + Wet Soil, $W3_{(gm)}$	136.59	102.21	111.89	112.86	84.93	113.18
Weight of Container + Dry Soil, $W4_{(gm)}$	124.19	92.25	100.98	100.76	77.65	101.53
Weight of Water W_w = W3 - W4 (gm)	12.40	9.96	10.91	12.10	7.28	11.65
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	80.92	56.96	70.10	70.50	47.00	68.16
Water Content, Wm (%)	15.32	17.49	15.56	17.16	15.49	17.09
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.577	1.576	1.663	1.661	1.770	1.767

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	2.2	3.7	5.2
CBR of Specimen at 5 mm Penetration	2.5	4.0	6.0
CBR of Specimen in Percent	**2.48**	**3.97**	**5.95**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 345+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.748
OMC (%) 15.50
Compaction (Type) Dynamic

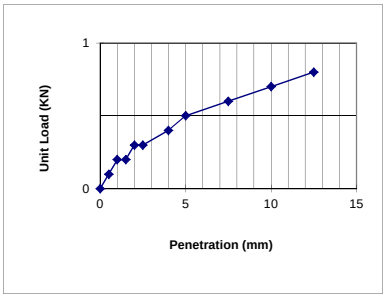
Date of Casting : 16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

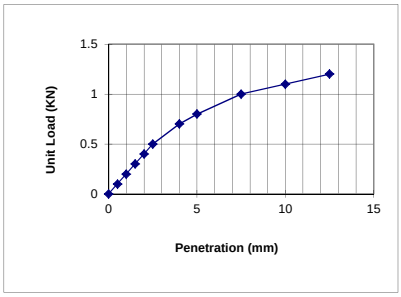


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	0.8	20.16	3.97

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.4		2.0
2.5	0.5	0.5	2.5
4.0	0.7		4.0
5.0	0.8	0.8	5.0
7.5	1		7.5
10.0	1.1		10.0
12.5	1.2		12.5

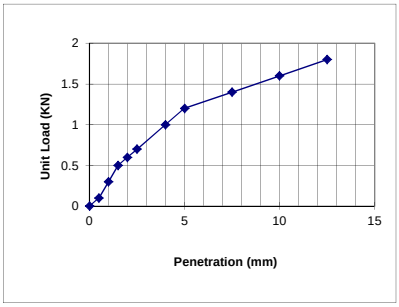


Sample-3

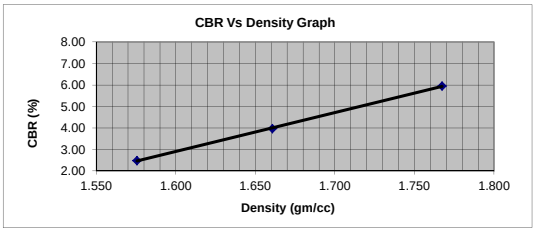
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.7	13.44	5.21
5.0	1.2	20.16	5.95

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.6		2.0
2.5	0.7	0.7	2.5
4.0	1		4.0
5.0	1.2	1.2	5.0
7.5	1.4		7.5
10.0	1.6		10.0
12.5	1.8		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.576	1.661	1.767
CBR (%)	2.48	3.97	5.95



97 % of Max Dry Density = 1.696
CBR corresponding to 97 % of Dry Density = 4.64

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 345+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.748

OMC (%) 15.50

Compaction (Type) Dynamic

Date of Casting : 16.09.13

Date of Testing : 16.09.13

Surcharge Weight :5 kg

Soaking	Unsoaked
No.of Blows	55
Mould No.	44
Weight of Mould, W1 (gm)	7466
Weight of Mould + Soil, W2 (gm)	12010
Weight of Soil, W = W2 - W1 (gm)	4544
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.020
Container No.	25
Weight of Container W_c (gm)	39.24
Weight of Container + Wet Soil, $W3_{(gm)}$	115.89
Weight of Container + Dry Soil, $W4_{(gm)}$	105.55
Weight of Water W_w = W3 - W4 (gm)	10.34
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	66.31
Water Content, Wm (%)	15.59
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.747

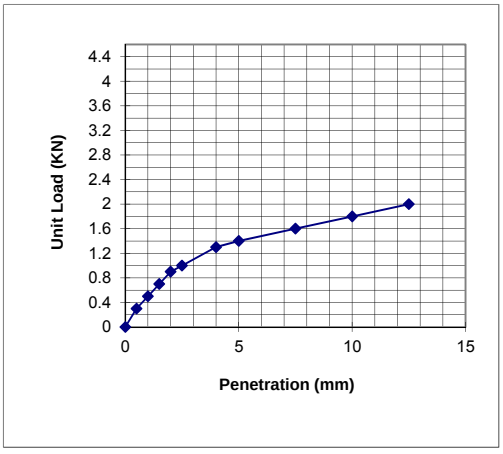
CBR of Specimen at 2.5 mm Penetration	7.44
CBR of Specimen at 5 mm Penetration	6.94
CBR of Specimen in Percent	**7.44**

No of Blows : 55

Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.0	13.44	7.44
5.0	1.4	20.16	6.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1	1.0	2.5
4.0	1.3		4.0
5.0	1.4	1.4	5.0
7.5	1.6		7.5
10.0	1.8		10.0
12.5	2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 350+000 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

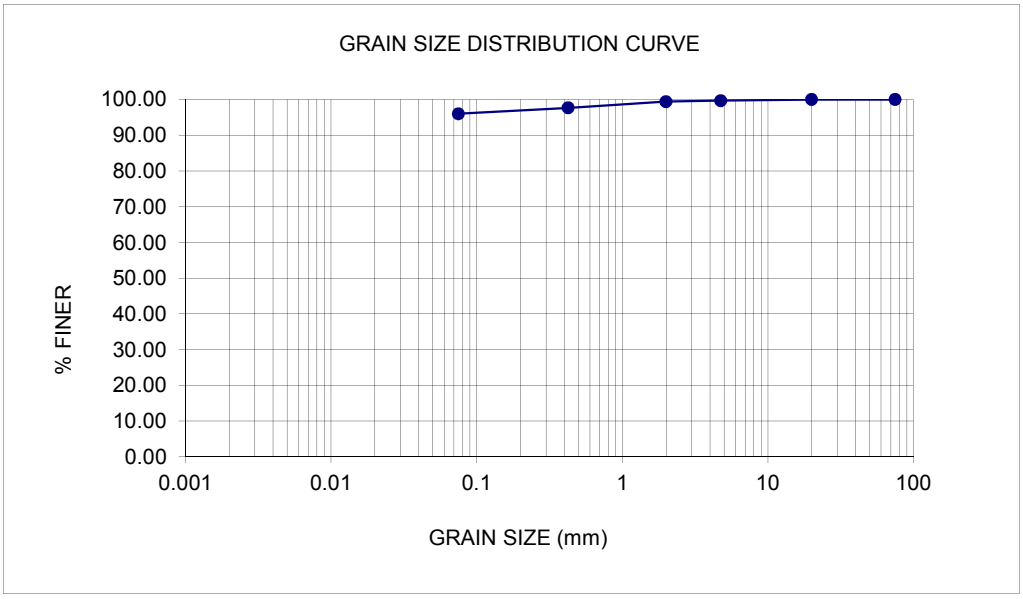
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	2.95	0.30	0.30	99.71
2 mm	2	2.86	0.29	0.58	99.42
425 m	0.425	17.51	1.75	2.33	97.67
75 m	0.075	16.3	1.63	3.96	96.04
Pan		960.38	96.04	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	0.30
Sand (%)	3.67
Fines (%)	96.04



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

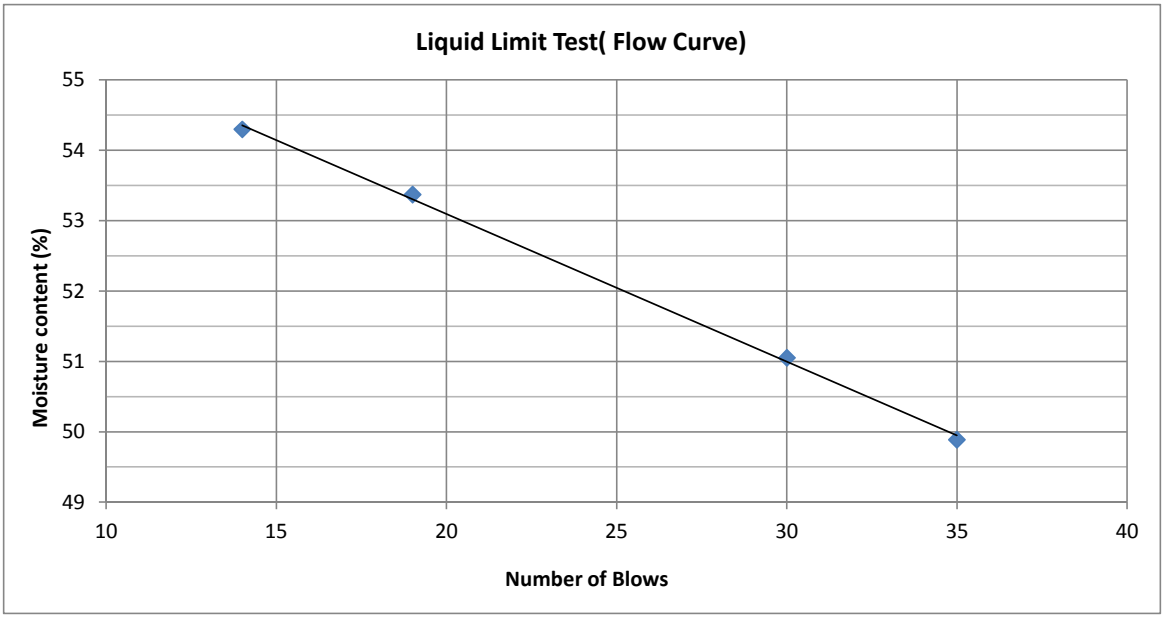
Sample Location: 350+000 RHS

Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	14	19	30	35		
2	Container No.	149	265	88	109	P7	P13
3	Mass of Container (gm)	23.94	35.7	33.37	34.17	55.8	57.84
4	Mass of Wet Soil + Container (gm)	55.54	71.88	62.75	61.42	76.16	77.76
5	Mass of Oven Dry Soil + Container (gm)	44.42	59.29	52.82	52.35	71.21	72.82
6	Mass of Water=(4-5) (gm)	11.12	12.59	9.93	9.07	4.95	4.94
7	Mass of Oven Dry Soil =(5-3) (gm)	20.48	23.59	19.45	18.18	15.41	14.98
8	Water Content (w=6/7*100) (%)	54.30	53.37	51.05	49.89	32.12	32.98

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 52.05 %

Plastic Limit 32.55 %

Platicity Index 19.50 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 350+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	12.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	20.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 350+000 RHS

Source of Materials: Test Pit

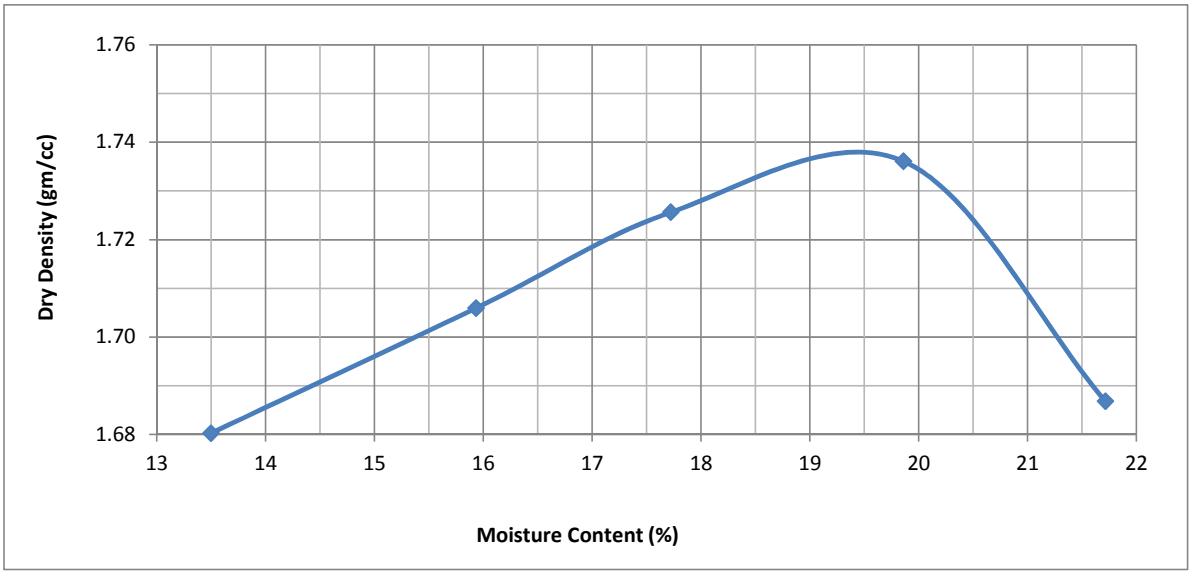
Type of Compation : Dynamic — Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 — Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	14	16	18	20	22
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	11985	12135	12249	12354	12295
Mass of Compacted Soil(M3=M2-M1) gm	4049	4199	4313	4418	4359
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1907.1	1977.7	2031.4	2080.9	2053.1
Container No.	195	15	147	66	234
Mass of Container (gm)	30.88	35.9	34.21	32.53	34.14
Mass of Wet Soil+Container (gm)	122.78	149.92	127.14	105.68	109.25
Mass of Oven Dry Soil +Container (gm)	111.85	134.25	113.15	93.56	95.85
Mass of Water (gm)	10.93	15.67	13.99	12.12	13.4
Water Content (%)	13.50	15.93	17.72	19.86	21.71
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.680	1.706	1.726	1.736	1.687

Remarks:



From Graph

Maximum Dry Density	1.739	gm/cc
Optimum Moisture Content	19.50	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 350+000 RHS

Source of Materials: Test Pit

MDD (gm/cc) 1.739

OMC (%) 19.50

Compaction (Type) Dynamic

Date of Casting : 14.09.13

Date of Testing : 18.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	52	52	29	29	57	57
Weight of Mould, W1 (gm)	7134	7134	7404	7404	7592	7592
Weight of Mould + Soil, W2 (gm)	11346	11461	11856	11956	12323	12415
Weight of Soil, W = W2 - W1 (gm)	4212	4327	4452	4552	4731	4823
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.872	1.923	1.979	2.023	2.103	2.144
Container No.	138	288	9	220	74	88
Weight of Container W_c (gm)	33.18	37.78	33.72	33.23	30.65	33.37
Weight of Container + Wet Soil, $W3_{(gm)}$	126.35	114.14	137.47	100.14	128.48	100.59
Weight of Container + Dry Soil, $W4_{(gm)}$	111.12	99.85	120.56	87.85	112.56	88.46
Weight of Water W_w = W3 - W4 (gm)	15.23	14.29	16.91	12.29	15.92	12.13
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	77.94	62.07	86.84	54.62	81.91	55.09
Water Content, Wm (%)	19.54	23.02	19.47	22.50	19.44	22.02
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.566	1.563	1.656	1.652	1.760	1.757

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	1.5	2.2	3.0
CBR of Specimen at 5 mm Penetration	1.5	2.5	3.5
CBR of Specimen in Percent	**1.49**	**2.48**	**3.47**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 350+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.739
OMC (%) 19.50
Compaction (Type) Dynamic

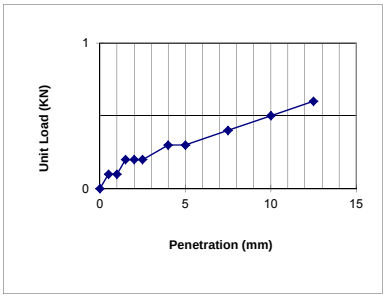
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.2	13.44	1.49
5.0	0.3	20.16	1.49

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.2		1.5
2.0	0.2		2.0
2.5	0.2	0.2	2.5
4.0	0.3		4.0
5.0	0.3	0.3	5.0
7.5	0.4		7.5
10.0	0.5		10.0
12.5	0.6		12.5

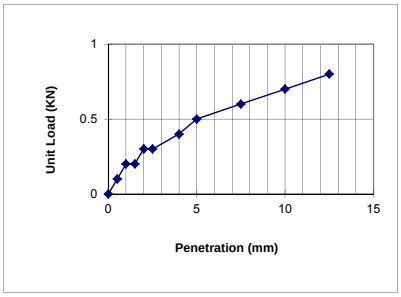


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

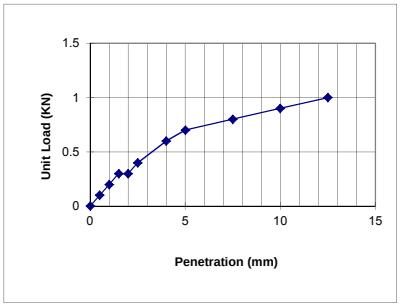


Sample-3

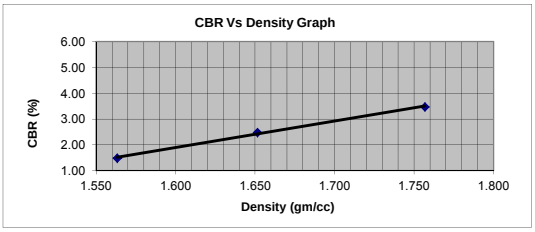
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.7	20.16	3.47

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.6		4.0
5.0	0.7	0.7	5.0
7.5	0.8		7.5
10.0	0.9		10.0
12.5	1		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.563	1.652	1.757
CBR (%)	1.49	2.48	3.47



97 % of Max Dry Density = 1.687
CBR corresponding to 97 % of Dry Density = 2.78

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 350+000 RHS

Source of Materials: Test Pit

MDD (gm/cc) 1.739

OMC (%) 19.50

Compaction (Type) Dynamic

Date of Casting : 14.09.13

Date of Testing : 14.09.13

Surcharge Weight :5 kg

Soaking	Unsoaked
No.of Blows	55
Mould No.	52
Weight of Mould, W1 (gm)	7134
Weight of Mould + Soil, W2 (gm)	11825
Weight of Soil, W = W2 - W1 (gm)	4691
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.085
Container No.	220
Weight of Container W_c (gm)	33.23
Weight of Container + Wet Soil, $W3_{(gm)}$	145.56
Weight of Container + Dry Soil, $W4_{(gm)}$	127.15
Weight of Water W_w = W3 - W4 (gm)	18.41
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	93.92
Water Content, Wm (%)	19.60
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.743

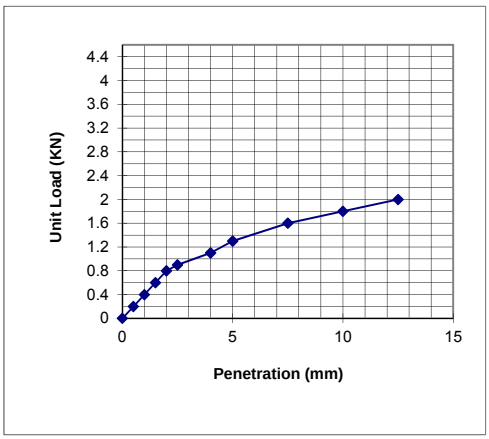
CBR of Specimen at 2.5 mm Penetration	6.70
CBR of Specimen at 5 mm Penetration	6.45
CBR of Specimen in Percent	**6.70**

No of Blows : 55

Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.3	20.16	6.45

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.6		1.5
2.0	0.8		2.0
2.5	0.9	0.9	2.5
4.0	1.1		4.0
5.0	1.3	1.3	5.0
7.5	1.6		7.5
10.0	1.8		10.0
12.5	2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 354+900 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

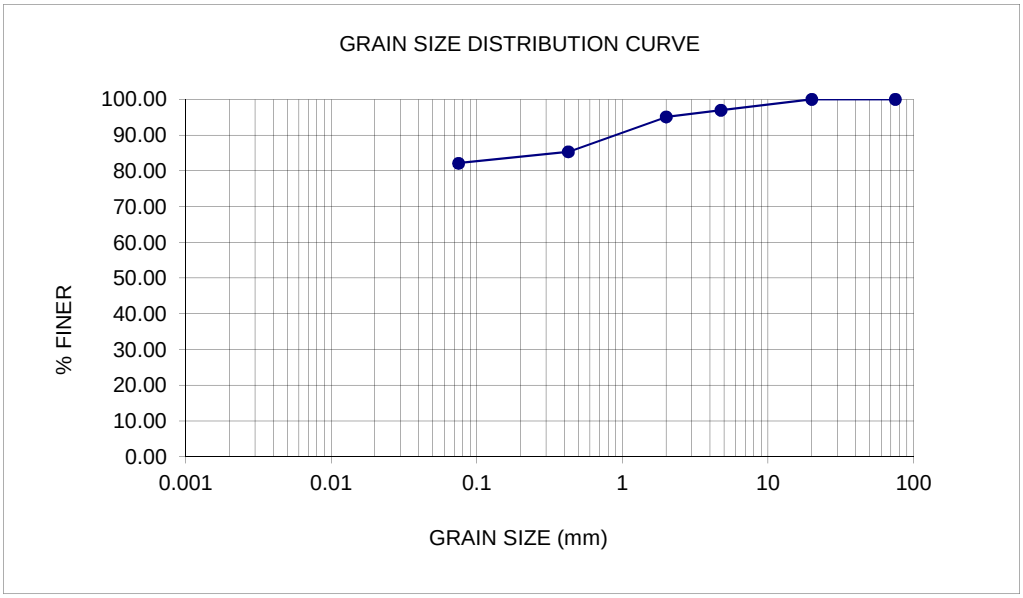
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	30.32	3.03	3.03	96.97
2 mm	2	18.9	1.89	4.92	95.08
425 m	0.425	97.56	9.76	14.68	85.32
75 m	0.075	31.73	3.17	17.85	82.15
Pan		821.49	82.15	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	3.03
Sand (%)	14.82
Fines (%)	82.15



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 354+900 LHS

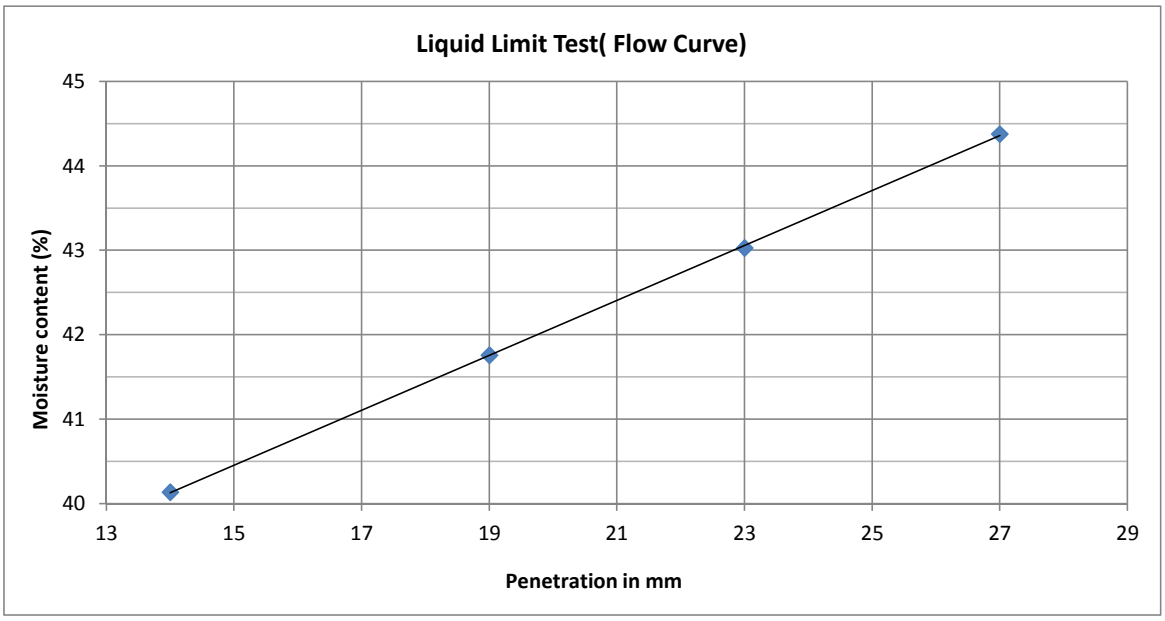
Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	14	19	23	27		
2	Container No.	82	149	153	152		
3	Mass of Container (gm)	32.86	23.94	32.95	32.63		
4	Mass of Wet Soil + Container (gm)	59.08	50.18	61.77	54.72		
5	Mass of Oven Dry Soil + Container (gm)	51.57	42.45	53.1	47.93	Non Plastic	
6	Mass of Water=(4-5) (gm)	7.51	7.73	8.67	6.79		
7	Mass of Oven Dry Soil =(5-3) (gm)	18.71	18.51	20.15	15.3		
8	Water Content (w=6/7*100) (%)	40.14	41.76	43.03	44.38		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 42.08 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 354+900 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :19.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 354+900 LHS

Source of Materials: Test Pit

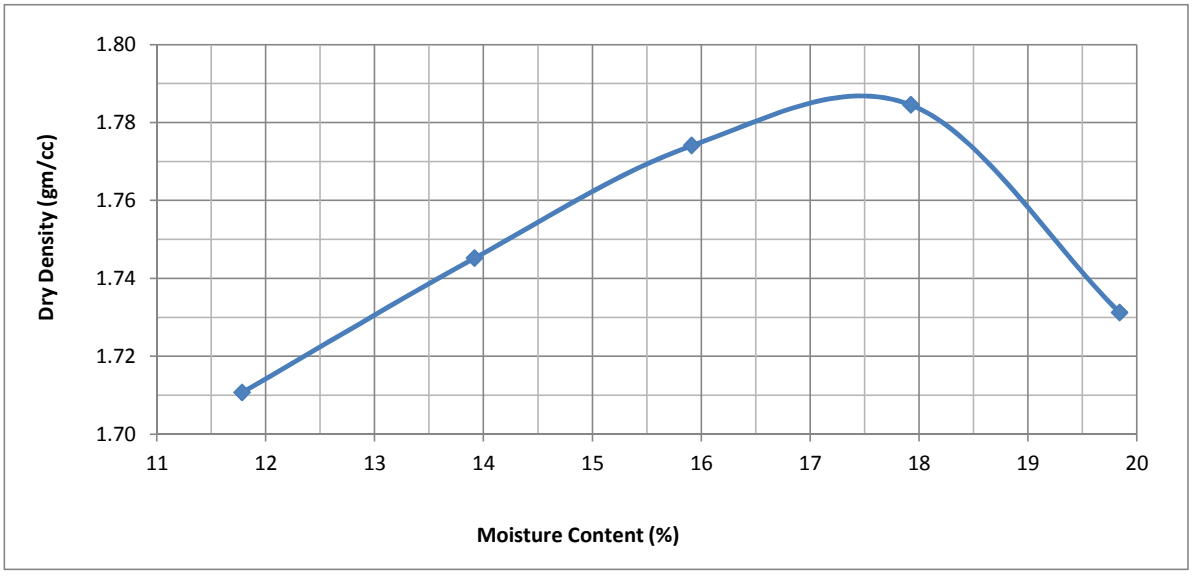
Type of Compation : Dynamic Date of Testing : 16.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	12	14	16	18	20
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11978	12139	12284	12386	12323
Mass of Compacted Soil(M3=M2-M1) gm	4060	4221	4366	4468	4405
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1912.3	1988.1	2056.4	2104.4	2074.8
Container No.	184	196	16	63	36
Mass of Container (gm)	33.72	32.32	28.39	34.81	36.05
Mass of Wet Soil+Container (gm)	125.38	111.64	103.42	113.23	120.43
Mass of Oven Dry Soil +Container (gm)	115.72	101.95	93.12	101.31	106.46
Mass of Water (gm)	9.66	9.69	10.3	11.92	13.97
Water Content (%)	11.78	13.92	15.91	17.92	19.84
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.711	1.745	1.774	1.785	1.731

Remarks:



From Graph

Maximum Dry Density 1.789 gm/cc

Optimum Moisture Content 17.50 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 354+900 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.789

OMC (%) 17.50

Compaction (Type) Dynamic

Date of Casting : 17.09.13

Date of Testing : 21.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	16	16	70	70	23	23
Weight of Mould, W1 (gm)	7402	7402	7536	7536	6716	6716
Weight of Mould + Soil, W2 (gm)	11684	11744	12029	12093	11504	11563
Weight of Soil, W = W2 - W1 (gm)	4282	4342	4493	4557	4788	4847
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.903	1.930	1.997	2.025	2.128	2.154
Container No.	258	189	60	297	137	92
Weight of Container W_c (gm)	31.75	34.08	32.91	0.00	31.98	34.74
Weight of Container + Wet Soil, $W3_{(gm)}$	97.61	98.61	101.52	93.30	98.01	113.80
Weight of Container + Dry Soil, $W4_{(gm)}$	87.79	87.97	91.35	78.32	88.15	101.13
Weight of Water W_w = W3 - W4 (gm)	9.82	10.64	10.17	14.98	9.86	12.67
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	56.04	53.89	58.44	78.32	56.17	66.39
Water Content, Wm (%)	17.52	19.74	17.40	19.13	17.55	19.08
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.619	1.612	1.701	1.700	1.810	1.809

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	2.2	4.5	6.0
CBR of Specimen at 5 mm Penetration	2.5	4.5	6.4
CBR of Specimen in Percent	**2.48**	**4.46**	**6.45**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 354+900 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.789
OMC (%) 17.50
Compaction (Type) Dynamic

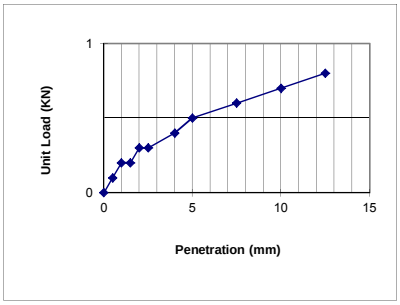
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

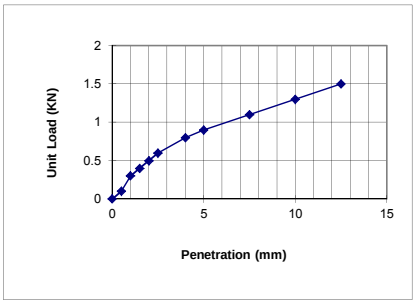


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.6	13.44	4.46
5.0	0.9	20.16	4.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.4		1.5
2.0	0.5		2.0
2.5	0.6	0.6	2.5
4.0	0.8		4.0
5.0	0.9	0.9	5.0
7.5	1.1		7.5
10.0	1.3		10.0
12.5	1.5		12.5

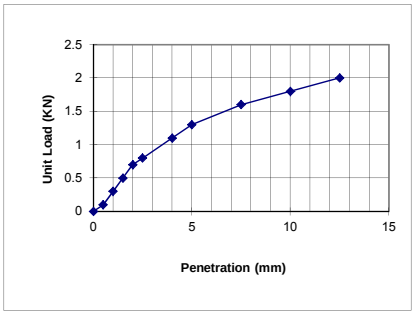


Sample-3

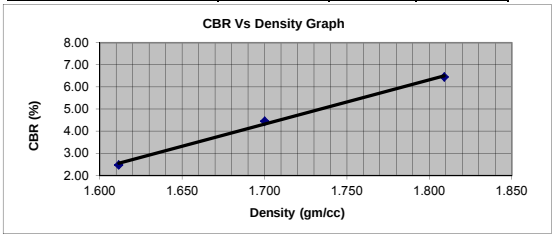
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.3	20.16	6.45

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.8	0.8	2.5
4.0	1.1		4.0
5.0	1.3	1.3	5.0
7.5	1.6		7.5
10.0	1.8		10.0
12.5	2		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.612	1.700	1.809
CBR (%)	2.48	4.46	6.45



97 % of Max Dry Density = 1.735
CBR corresponding to 97 % of Dry Density = 5.03

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 354+900 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.789
OMC (%) 17.50
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

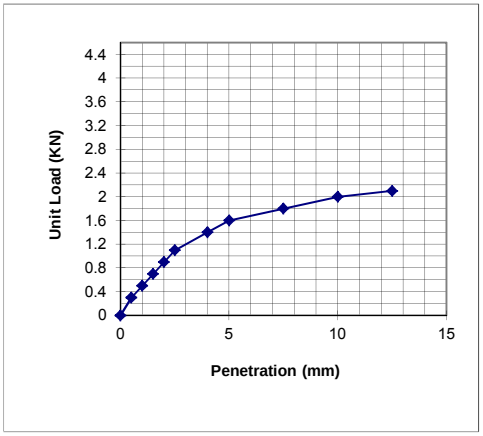
Soaking	Unsoaked
No.of Blows	55
Mould No.	23
Weight of Mould, W1 (gm)	6716
Weight of Mould + Soil, W2 (gm)	11446
Weight of Soil, W = W2 - W1 (gm)	4730
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.102
Container No.	20
Weight of Container W_c (gm)	36.77
Weight of Container + Wet Soil, W3 (gm)	112.56
Weight of Container + Dry Soil, W4 (gm)	101.15
Weight of Water W_w = W3 - W4 (gm)	11.41
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	64.38
Water Content, Wm (%)	17.72
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.786

CBR of Specimen at 2.5 mm Penetration	8.18
CBR of Specimen at 5 mm Penetration	7.94
CBR of Specimen in Percent	**8.18**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.1	13.44	8.18
5.0	1.6	20.16	7.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1.1	1.1	2.5
4.0	1.4		4.0
5.0	1.6	1.6	5.0
7.5	1.8		7.5
10.0	2		10.0
12.5	2.1		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 359+900 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

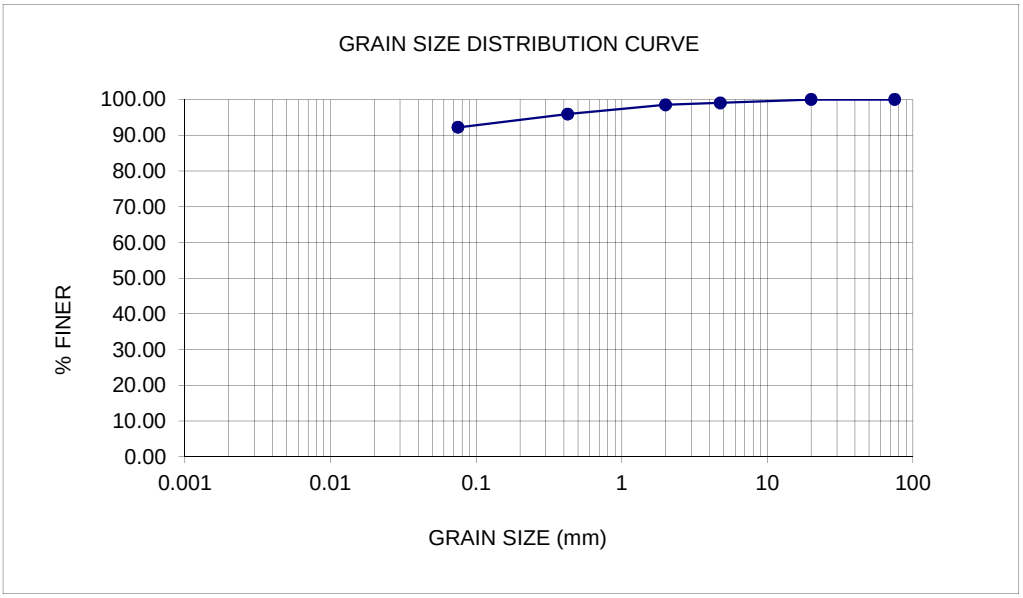
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	9.57	0.96	0.96	99.04
2 mm	2	5.1	0.51	1.47	98.53
425 m	0.425	26.32	2.63	4.10	95.90
75 m	0.075	36.82	3.68	7.78	92.22
Pan		922.19	92.22	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	0.96
Sand (%)	6.82
Fines (%)	92.22



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

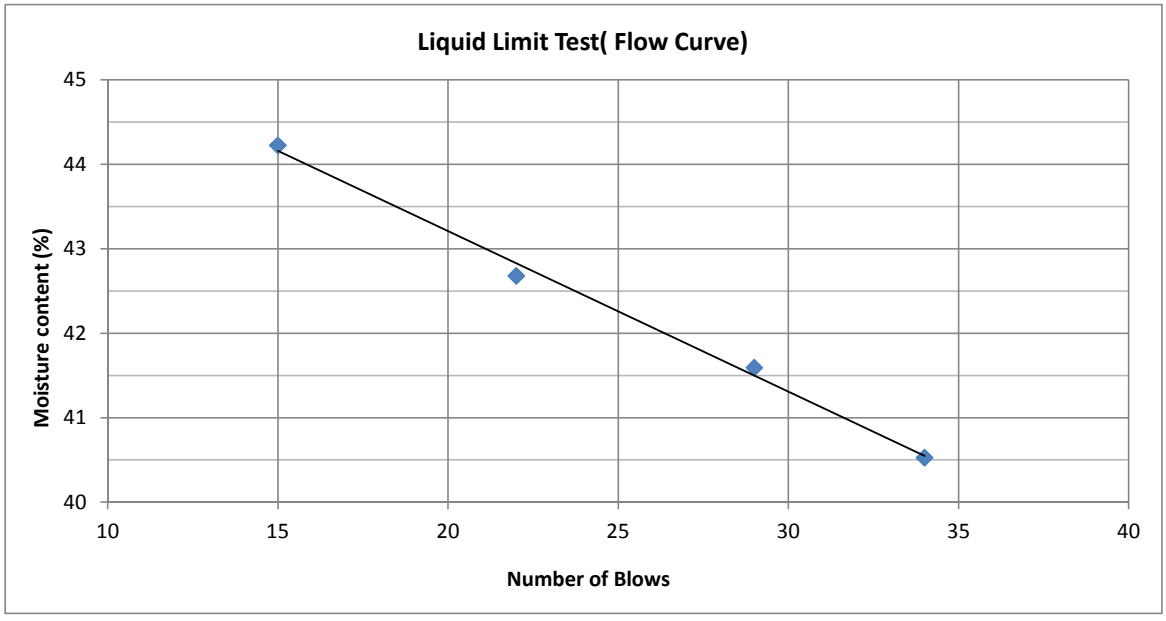
Sample Location: 359+900 RHS

Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	22	29	34		
2	Container No.	185	232	151	159	P9	P12
3	Mass of Container (gm)	32.87	31.07	32.49	24.58	58.82	60.41
4	Mass of Wet Soil + Container (gm)	66.72	63.33	66.94	58.04	79.43	81.78
5	Mass of Oven Dry Soil + Container (gm)	56.34	53.68	56.82	48.39	74.82	77.28
6	Mass of Water=(4-5) (gm)	10.38	9.65	10.12	9.65	4.61	4.5
7	Mass of Oven Dry Soil =(5-3) (gm)	23.47	22.61	24.33	23.81	16	16.87
8	Water Content (w=6/7*100) (%)	44.23	42.68	41.59	40.53	28.81	26.67

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit	42.26	%
Plastic Limit	27.74	%
Platicity Index	14.52	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 359+900 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 359+900 RHS

Source of Materials: Test Pit

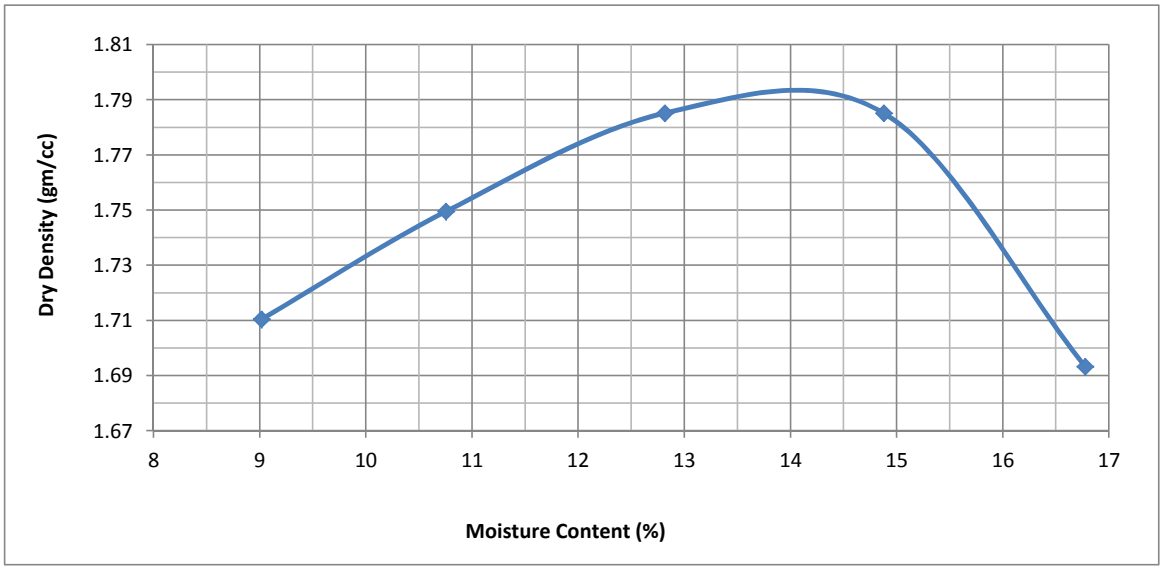
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	9	11	13	15	17
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	11895	12050	12212	12290	12134
Mass of Compacted Soil(M3=M2-M1) gm	3959	4114	4276	4354	4198
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1864.7	1937.7	2014.0	2050.7	1977.3
Container No.	155	126	97	25	226
Mass of Container (gm)	35.16	35.9	33.2	39.24	31.87
Mass of Wet Soil+Container (gm)	124.61	133.51	119.45	146.25	113.59
Mass of Oven Dry Soil +Container (gm)	117.21	124.03	109.65	132.39	101.85
Mass of Water (gm)	7.4	9.48	9.8	13.86	11.74
Water Content (%)	9.02	10.76	12.82	14.88	16.78
	1.710	1.750	1.785	1.785	1.693

Remarks:



From Graph

Maximum Dry Density 1.792 gm/cc

Optimum Moisture Content 14.10 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 359+900 RHS

Source of Materials: Test Pit — Date of Casting : 14.09.13

MDD (gm/cc) 1.792 — Date of Testing : 18.09.13

OMC (%) 14.10 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	43	43	35	35	55	55
Weight of Mould, W1 (gm)	7350	7350	7410	7410	6724	6724
Weight of Mould + Soil, W2 (gm)	11518	11624	11795	11875	11376	11461
Weight of Soil, W = W2 - W1 (gm)	4168	4274	4385	4465	4652	4737
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.852	1.900	1.949	1.984	2.068	2.105
Container No.	115	79	25	152	259	16
Weight of Container W_c (gm)	32.19	35.37	39.24	32.63	35.77	28.39
Weight of Container + Wet Soil, $W3_{(gm)}$	93.37	117.83	123.5	104.25	112.51	96.03
Weight of Container + Dry Soil, $W4_{(gm)}$	85.65	105.56	113.1	94.15	103.02	86.55
Weight of Water $W_w = W3 - W4$ (gm)	7.72	12.27	10.40	10.10	9.49	9.48
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	53.46	70.19	73.86	61.52	67.25	58.16
Water Content, Wm (%)	14.44	17.48	14.08	16.42	14.11	16.30
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.619	1.617	1.708	1.705	1.812	1.810

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	1.5	2.2	3.7
CBR of Specimen at 5 mm Penetration	1.5	2.5	3.5
CBR of Specimen in Percent	**1.49**	**2.48**	**3.72**

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 359+900 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.792
OMC (%) 14.10
Compaction (Type) Dynamic

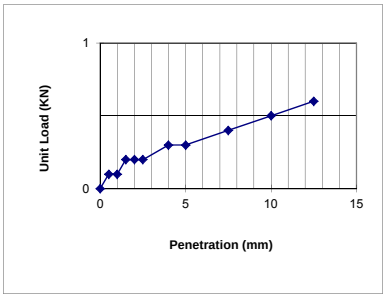
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.2	13.44	1.49
5.0	0.3	20.16	1.49

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.2		1.5
2.0	0.2		2.0
2.5	0.2	0.2	2.5
4.0	0.3		4.0
5.0	0.3	0.3	5.0
7.5	0.4		7.5
10.0	0.5		10.0
12.5	0.6		12.5

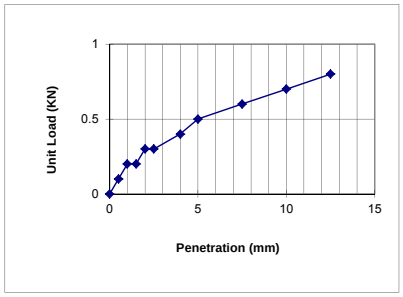


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

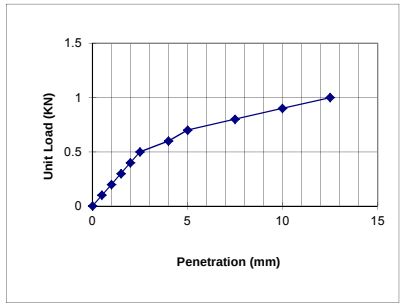


Sample-3

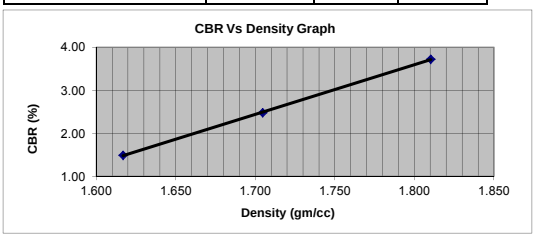
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	0.7	20.16	3.47

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.4		2.0
2.5	0.5	0.5	2.5
4.0	0.6		4.0
5.0	0.7	0.7	5.0
7.5	0.8		7.5
10.0	0.9		10.0
12.5	1		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.617	1.705	1.810
CBR (%)	1.49	2.48	3.72



97 % of Max Dry Density = 1.738
CBR corresponding to 97 % of Dry Density = 2.88

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 359+900 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.792
OMC (%) 14.10
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

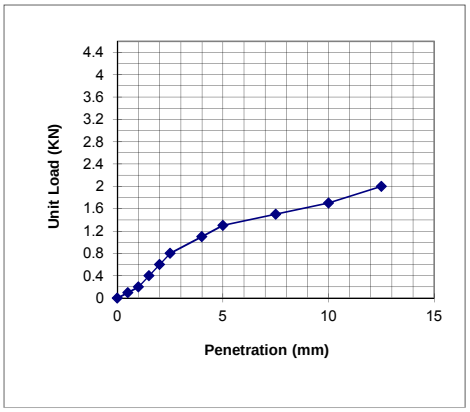
Soaking	Unsoaked
No.of Blows	55
Mould No.	43
Weight of Mould, W1 (gm)	7350
Weight of Mould + Soil, W2 (gm)	11946
Weight of Soil, W = W2 - W1 (gm)	4596
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.043
Container No.	16
Weight of Container W_c (gm)	28.39
Weight of Container + Wet Soil, W3 (gm)	125.65
Weight of Container + Dry Soil, W4 (gm)	113.56
Weight of Water W_w = W3 - W4 (gm)	12.09
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	85.17
Water Content, Wm (%)	14.20
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.789

CBR of Specimen at 2.5 mm Penetration	5.95
CBR of Specimen at 5 mm Penetration	6.45
CBR of Specimen in Percent	**6.45**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.3	20.16	6.45

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.4		1.5
2.0	0.6		2.0
2.5	0.8	0.8	2.5
4.0	1.1		4.0
5.0	1.3	1.3	5.0
7.5	1.5		7.5
10.0	1.7		10.0
12.5	2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 370+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

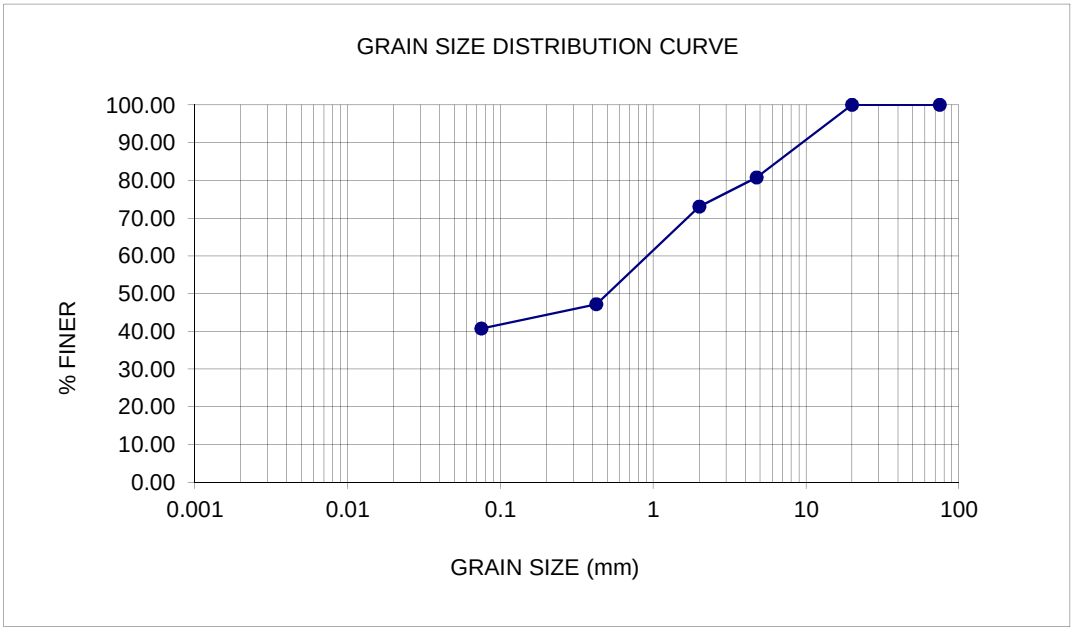
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	192.49	19.25	19.25	80.75
2 mm	2	77.28	7.73	26.98	73.02
425 m	0.425	258.62	25.86	52.84	47.16
75 m	0.075	64.61	6.46	59.30	40.70
Pan		407	40.70	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	19.25
Sand (%)	40.05
Fines (%)	40.70



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

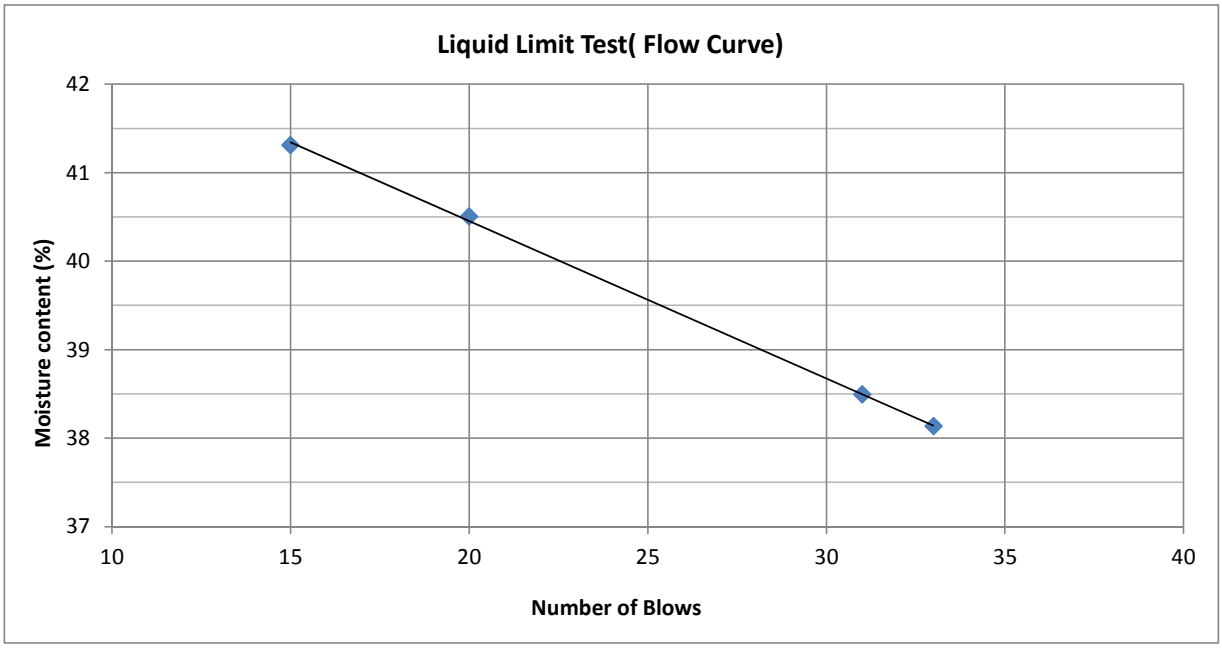
Sample Location: 370+000 LHS

Source of Materials: Test Pit Date of Testing :13.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	20	31	33		
2	Container No.	16	117	213	74		
3	Mass of Container (gm)	28.39	33.49	35.29	30.65		
4	Mass of Wet Soil + Container (gm)	55.38	68.77	70.55	60.86		
5	Mass of Oven Dry Soil + Container (gm)	47.49	58.6	60.75	52.52		
6	Mass of Water=(4-5) (gm)	7.89	10.17	9.8	8.34		
7	Mass of Oven Dry Soil =(5-3) (gm)	19.1	25.11	25.46	21.87		
8	Water Content (w=6/7*100) (%)	41.31	40.50	38.49	38.13		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 39.56 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 370+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 370+000 LHS

Source of Materials: Test Pit

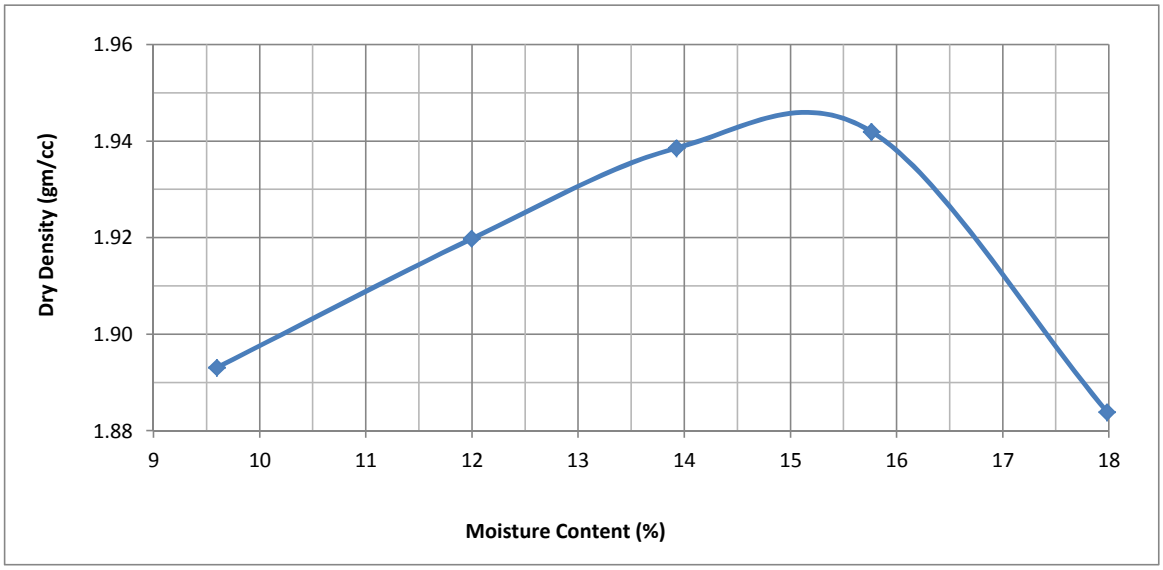
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	12285	12445	12569	12653	12599
Mass of Compacted Soil(M3=M2-M1) gm	4405	4565	4689	4773	4719
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2074.8	2150.1	2208.5	2248.1	2222.6
Container No.	46	4	60	123	98
Mass of Container (gm)	40.11	35.9	32.91	39.35	33.82
Mass of Wet Soil+Container (gm)	166.53	161.73	129.69	174.91	118.32
Mass of Oven Dry Soil +Container (gm)	155.46	148.25	117.86	156.45	105.44
Mass of Water (gm)	11.07	13.48	11.83	18.46	12.88
Water Content (%)	9.60	12.00	13.93	15.76	17.98
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.893	1.920	1.939	1.942	1.884

Remarks:



From Graph

Maximum Dry Density	1.945	gm/cc
Optimum Moisture Content	15.30	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 370+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.945

OMC (%) 15.30

Compaction (Type) Dynamic

Date of Casting : 14.09.13

Date of Testing : 18.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	1	1	66	66	10	10
Weight of Mould, W1 (gm)	7526	7526	7000	7000	7416	7416
Weight of Mould + Soil, W2 (gm)	12079	12195	11805	11895	12512	12608
Weight of Soil, W = W2 - W1 (gm)	4553	4669	4805	4895	5096	5192
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.024	2.075	2.136	2.176	2.265	2.308
Container No.	100	197	23	154	182	195
Weight of Container W_c (gm)	34.94	35.18	36.07	33.35	34.02	30.88
Weight of Container + Wet Soil, $W3_{(gm)}$	132.63	129.22	128.63	114.63	130.71	101.43
Weight of Container + Dry Soil, $W4_{(gm)}$	119.78	114.56	116.35	102.45	117.95	90.95
Weight of Water W_w = W3 - W4 (gm)	12.85	14.66	12.28	12.18	12.76	10.48
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	84.84	79.38	80.28	69.10	83.93	60.07
Water Content, Wm (%)	15.15	18.47	15.30	17.63	15.20	17.45
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.757	1.752	1.852	1.850	1.966	1.965

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	4.5	8.2	12.6
CBR of Specimen at 5 mm Penetration	4.5	7.9	12.4
CBR of Specimen in Percent	**4.46**	**8.18**	**12.65**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 370+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.945
OMC (%) 15.30
Compaction (Type) Dynamic

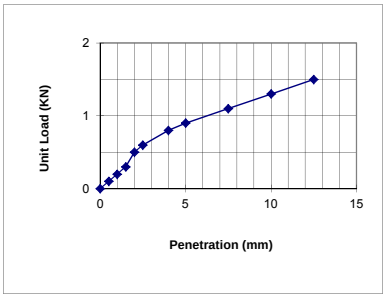
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.6	13.44	4.46
5.0	0.9	20.16	4.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.5		2.0
2.5	0.6	0.6	2.5
4.0	0.8		4.0
5.0	0.9	0.9	5.0
7.5	1.1		7.5
10.0	1.3		10.0
12.5	1.5		12.5

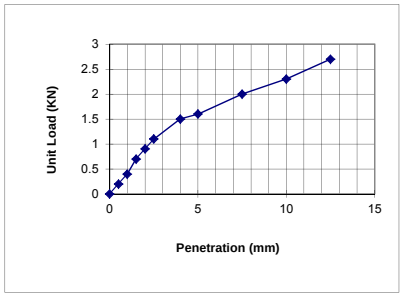


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.1	13.44	8.18
5.0	1.6	20.16	7.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1.1	1.1	2.5
4.0	1.5		4.0
5.0	1.6	1.6	5.0
7.5	2		7.5
10.0	2.3		10.0
12.5	2.7		12.5

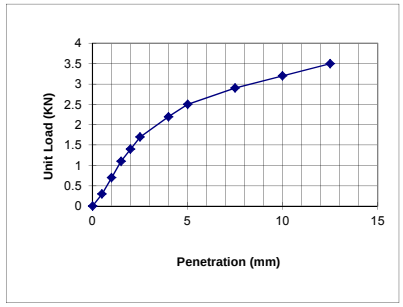


Sample-3

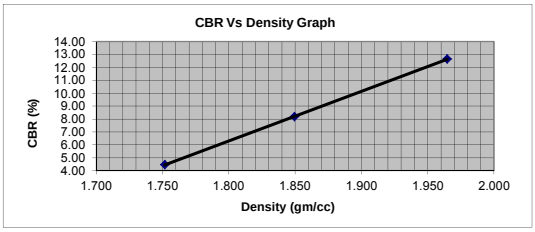
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.7	13.44	12.65
5.0	2.5	20.16	12.40

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.7		1.0
1.5	1.1		1.5
2.0	1.4		2.0
2.5	1.7	1.7	2.5
4.0	2.2		4.0
5.0	2.5	2.5	5.0
7.5	2.9		7.5
10.0	3.2		10.0
12.5	3.5		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.752	1.850	1.965
CBR (%)	4.46	8.18	12.65



97 % of Max Dry Density = 1.887
CBR corresponding to 97 % of Dry Density = 9.64

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 370+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.945
OMC (%) 15.30
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

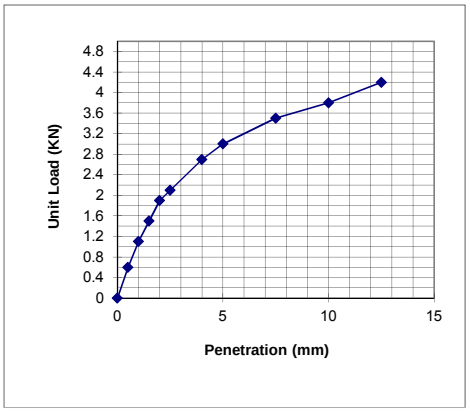
Soaking	Unsoaked
No.of Blows	55
Mould No.	1
Weight of Mould, W1 (gm)	7526
Weight of Mould + Soil, W2 (gm)	12565
Weight of Soil, W = W2 - W1 (gm)	5039
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.240
Container No.	23
Weight of Container W_c (gm)	36.07
Weight of Container + Wet Soil, W3 (gm)	185.65
Weight of Container + Dry Soil, W4 (gm)	165.89
Weight of Water W_w = W3 - W4 (gm)	19.76
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	129.82
Water Content, Wm (%)	15.22
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.944

CBR of Specimen at 2.5 mm Penetration	15.63
CBR of Specimen at 5 mm Penetration	14.88
CBR of Specimen in Percent	**15.63**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.1	13.44	15.63
5.0	3.0	20.16	14.88

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.6		0.5
1.0	1.1		1.0
1.5	1.5		1.5
2.0	1.9		2.0
2.5	2.1	2.1	2.5
4.0	2.7		4.0
5.0	3	3.0	5.0
7.5	3.5		7.5
10.0	3.8		10.0
12.5	4.2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 375+100 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

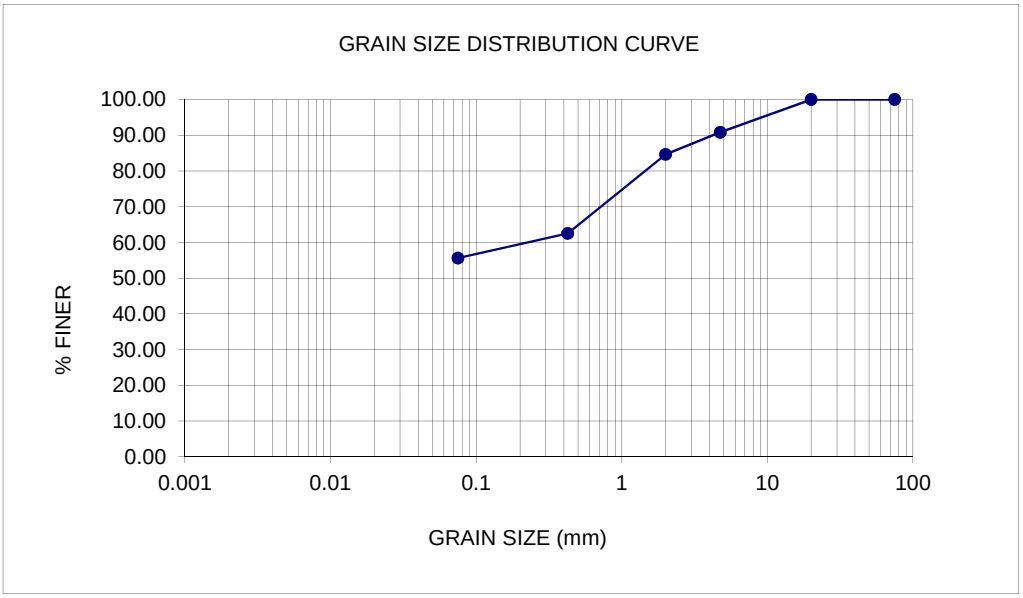
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	91.54	9.15	9.15	90.85
2 mm	2	62.27	6.23	15.38	84.62
425 m	0.425	221.21	22.12	37.50	62.50
75 m	0.075	68.58	6.86	44.36	55.64
Pan		556.4	55.64	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	9.15
Sand (%)	35.21
Fines (%)	55.64



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

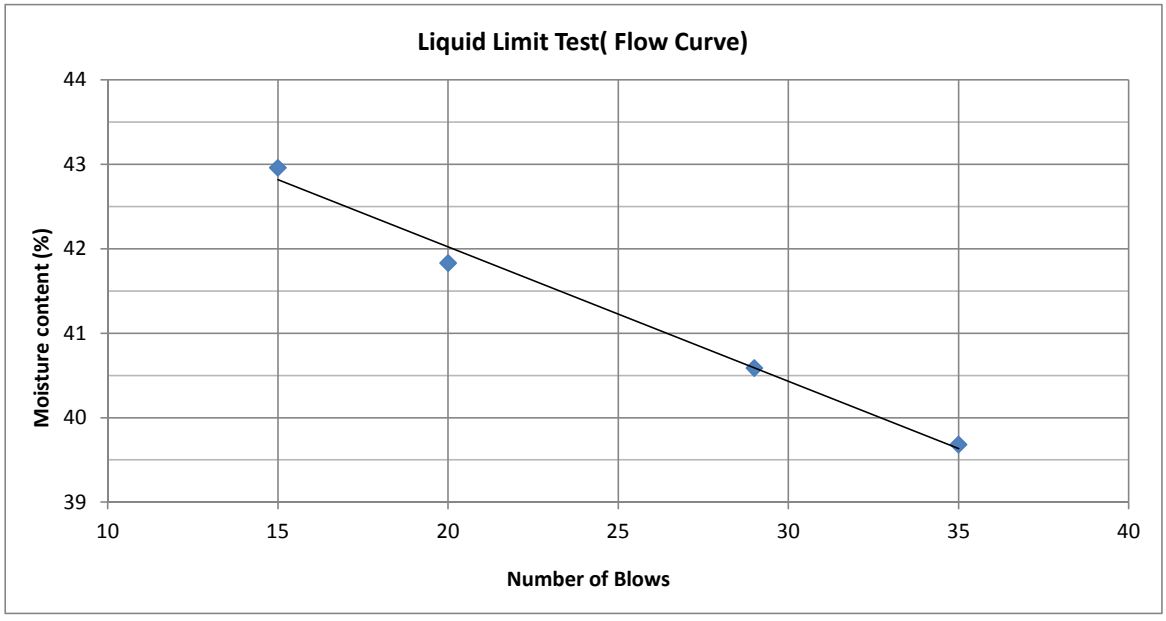
Sample Location: 375+100 RHS

Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	20	29	35		
2	Container No.	254	162	154	148		
3	Mass of Container (gm)	30.96	25.2	33.35	33.27		
4	Mass of Wet Soil + Container (gm)	62.34	57.85	62.03	59.88		
5	Mass of Oven Dry Soil + Container (gm)	52.91	48.22	53.75	52.32		
6	Mass of Water=(4-5) (gm)	9.43	9.63	8.28	7.56		
7	Mass of Oven Dry Soil =(5-3) (gm)	21.95	23.02	20.4	19.05		
8	Water Content (w=6/7*100) (%)	42.96	41.83	40.59	39.69		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 41.23 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 375+100 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	12.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	20.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 375+100 RHS

Source of Materials: Test Pit

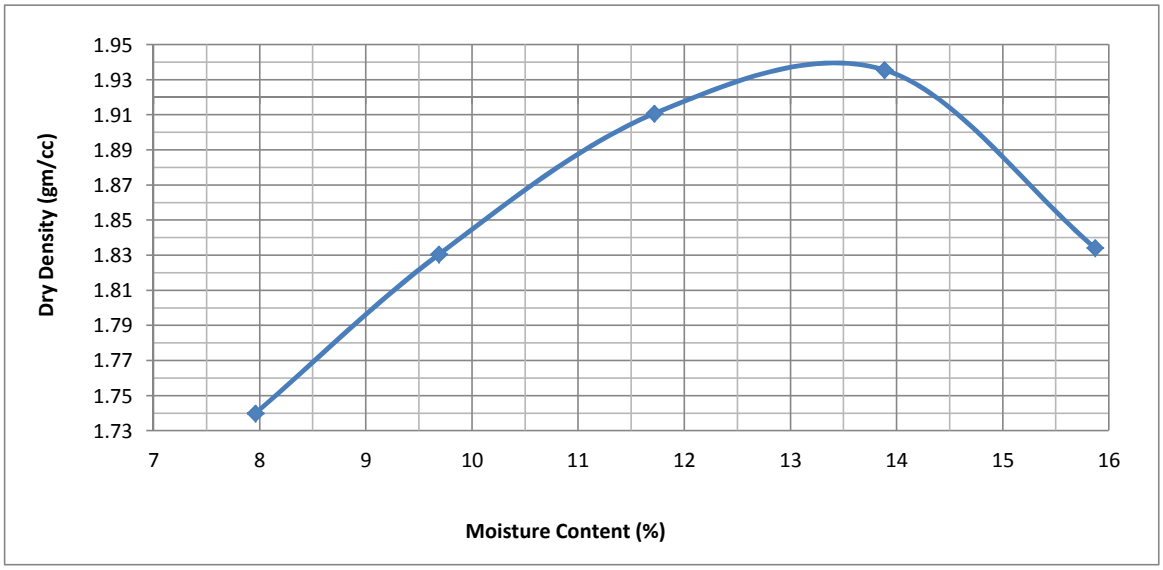
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	11924	12199	12468	12616	12448
Mass of Compacted Soil(M3=M2-M1) gm	3988	4263	4532	4680	4512
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1878.3	2007.9	2134.6	2204.3	2125.2
Container No.	22	252	37	114	70
Mass of Container (gm)	39.68	35.9	45.23	34.71	31.44
Mass of Wet Soil+Container (gm)	159.71	133.59	164.98	130.18	102.26
Mass of Oven Dry Soil +Container (gm)	150.86	124.96	152.42	118.54	92.56
Mass of Water (gm)	8.85	8.63	12.56	11.64	9.7
Water Content (%)	7.96	9.69	11.72	13.89	15.87
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.740	1.830	1.911	1.936	1.834

Remarks:



From Graph

Maximum Dry Density 1.940 gm/cc

Optimum Moisture Content 13.50 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 375+100 RHS

Source of Materials: Test Pit — Date of Casting : 14.09.13

MDD (gm/cc) 1.940 — Date of Testing : 18.09.13

OMC (%) 13.50 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	60	60	49	49	33	33
Weight of Mould, W1 (gm)	6996	6996	7400	7400	7338	7338
Weight of Mould + Soil, W2 (gm)	11470	11570	12125	12195	12345	12415
Weight of Soil, W = W2 - W1 (gm)	4474	4574	4725	4795	5007	5077
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.988	2.033	2.100	2.131	2.225	2.256
Container No.	249	48	175	155	237	272
Weight of Container W_c (gm)	33.34	34.18	23.32	35.16	33.36	42.37
Weight of Container + Wet Soil, $W3_{(gm)}$	146	112.82	106.48	112.84	115.35	136.98
Weight of Container + Dry Soil, $W4_{(gm)}$	132.56	101.76	96.56	102.45	105.65	124.56
Weight of Water W_w = W3 - W4 (gm)	13.44	11.06	9.92	10.39	9.70	12.42
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	99.22	67.58	73.24	67.29	72.29	82.19
Water Content, Wm (%)	13.55	16.37	13.54	15.44	13.42	15.11
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.751	1.747	1.849	1.846	1.962	1.960

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	3.0	5.2	8.2
CBR of Specimen at 5 mm Penetration	3.0	5.0	8.4
CBR of Specimen in Percent	**2.98**	**5.21**	**8.43**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 375+100 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.940
OMC (%) 13.50
Compaction (Type) Dynamic

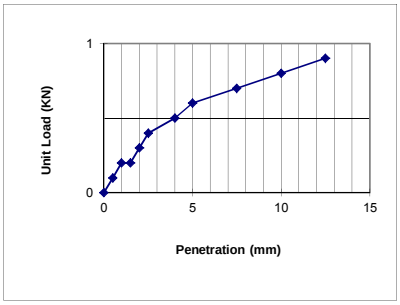
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.6	20.16	2.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.5		4.0
5.0	0.6	0.6	5.0
7.5	0.7		7.5
10.0	0.8		10.0
12.5	0.9		12.5

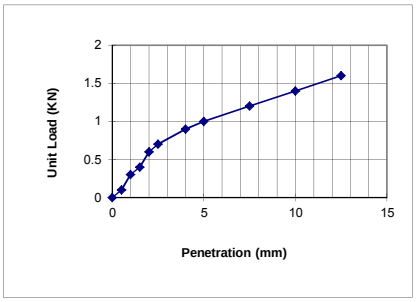


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.7	13.44	5.21
5.0	1.0	20.16	4.96

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.4		1.5
2.0	0.6		2.0
2.5	0.7	0.7	2.5
4.0	0.9		4.0
5.0	1	1.0	5.0
7.5	1.2		7.5
10.0	1.4		10.0
12.5	1.6		12.5

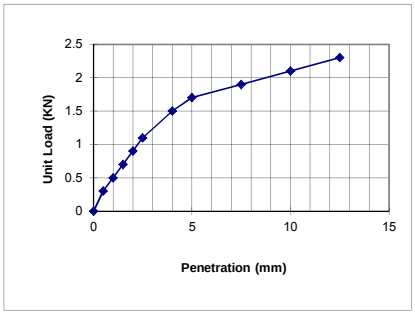


Sample-3

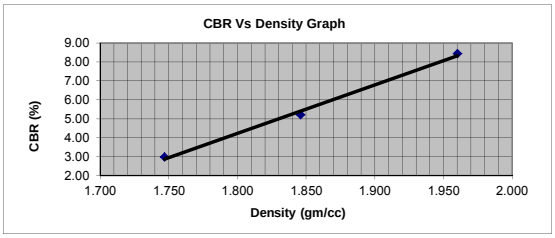
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.1	13.44	8.18
5.0	1.7	20.16	8.43

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1.1	1.1	2.5
4.0	1.5		4.0
5.0	1.7	1.7	5.0
7.5	1.9		7.5
10.0	2.1		10.0
12.5	2.3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.747	1.846	1.960
CBR (%)	2.98	5.21	8.43



97 % of Max Dry Density = 1.882
CBR corresponding to 97 % of Dry Density = 6.33

Geo-Technical Laboratory,
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Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 375+100 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.940
OMC (%) 13.50
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

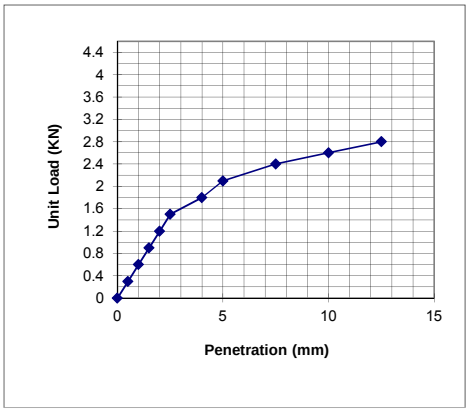
Soaking	Unsoaked
No.of Blows	55
Mould No.	60
Weight of Mould, W1 (gm)	6996
Weight of Mould + Soil, W2 (gm)	11965
Weight of Soil, W = W2 - W1 (gm)	4969
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.208
Container No.	272
Weight of Container W_c (gm)	42.37
Weight of Container + Wet Soil, W3 (gm)	132.82
Weight of Container + Dry Soil, W4 (gm)	121.85
Weight of Water W_w = W3 - W4 (gm)	10.97
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	79.48
Water Content, Wm (%)	13.80
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.941

CBR of Specimen at 2.5 mm Penetration	11.16
CBR of Specimen at 5 mm Penetration	10.42
CBR of Specimen in Percent	**11.16**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.5	13.44	11.16
5.0	2.1	20.16	10.42

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	0.9		1.5
2.0	1.2		2.0
2.5	1.5	1.5	2.5
4.0	1.8		4.0
5.0	2.1	2.1	5.0
7.5	2.4		7.5
10.0	2.6		10.0
12.5	2.8		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 379+800 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

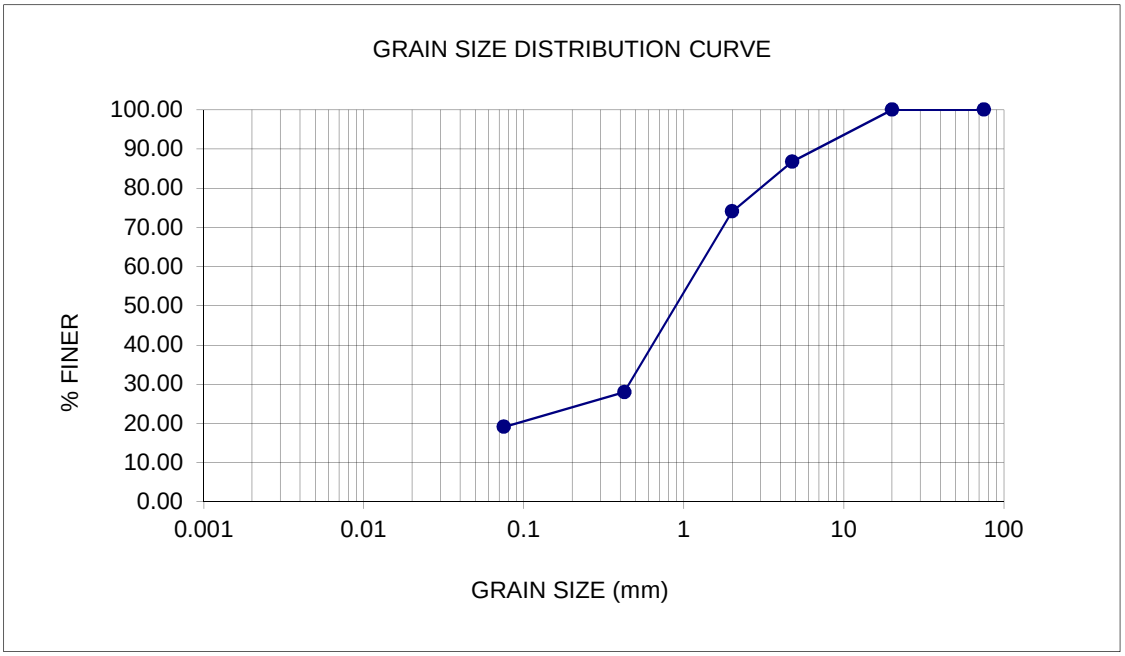
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	132.45	13.25	13.25	86.76
2 mm	2	127.22	12.72	25.97	74.03
425 m	0.425	461.13	46.11	72.08	27.92
75 m	0.075	88.25	8.83	80.91	19.10
Pan		190.95	19.10	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	13.25
Sand (%)	67.66
Fines (%)	19.10



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

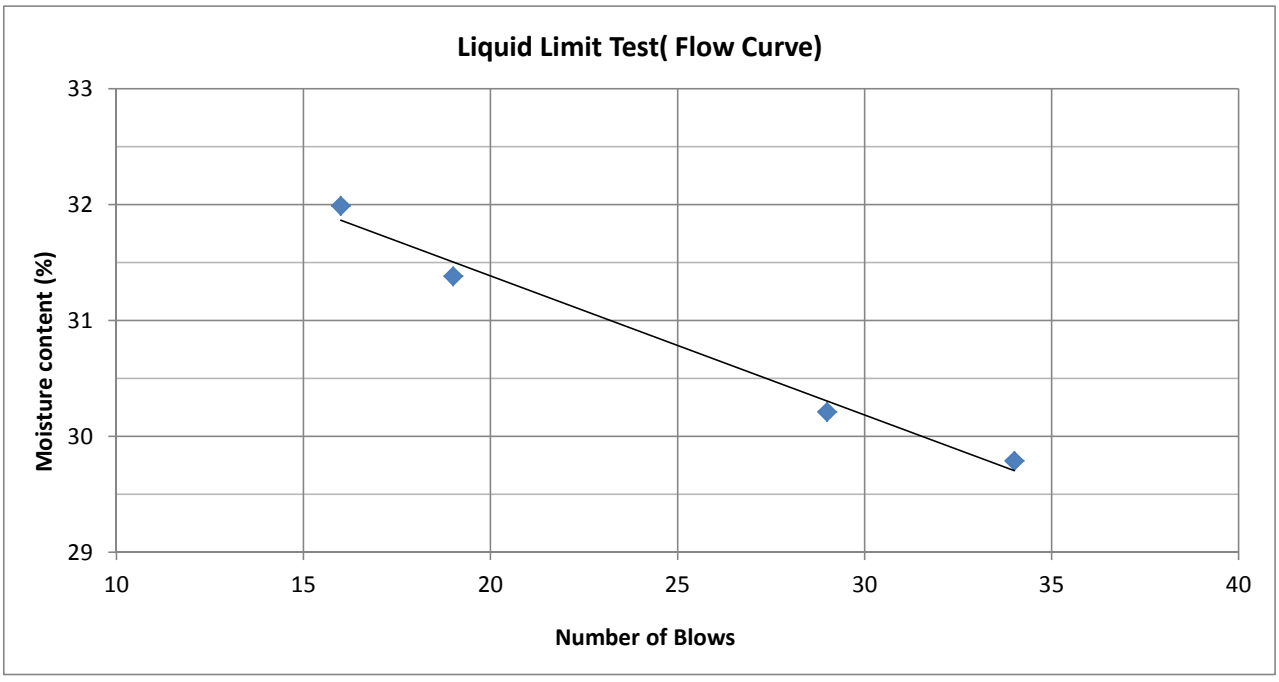
Sample Location: 379+800 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	16	19	29	34		
2	Container No.	79	157	134	59	288	130
3	Mass of Container (gm)	35.37	33.15	36.46	32.08	37.78	34.68
4	Mass of Wet Soil + Container (gm)	70.11	67.06	70.81	68.72	59.14	55
5	Mass of Oven Dry Soil + Container (gm)	61.69	58.96	62.84	60.31	55.63	51.69
6	Mass of Water=(4-5) (gm)	8.42	8.1	7.97	8.41	3.51	3.31
7	Mass of Oven Dry Soil =(5-3) (gm)	26.32	25.81	26.38	28.23	17.85	17.01
8	Water Content (w=6/7*100) (%)	31.99	31.38	30.21	29.79	19.66	19.46

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 30.78 %

Plastic Limit 19.56 %

Platicity Index 11.22 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 379+800 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	10.5
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	5.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 379+800 RHS

Source of Materials: Test Pit

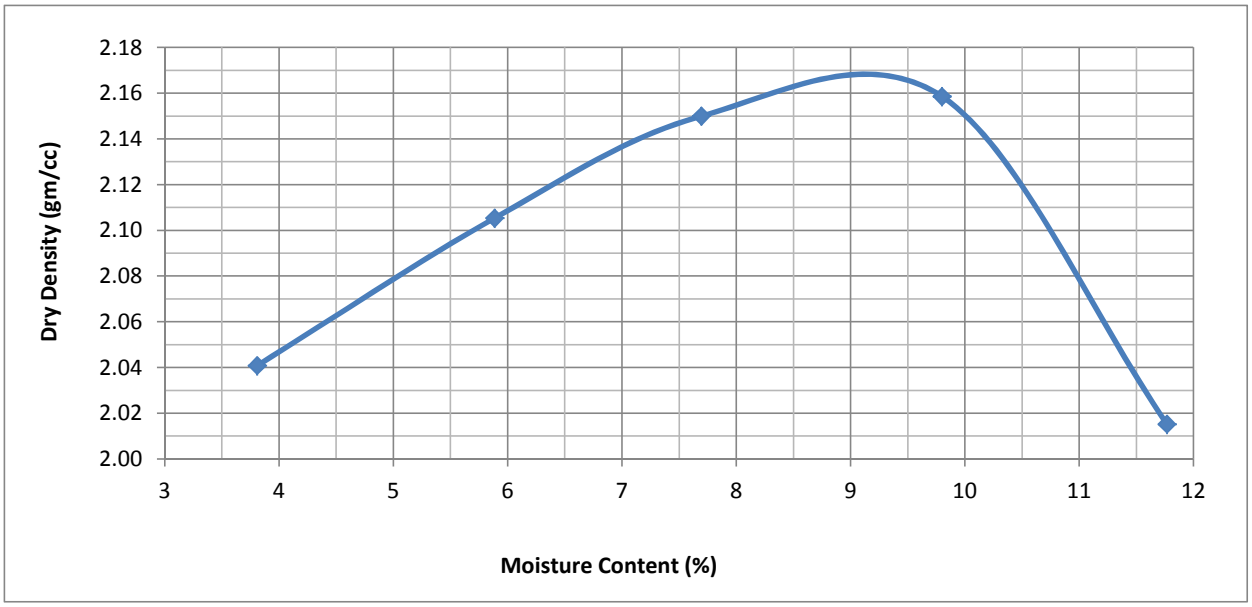
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	4	6	8	10	12
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	12434	12669	12852	12968	12718
Mass of Compacted Soil(M3=M2-M1) gm	4498	4733	4916	5032	4782
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2118.6	2229.2	2315.4	2370.1	2252.3
Container No.	279	79	20	10	194
Mass of Container (gm)	35.97	35.37	36.77	40.98	31.68
Mass of Wet Soil+Container (gm)	139.26	142.41	152.64	160.31	103.2
Mass of Oven Dry Soil +Container (gm)	135.47	136.46	144.36	149.66	95.67
Mass of Water (gm)	3.79	5.95	8.28	10.65	7.53
Water Content (%)	3.81	5.89	7.70	9.80	11.77
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	2.041	2.105	2.150	2.159	2.015

Remarks:



From Graph

Maximum Dry Density 2.170 gm/cc

Optimum Moisture Content 9.20 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 379+800 RHS

Source of Materials: Test Pit — Date of Casting : 17.09.13

MDD (gm/cc) 2.170 — Date of Testing : 21.09.13

OMC (%) 9.20 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	63	63	31	31	42	42
Weight of Mould, W1 (gm)	7250	7250	7414	7414	7208	7208
Weight of Mould + Soil, W2 (gm)	12064	12145	12499	12582	12618	12702
Weight of Soil, W = W2 - W1 (gm)	4814	4895	5085	5168	5410	5494
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.140	2.176	2.260	2.297	2.404	2.442
Container No.	187	58	182	33	18	3
Weight of Container W_c (gm)	32.79	28.24	34.02	38.45	38.97	40.26
Weight of Container + Wet Soil, W3 (gm)	132.62	122.66	123.67	128.26	134.96	158.06
Weight of Container + Dry Soil, W4 (gm)	124.15	112.95	115.99	119.12	126.75	146.17
Weight of Water W_w = W3 - W4 (gm)	8.47	9.71	7.68	9.14	8.21	11.89
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	91.36	84.71	81.97	80.67	87.78	105.91
Water Content, Wm (%)	9.27	11.46	9.37	11.33	9.35	11.23
Dry Density of Soil, $\gamma_d = \gamma_b$ / [1+(Wm/100)] (gm/cc)	1.958	1.952	2.066	2.063	2.199	2.195

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	7.4	11.9	16.4
CBR of Specimen at 5 mm Penetration	7.9	10.4	15.9
CBR of Specimen in Percent	**7.94**	**11.91**	**16.37**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 379+800 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.170
OMC (%) 9.20
Compaction (Type) Dynamic

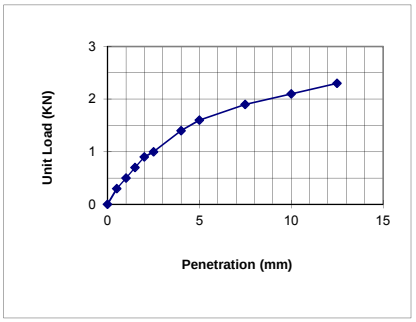
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.0	13.44	7.44
5.0	1.6	20.16	7.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1	1.0	2.5
4.0	1.4		4.0
5.0	1.6	1.6	5.0
7.5	1.9		7.5
10.0	2.1		10.0
12.5	2.3		12.5

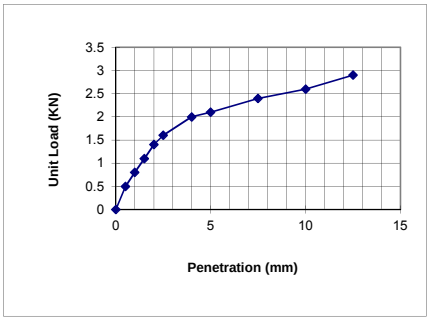


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.1	20.16	10.42

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	0.8		1.0
1.5	1.1		1.5
2.0	1.4		2.0
2.5	1.6	1.6	2.5
4.0	2		4.0
5.0	2.1	2.1	5.0
7.5	2.4		7.5
10.0	2.6		10.0
12.5	2.9		12.5

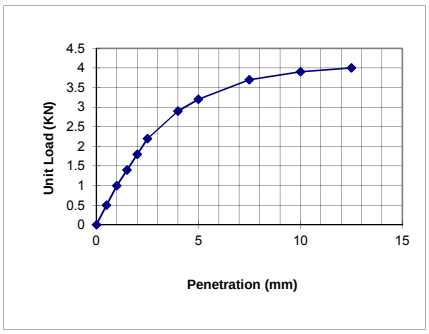


Sample-3

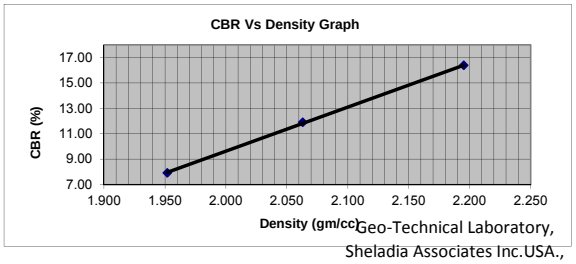
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.2	13.44	16.37
5.0	3.2	20.16	15.87

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	1		1.0
1.5	1.4		1.5
2.0	1.8		2.0
2.5	2.2	2.2	2.5
4.0	2.9		4.0
5.0	3.2	3.2	5.0
7.5	3.7		7.5
10.0	3.9		10.0
12.5	4		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.952	2.063	2.195
CBR (%)	7.94	11.91	16.37



97 % of Max Dry Density = 2.105
CBR corresponding to 97 % of Dry Density = 13.27

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Bal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 379+800 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.170
OMC (%) 9.20
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

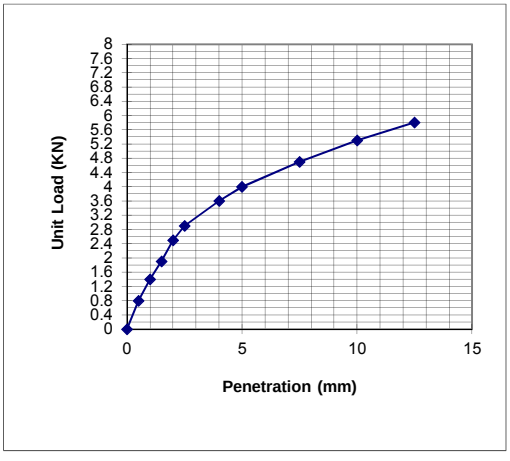
Soaking	Unsoaked
No.of Blows	55
Mould No.	31
Weight of Mould, W1 (gm)	7414
Weight of Mould + Soil, W2 (gm)	12741
Weight of Soil, W = W2 - W1 (gm)	5327
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.368
Container No.	256
Weight of Container W_c (gm)	35.88
Weight of Container + Wet Soil, W3 (gm)	145.65
Weight of Container + Dry Soil, W4 (gm)	136.36
Weight of Water W_w = W3 - W4 (gm)	9.29
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	100.48
Water Content, Wm (%)	9.25
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	2.167

CBR of Specimen at 2.5 mm Penetration	21.58
CBR of Specimen at 5 mm Penetration	19.84
CBR of Specimen in Percent	**21.58**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.9	13.44	21.58
5.0	4.0	20.16	19.84

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.8		0.5
1.0	1.4		1.0
1.5	1.9		1.5
2.0	2.5		2.0
2.5	2.9	2.9	2.5
4.0	3.6		4.0
5.0	4	4.0	5.0
7.5	4.7		7.5
10.0	5.3		10.0
12.5	5.8		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 385+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

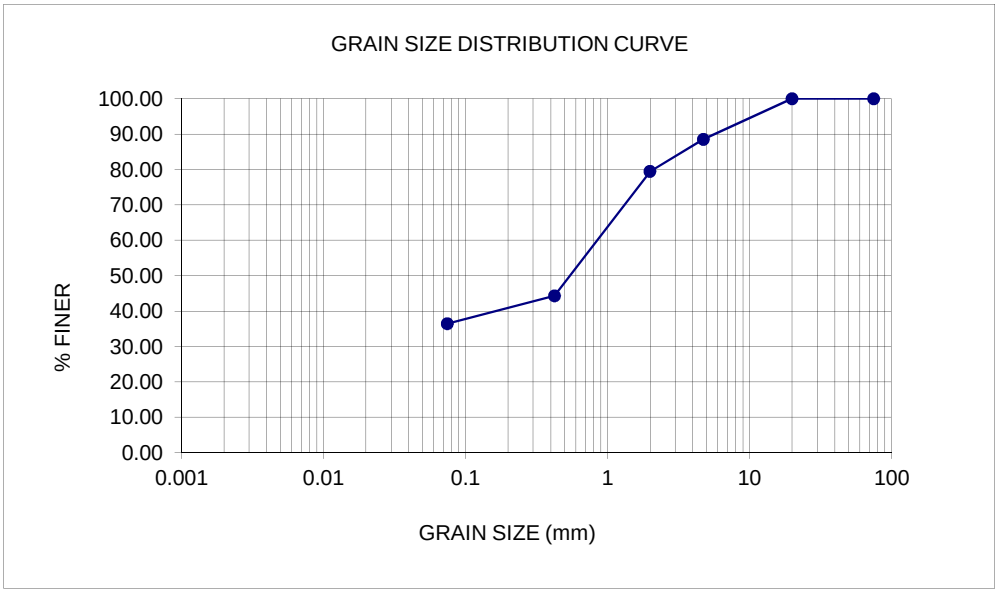
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	114.94	11.49	11.49	88.51
2 mm	2	90.78	9.08	20.57	79.43
425 m	0.425	351.64	35.16	55.74	44.26
75 m	0.075	78.62	7.86	63.60	36.40
Pan		364.02	36.40	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	11.49
Sand (%)	52.10
Fines (%)	36.40



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

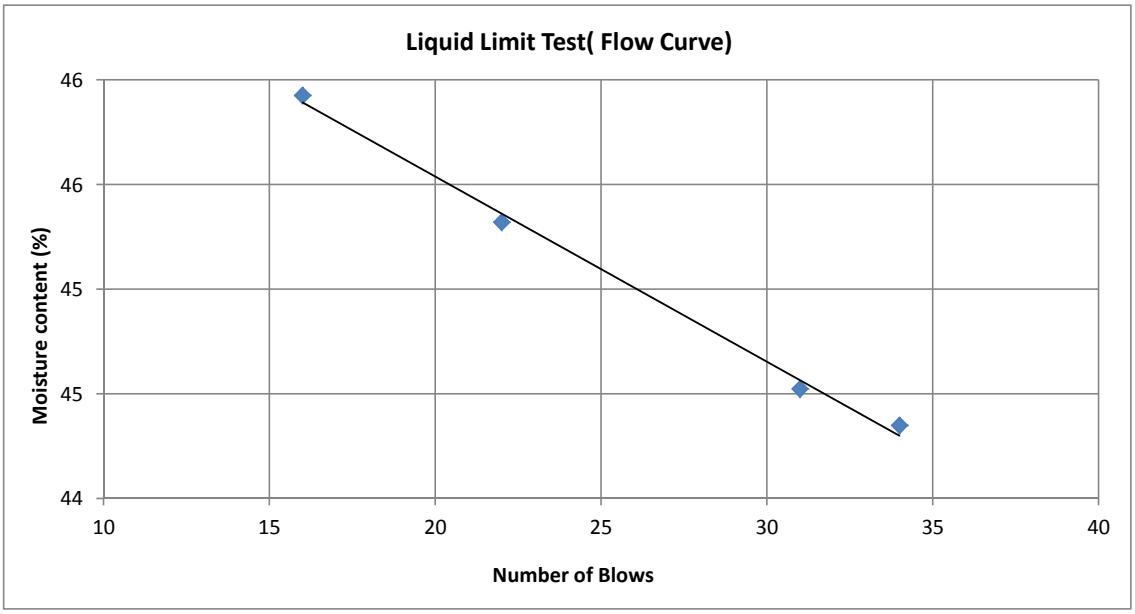
Sample Location: 385+000 LHS

Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	16	22	31	34		
2	Container No.	240	137	183	155		
3	Mass of Container (gm)	32.8	31.98	32.42	35.16		
4	Mass of Wet Soil + Container (gm)	59.49	64.59	66.73	65.56		
5	Mass of Oven Dry Soil + Container (gm)	51.09	54.42	56.16	56.22		
6	Mass of Water=(4-5) (gm)	8.4	10.17	10.57	9.34		
7	Mass of Oven Dry Soil =(5-3) (gm)	18.29	22.44	23.74	21.06		
8	Water Content (w=6/7*100) (%)	45.93	45.32	44.52	44.35		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 45.10 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 385+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :15.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 385+000 LHS

Source of Materials: Test Pit

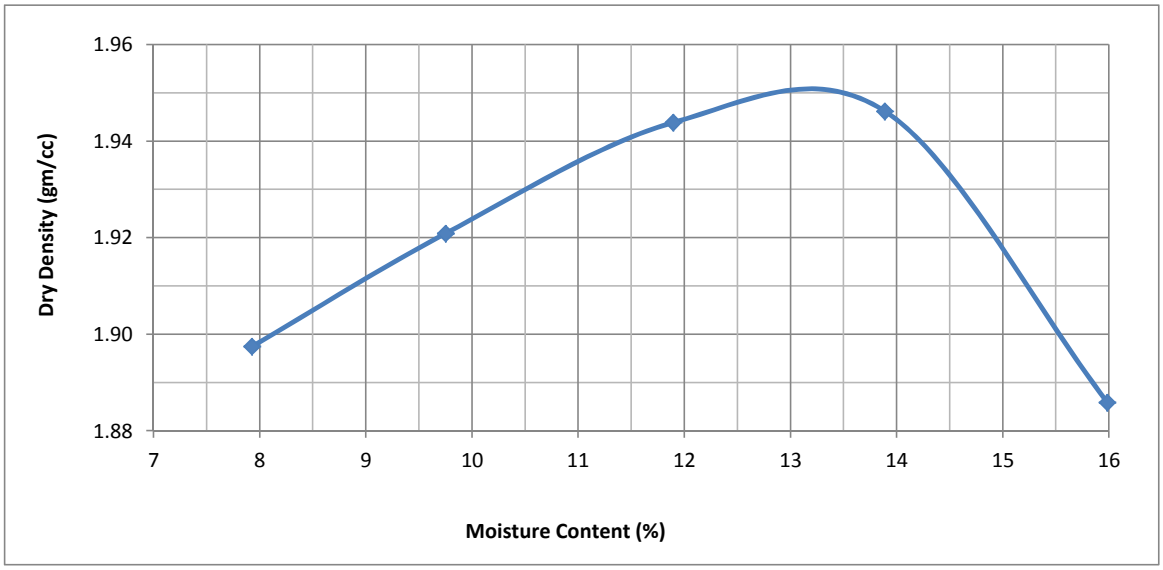
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	12228	12356	12498	12586	12524
Mass of Compacted Soil(M3=M2-M1) gm	4348	4476	4618	4706	4644
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2047.9	2108.2	2175.1	2216.5	2187.3
Container No.	256	115	1	247	102
Mass of Container (gm)	35.88	35.9	43.27	33.26	33.32
Mass of Wet Soil+Container (gm)	142.59	140.79	175.43	128.62	138.67
Mass of Oven Dry Soil +Container (gm)	134.75	131.47	161.38	116.99	124.15
Mass of Water (gm)	7.84	9.32	14.05	11.63	14.52
Water Content (%)	7.93	9.75	11.90	13.89	15.99
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.897	1.921	1.944	1.946	1.886

Remarks:



From Graph

Maximum Dry Density	1.950	gm/cc
Optimum Moisture Content	13.20	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 385+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.950

OMC (%) 13.20

Compaction (Type) Dynamic

Date of Casting : 14.09.13

Date of Testing : 18.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	27	27	4	4	46	46
Weight of Mould, W1 (gm)	7532	7532	7438	7438	7394	7394
Weight of Mould + Soil, W2 (gm)	12015	12115	12176	12258	12426	12515
Weight of Soil, W = W2 - W1 (gm)	4483	4583	4738	4820	5032	5121
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.992	2.037	2.106	2.142	2.236	2.276
Container No.	112	140	2	98	258	198
Weight of Container W_c (gm)	28.88	32.20	40.95	33.82	31.75	31.85
Weight of Container + Wet Soil, $W3_{(gm)}$	99.3	130.51	164.81	117.47	116.05	108.12
Weight of Container + Dry Soil, $W4_{(gm)}$	91.05	116.89	150.15	106.15	106.04	97.85
Weight of Water $W_w = W3 - W4$ (gm)	8.25	13.62	14.66	11.32	10.01	10.27
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	62.17	84.69	109.20	72.33	74.29	66.00
Water Content, Wm (%)	13.27	16.08	13.42	15.65	13.47	15.56
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.759	1.755	1.857	1.852	1.971	1.970

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	6.7	9.7	12.6
CBR of Specimen at 5 mm Penetration	6.9	9.9	12.4
CBR of Specimen in Percent	**6.94**	**9.92**	**12.65**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 385+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.950
OMC (%) 13.20
Compaction (Type) Dynamic

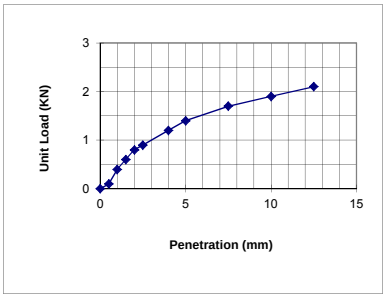
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.4	20.16	6.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.4		1.0
1.5	0.6		1.5
2.0	0.8		2.0
2.5	0.9	0.9	2.5
4.0	1.2		4.0
5.0	1.4	1.4	5.0
7.5	1.7		7.5
10.0	1.9		10.0
12.5	2.1		12.5

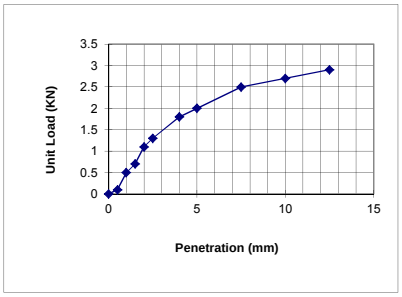


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.3	13.44	9.67
5.0	2.0	20.16	9.92

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	1.1		2.0
2.5	1.3	1.3	2.5
4.0	1.8		4.0
5.0	2	2.0	5.0
7.5	2.5		7.5
10.0	2.7		10.0
12.5	2.9		12.5

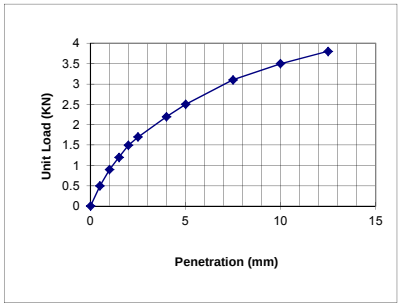


Sample-3

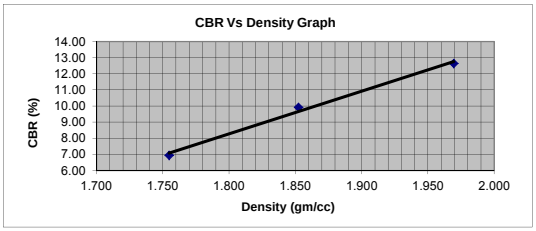
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.7	13.44	12.65
5.0	2.5	20.16	12.40

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	0.9		1.0
1.5	1.2		1.5
2.0	1.5		2.0
2.5	1.7	1.7	2.5
4.0	2.2		4.0
5.0	2.5	2.5	5.0
7.5	3.1		7.5
10.0	3.5		10.0
12.5	3.8		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.755	1.852	1.970
CBR (%)	6.94	9.92	12.65



97 % of Max Dry Density = 1.892
CBR corresponding to 97 % of Dry Density = 10.70

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 385+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.950
OMC (%) 13.20
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

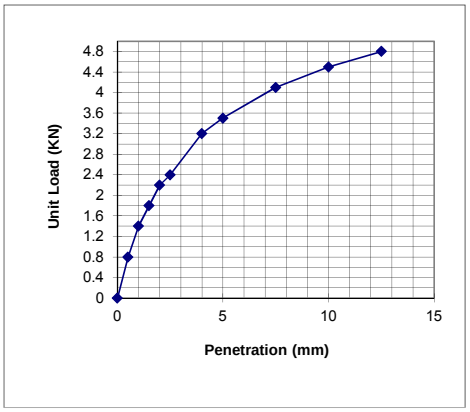
Soaking	Unsoaked
No.of Blows	55
Mould No.	27
Weight of Mould, W1 (gm)	7532
Weight of Mould + Soil, W2 (gm)	12511
Weight of Soil, W = W2 - W1 (gm)	4979
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.213
Container No.	40
Weight of Container W_c (gm)	37.47
Weight of Container + Wet Soil, W3 (gm)	126.98
Weight of Container + Dry Soil, W4 (gm)	116.36
Weight of Water W_w = W3 - W4 (gm)	10.62
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	78.89
Water Content, Wm (%)	13.46
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.950

CBR of Specimen at 2.5 mm Penetration	17.86
CBR of Specimen at 5 mm Penetration	17.36
CBR of Specimen in Percent	**17.86**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.4	13.44	17.86
5.0	3.5	20.16	17.36

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.8		0.5
1.0	1.4		1.0
1.5	1.8		1.5
2.0	2.2		2.0
2.5	2.4	2.4	2.5
4.0	3.2		4.0
5.0	3.5	3.5	5.0
7.5	4.1		7.5
10.0	4.5		10.0
12.5	4.8		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 390+500 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

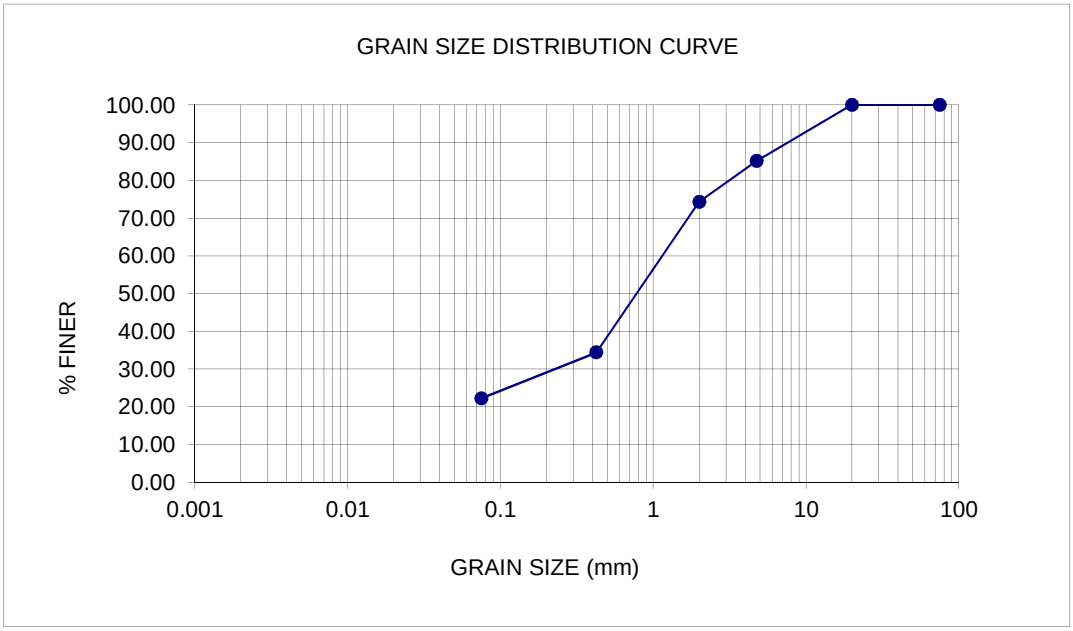
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	148.66	14.87	14.87	85.13
2 mm	2	108.44	10.84	25.71	74.29
425 m	0.425	398.98	39.90	65.61	34.39
75 m	0.075	121.75	12.18	77.78	22.22
Pan		222.17	22.22	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	14.87
Sand (%)	62.92
Fines (%)	22.22



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 390+500 LHS

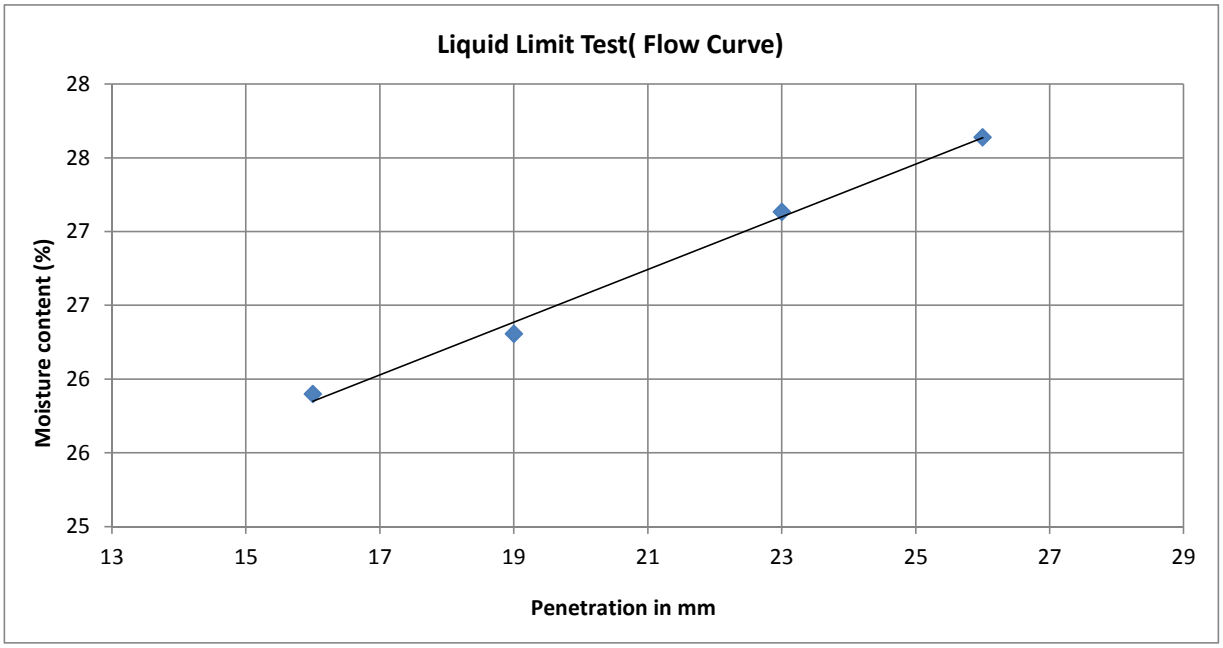
Source of Materials: Test Pit Date of Testing :14.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	16	19	23	26		
2	Container No.	160	65	101	181		
3	Mass of Container (gm)	24.38	27.99	31.75	32.31		
4	Mass of Wet Soil + Container (gm)	56.66	58	63.19	68.98		
5	Mass of Oven Dry Soil + Container (gm)	50.02	51.75	56.48	61.04	Non Plastic	
6	Mass of Water=(4-5) (gm)	6.64	6.25	6.71	7.94		
7	Mass of Oven Dry Soil =(5-3) (gm)	25.64	23.76	24.73	28.73		
8	Water Content (w=6/7*100) (%)	25.90	26.30	27.13	27.64		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 26.56 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 390+500 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	10.5
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	5.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 390+500 LHS

Source of Materials: Test Pit

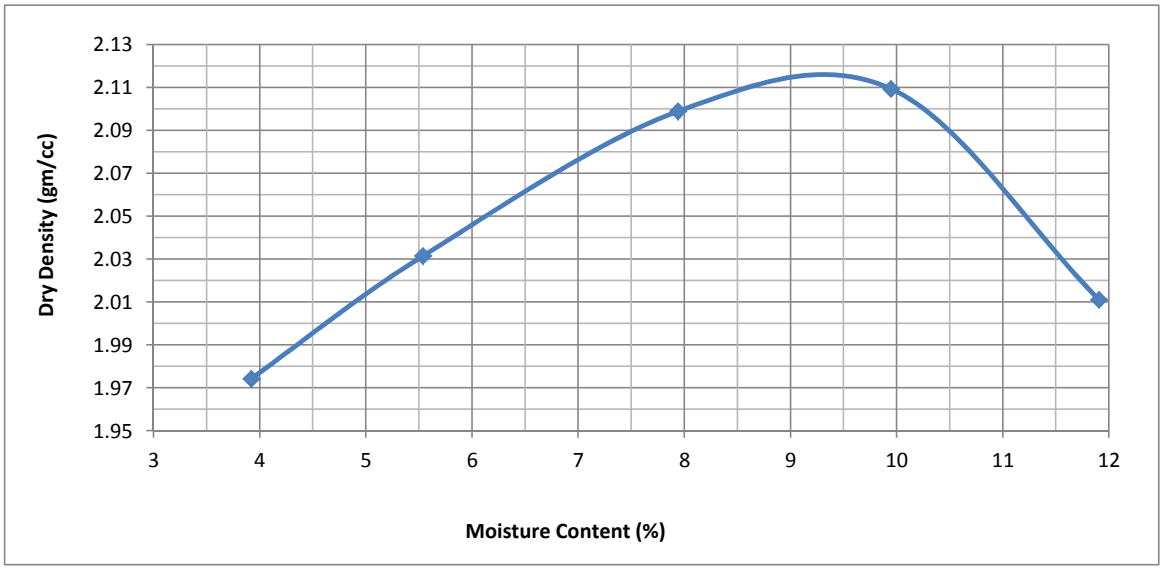
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	4	6	8	10	12
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	12236	12432	12690	12804	12658
Mass of Compacted Soil(M3=M2-M1) gm	4356	4552	4810	4924	4778
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2051.7	2144.0	2265.5	2319.2	2250.4
Container No.	8	304	40	18	59
Mass of Container (gm)	38.59	35.9	37.47	38.97	32.08
Mass of Wet Soil+Container (gm)	168.45	181.46	177.76	150.73	130.86
Mass of Oven Dry Soil +Container (gm)	163.55	173.82	167.44	140.62	120.35
Mass of Water (gm)	4.9	7.64	10.32	10.11	10.51
Water Content (%)	3.92	5.54	7.94	9.95	11.91
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.974	2.031	2.099	2.109	2.011

Remarks:



From Graph

Maximum Dry Density 2.116 gm/cc

Optimum Moisture Content 9.40 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 390+500 LHS

Source of Materials: Test Pit

MDD (gm/cc) 2.116

OMC (%) 9.40

Compaction (Type) Dynamic

Date of Casting :16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	65	65	3	3	8	8
Weight of Mould, W1 (gm)	7332	7332	7586	7586	6692	6692
Weight of Mould + Soil, W2 (gm)	12028	12125	12552	12638	11962	12055
Weight of Soil, W = W2 - W1 (gm)	4696	4793	4966	5052	5270	5363
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.087	2.130	2.207	2.245	2.342	2.384
Container No.	194	230	183	36	104	244
Weight of Container W_c (gm)	31.68	32.08	32.42	36.05	35.95	34.09
Weight of Container + Wet Soil, $W3_{(gm)}$	124.51	131.28	120.34	134.28	118.23	137.48
Weight of Container + Dry Soil, $W4_{(gm)}$	116.65	120.75	112.85	124.1	111.16	126.85
Weight of Water $W_w = W3 - W4$ (gm)	7.86	10.53	7.49	10.18	7.07	10.63
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	84.97	88.67	80.43	88.05	75.21	92.76
Water Content, Wm (%)	9.25	11.88	9.31	11.56	9.40	11.46
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.910	1.904	2.019	2.013	2.141	2.138

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	8.2	13.4	18.6
CBR of Specimen at 5 mm Penetration	8.4	12.9	18.4
CBR of Specimen in Percent	**8.43**	**13.39**	**18.60**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 390+500 LHS
Source of Materials: Test Pit
MDD (gm/cc) 2.116
OMC (%) 9.40
Compaction (Type) Dynamic

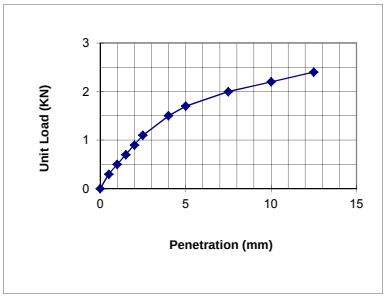
Date of Casting :16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.1	13.44	8.18
5.0	1.7	20.16	8.43

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1.1	1.1	2.5
4.0	1.5		4.0
5.0	1.7	1.7	5.0
7.5	2		7.5
10.0	2.2		10.0
12.5	2.4		12.5

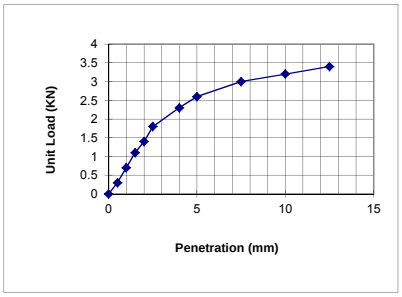


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.8	13.44	13.39
5.0	2.6	20.16	12.90

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.7		1.0
1.5	1.1		1.5
2.0	1.4		2.0
2.5	1.8	1.8	2.5
4.0	2.3		4.0
5.0	2.6	2.6	5.0
7.5	3		7.5
10.0	3.2		10.0
12.5	3.4		12.5

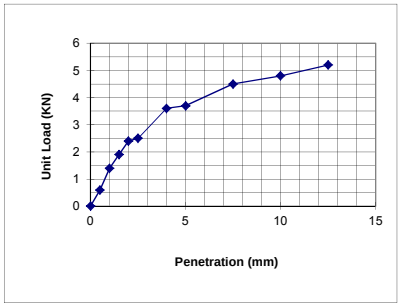


Sample-3

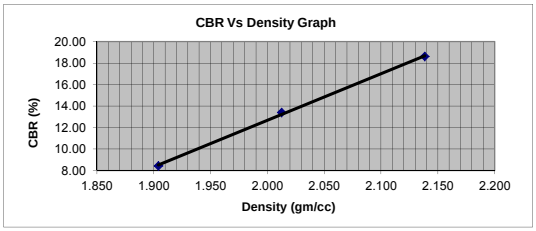
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.5	13.44	18.60
5.0	3.7	20.16	18.35

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.6		0.5
1.0	1.4		1.0
1.5	1.9		1.5
2.0	2.4		2.0
2.5	2.5	2.5	2.5
4.0	3.6		4.0
5.0	3.7	3.7	5.0
7.5	4.5		7.5
10.0	4.8		10.0
12.5	5.2		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.904	2.013	2.138
CBR (%)	8.43	13.39	18.60



97 % of Max Dry Density = 2.053
CBR corresponding to 97 % of Dry Density = 14.95

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 390+500 LHS
Source of Materials: Test Pit
MDD (gm/cc) 2.116
OMC (%) 9.40
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

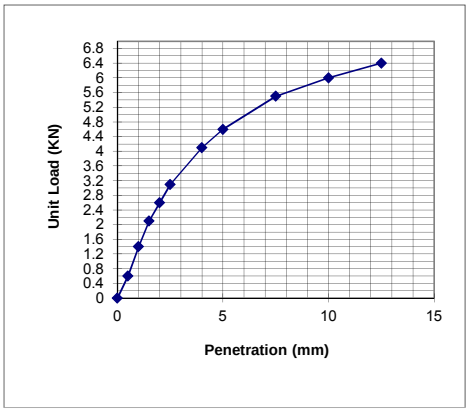
Soaking	Unsoaked
No.of Blows	55
Mould No.	3
Weight of Mould, W1 (gm)	7586
Weight of Mould + Soil, W2 (gm)	12785
Weight of Soil, W = W2 - W1 (gm)	5199
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.311
Container No.	71
Weight of Container W_c (gm)	30.49
Weight of Container + Wet Soil, W3 (gm)	112.84
Weight of Container + Dry Soil, W4 (gm)	105.78
Weight of Water W_w = W3 - W4 (gm)	7.06
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	75.29
Water Content, Wm (%)	9.38
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	2.113

CBR of Specimen at 2.5 mm Penetration	23.07
CBR of Specimen at 5 mm Penetration	22.82
CBR of Specimen in Percent	**23.07**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	3.1	13.44	23.07
5.0	4.6	20.16	22.82

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.6		0.5
1.0	1.4		1.0
1.5	2.1		1.5
2.0	2.6		2.0
2.5	3.1	3.1	2.5
4.0	4.1		4.0
5.0	4.6	4.6	5.0
7.5	5.5		7.5
10.0	6		10.0
12.5	6.4		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 395+000 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

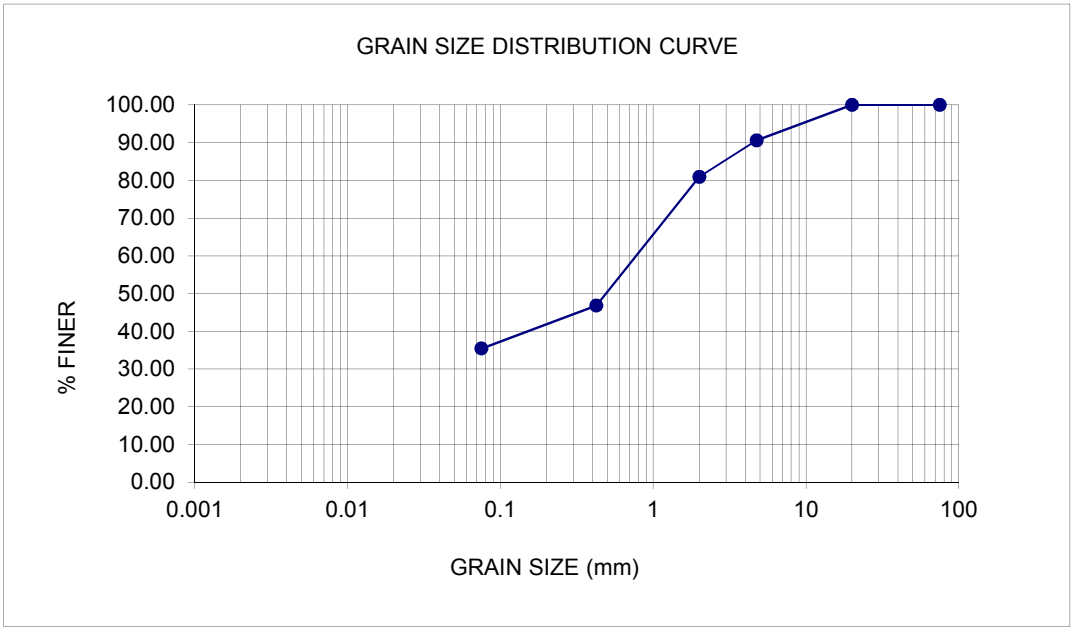
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	93.82	9.38	9.38	90.62
2 mm	2	96.97	9.70	19.08	80.92
425 m	0.425	341.26	34.13	53.21	46.80
75 m	0.075	113.76	11.38	64.58	35.42
Pan		354.19	35.42	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	9.38
Sand (%)	55.20
Fines (%)	35.42



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

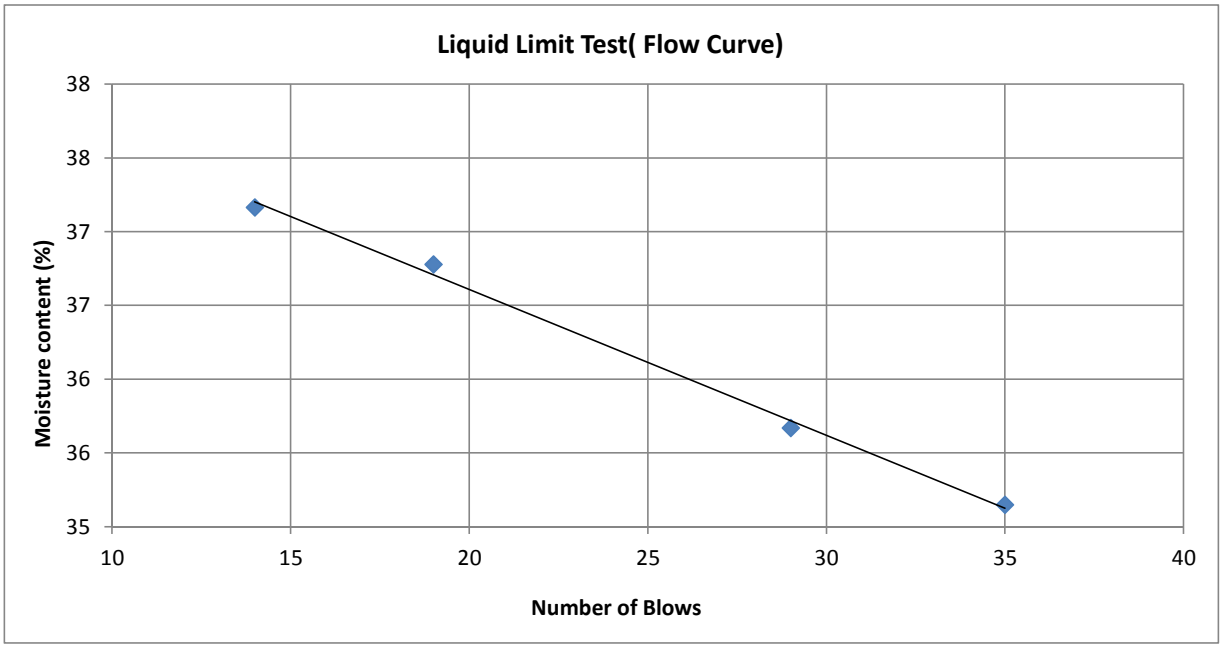
Sample Location: 395+000 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	14	19	29	35		
2	Container No.	4	190	199	246		
3	Mass of Container (gm)	39.19	33.19	33.03	31.17		
4	Mass of Wet Soil + Container (gm)	71.78	66.96	67.53	65.47		
5	Mass of Oven Dry Soil + Container (gm)	62.95	57.88	58.46	56.55		
6	Mass of Water=(4-5) (gm)	8.83	9.08	9.07	8.92		
7	Mass of Oven Dry Soil =(5-3) (gm)	23.76	24.69	25.43	25.38		
8	Water Content (w=6/7*100) (%)	37.16	36.78	35.67	35.15		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 36.11 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 395+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 395+000 RHS

Source of Materials: Test Pit

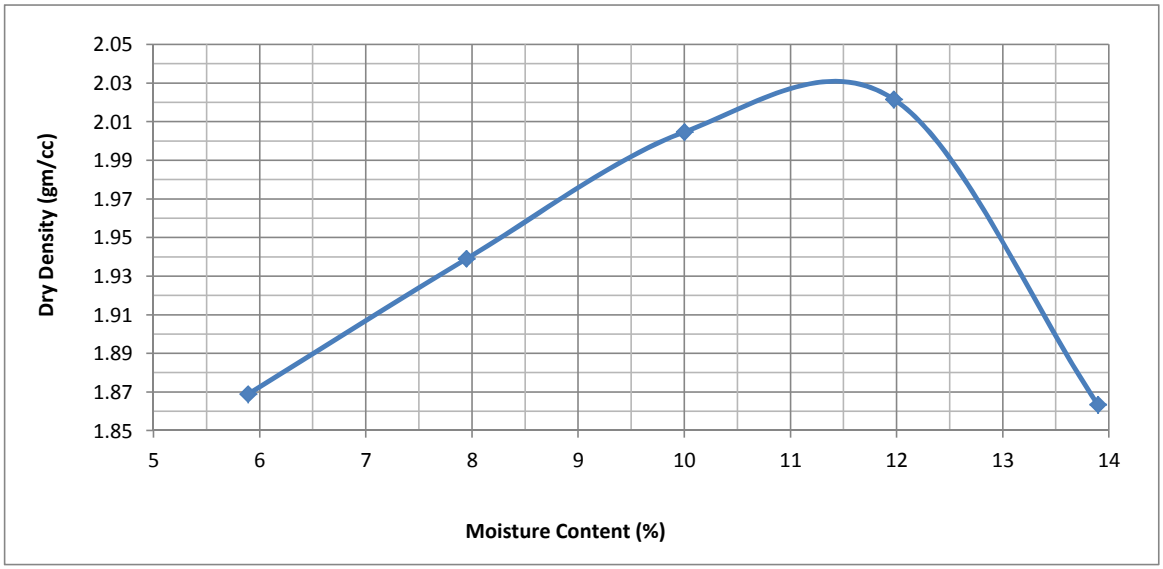
Type of Compation : Dynamic Date of Testing : 16.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	6	8	10	12	14
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	12138	12380	12618	12742	12442
Mass of Compacted Soil(M3=M2-M1) gm	4202	4444	4682	4806	4506
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1979.1	2093.1	2205.2	2263.6	2122.3
Container No.	148	10	185	1	271
Mass of Container (gm)	33.27	40.98	32.87	43.27	38.43
Mass of Wet Soil+Container (gm)	126.53	157.35	121.51	139.02	133.75
Mass of Oven Dry Soil +Container (gm)	121.34	148.78	113.45	128.78	122.12
Mass of Water (gm)	5.19	8.57	8.06	10.24	11.63
Water Content (%)	5.89	7.95	10.00	11.98	13.90
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.869	1.939	2.005	2.022	1.863

Remarks:



From Graph

Maximum Dry Density	2.030	gm/cc
Optimum Moisture Content	11.50	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 395+000 RHS

Source of Materials: Test Pit — Date of Casting : 17.09.13

MDD (gm/cc) 2.030 — Date of Testing : 21.09.13

OMC (%) 11.50 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	6	6	22	22	14	14
Weight of Mould, W1 (gm)	7496	7496	7336	7336	6667	6667
Weight of Mould + Soil, W2 (gm)	12089	12143	12175	12235	11812	11860
Weight of Soil, W = W2 - W1 (gm)	4593	4647	4839	4899	5145	5193
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.041	2.065	2.151	2.177	2.287	2.308
Container No.	253	137	92	26	127	290
Weight of Container W_c (gm)	33.27	31.98	34.74	39.80	38.70	36.85
Weight of Container + Wet Soil, $W3_{(gm)}$	108.67	102.21	102.83	184.62	127.62	170.13
Weight of Container + Dry Soil, $W4_{(gm)}$	100.88	94.15	95.85	168.12	118.49	155.27
Weight of Water $W_w = W3 - W4$ (gm)	7.79	8.06	6.98	16.50	9.13	14.86
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	67.61	62.17	61.11	128.32	79.79	118.42
Water Content, Wm (%)	11.52	12.96	11.42	12.86	11.44	12.55
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.830	1.828	1.930	1.929	2.052	2.051

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	6.0	10.4	14.9
CBR of Specimen at 5 mm Penetration	5.5	9.9	13.9
CBR of Specimen in Percent	**5.95**	**10.42**	**14.88**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 395+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.030
OMC (%) 11.50
Compaction (Type) Dynamic

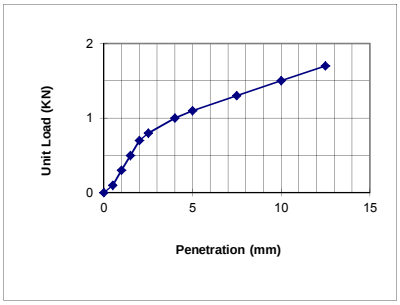
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.1	20.16	5.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.8	0.8	2.5
4.0	1		4.0
5.0	1.1	1.1	5.0
7.5	1.3		7.5
10.0	1.5		10.0
12.5	1.7		12.5

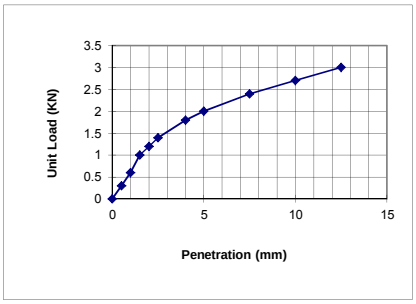


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.4	13.44	10.42
5.0	2.0	20.16	9.92

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	1		1.5
2.0	1.2		2.0
2.5	1.4	1.4	2.5
4.0	1.8		4.0
5.0	2	2.0	5.0
7.5	2.4		7.5
10.0	2.7		10.0
12.5	3		12.5

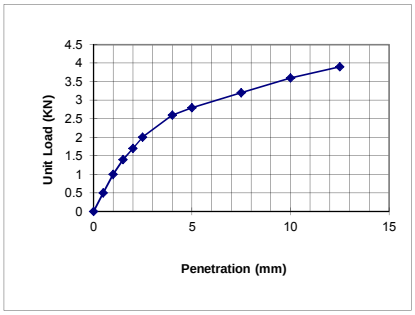


Sample-3

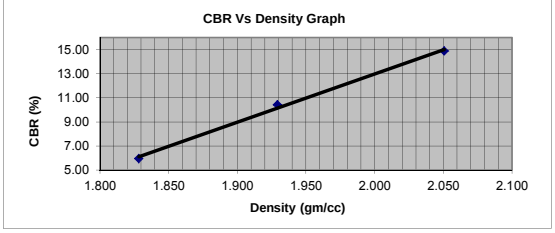
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.0	13.44	14.88
5.0	2.8	20.16	13.89

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	1		1.0
1.5	1.4		1.5
2.0	1.7		2.0
2.5	2	2.0	2.5
4.0	2.6		4.0
5.0	2.8	2.8	5.0
7.5	3.2		7.5
10.0	3.6		10.0
12.5	3.9		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.828	1.929	2.051
CBR (%)	5.95	10.42	14.88



97 % of Max Dry Density = 1.969
CBR corresponding to 97 % of Dry Density = 11.74

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 395+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.030
OMC (%) 11.50
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

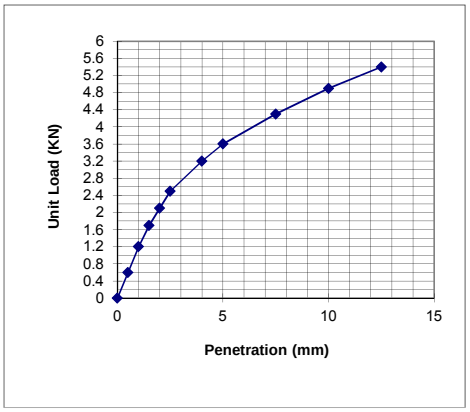
Soaking	Unsoaked
No.of Blows	55
Mould No.	14
Weight of Mould, W1 (gm)	6667
Weight of Mould + Soil, W2 (gm)	11746
Weight of Soil, W = W2 - W1 (gm)	5079
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.257
Container No.	31
Weight of Container W_c (gm)	45.21
Weight of Container + Wet Soil, W3 (gm)	136.58
Weight of Container + Dry Soil, W4 (gm)	127.15
Weight of Water W_w = W3 - W4 (gm)	9.43
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	81.94
Water Content, Wm (%)	11.51
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	2.024

CBR of Specimen at 2.5 mm Penetration	18.60
CBR of Specimen at 5 mm Penetration	17.86
CBR of Specimen in Percent	**18.60**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.5	13.44	18.60
5.0	3.6	20.16	17.86

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.6		0.5
1.0	1.2		1.0
1.5	1.7		1.5
2.0	2.1		2.0
2.5	2.5	2.5	2.5
4.0	3.2		4.0
5.0	3.6	3.6	5.0
7.5	4.3		7.5
10.0	4.9		10.0
12.5	5.4		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 401+000 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

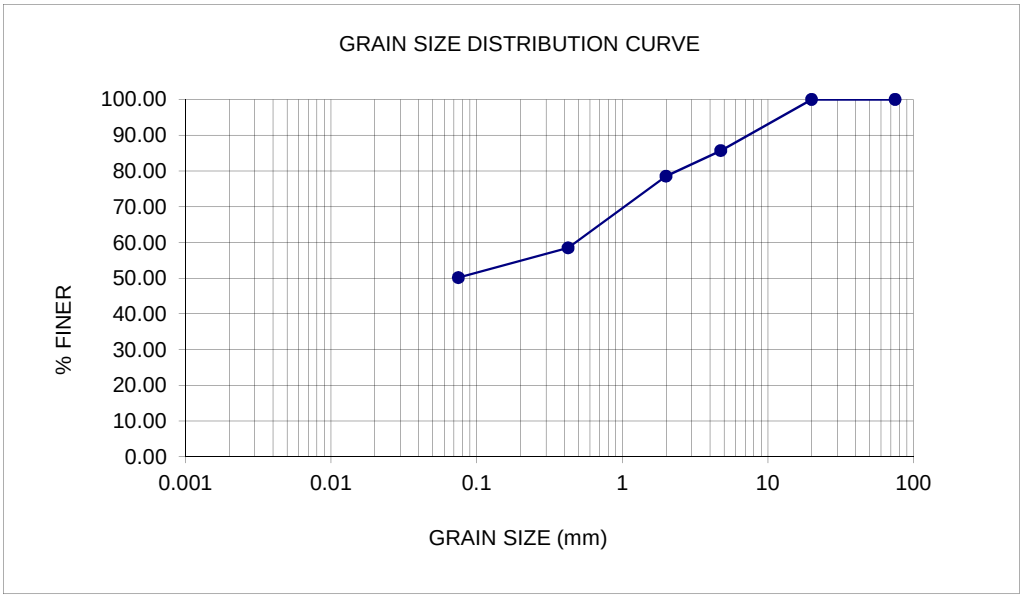
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	143.13	14.31	14.31	85.69
2 mm	2	71.41	7.14	21.45	78.55
425 m	0.425	200.62	20.06	41.52	58.48
75 m	0.075	83.16	8.32	49.83	50.17
Pan		501.68	50.17	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	14.31
Sand (%)	35.52
Fines (%)	50.17



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

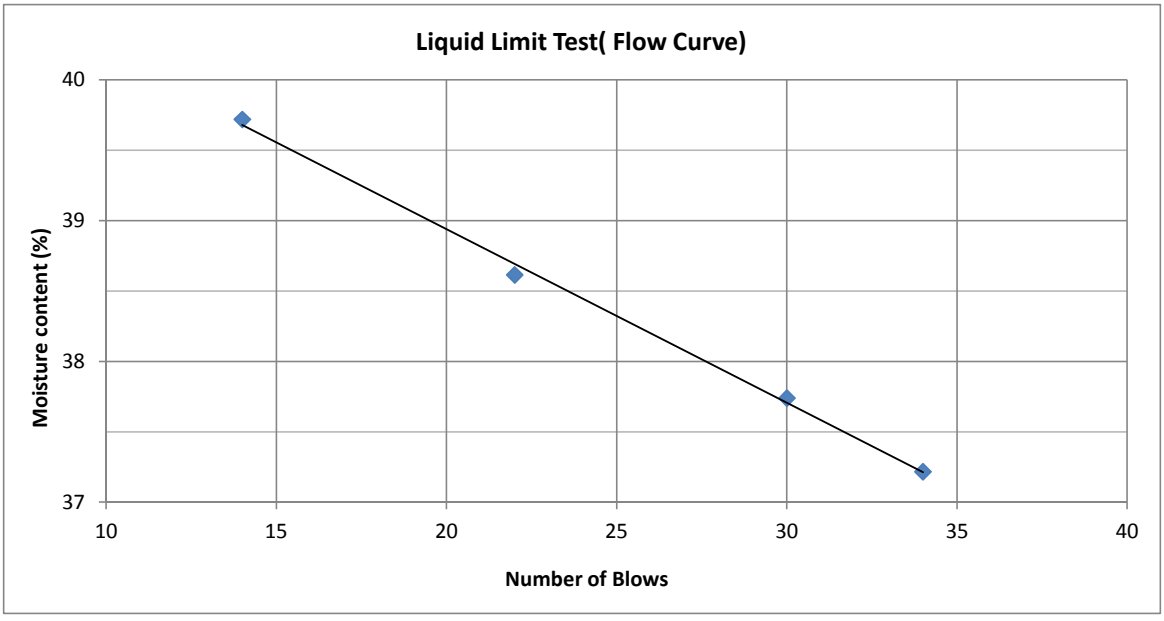
Sample Location: 401+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	14	22	30	34		
2	Container No.	160	289	66	300		
3	Mass of Container (gm)	24.38	37.55	32.53	36.96		
4	Mass of Wet Soil + Container (gm)	55.3	63.97	64.1	75.12		
5	Mass of Oven Dry Soil + Container (gm)	46.51	56.61	55.45	64.77		
6	Mass of Water=(4-5) (gm)	8.79	7.36	8.65	10.35		
7	Mass of Oven Dry Soil =(5-3) (gm)	22.13	19.06	22.92	27.81		
8	Water Content (w=6/7*100) (%)	39.72	38.61	37.74	37.22		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 38.32 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 401+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :19.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 401+000 LHS

Source of Materials: Test Pit

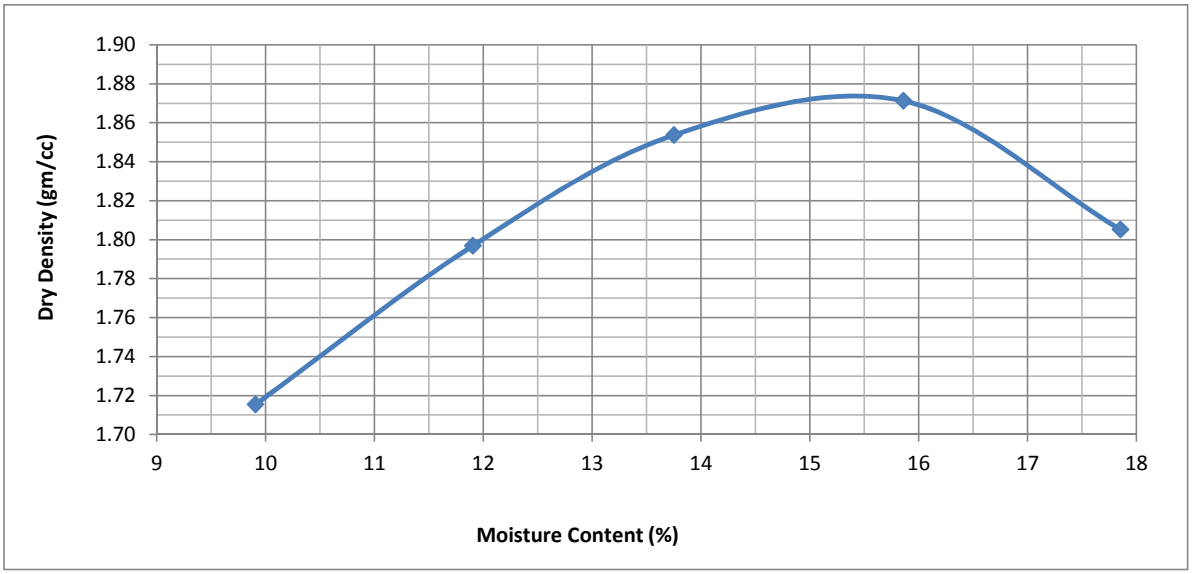
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7929	7929	7929	7929	7929
Mass of mould+Compacted Soil (M2) gm	11932	12198	12406	12532	12446
Mass of Compacted Soil(M3=M2-M1) gm	4003	4269	4477	4603	4517
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1885.4	2010.7	2108.7	2168.0	2127.5
Container No.	208	83	21	107	267
Mass of Container (gm)	33.32	35.9	36.14	30.58	31.65
Mass of Wet Soil+Container (gm)	116.4	139.69	133.66	121.53	123.08
Mass of Oven Dry Soil +Container (gm)	108.91	128.65	121.87	109.08	109.23
Mass of Water (gm)	7.49	11.04	11.79	12.45	13.85
Water Content (%)	9.91	11.90	13.75	15.86	17.85
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.715	1.797	1.854	1.871	1.805

Remarks:



From Graph

Maximum Dry Density	1.872	gm/cc
Optimum Moisture Content	15.50	%

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 401+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.872

OMC (%) 15.50

Compaction (Type) Dynamic

Date of Casting :16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	12	12	25	25	58	58
Weight of Mould, W1 (gm)	7618	7618	7574	7574	6922	6922
Weight of Mould + Soil, W2 (gm)	11989	12079	12196	12271	11848	11915
Weight of Soil, W = W2 - W1 (gm)	4371	4461	4622	4697	4926	4993
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.943	1.983	2.054	2.088	2.189	2.219
Container No.	123	213	115	262	200	263
Weight of Container W_c (gm)	39.35	35.29	32.19	36.63	33.86	36.67
Weight of Container + Wet Soil, $W3_{(gm)}$	110.56	102.21	132.44	151.77	133.53	124.14
Weight of Container + Dry Soil, $W4_{(gm)}$	101.15	92.15	118.95	134.65	120.15	111.25
Weight of Water W_w = W3 - W4 (gm)	9.41	10.06	13.49	17.12	13.38	12.89
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	61.80	56.86	86.76	98.02	86.29	74.58
Water Content, Wm (%)	15.23	17.69	15.55	17.47	15.51	17.28
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.686	1.685	1.778	1.777	1.895	1.892

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	2.2	5.2	8.9
CBR of Specimen at 5 mm Penetration	2.5	5.5	8.4
CBR of Specimen in Percent	**2.48**	**5.46**	**8.93**

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 401+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.872
OMC (%) 15.50
Compaction (Type) Dynamic

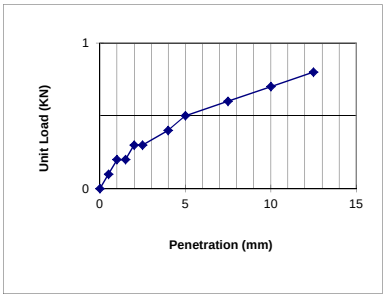
Date of Casting :16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

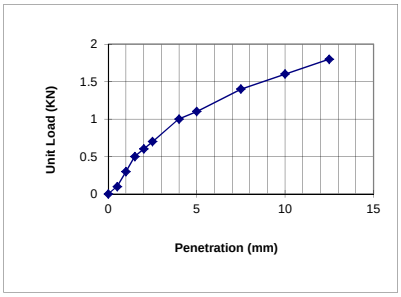


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.7	13.44	5.21
5.0	1.1	20.16	5.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.6		2.0
2.5	0.7	0.7	2.5
4.0	1		4.0
5.0	1.1	1.1	5.0
7.5	1.4		7.5
10.0	1.6		10.0
12.5	1.8		12.5

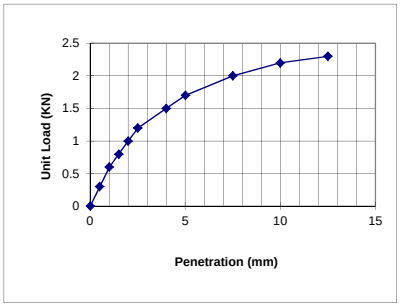


Sample-3

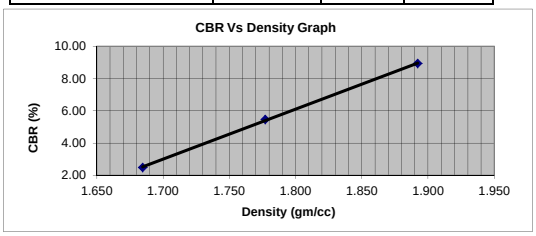
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.2	13.44	8.93
5.0	1.7	20.16	8.43

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	0.8		1.5
2.0	1		2.0
2.5	1.2	1.2	2.5
4.0	1.5		4.0
5.0	1.7	1.7	5.0
7.5	2		7.5
10.0	2.2		10.0
12.5	2.3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.685	1.777	1.892
CBR (%)	2.48	5.46	8.93



97 % of Max Dry Density = 1.816
CBR corresponding to 97 % of Dry Density = 6.59

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 401+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.872
OMC (%) 15.50
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

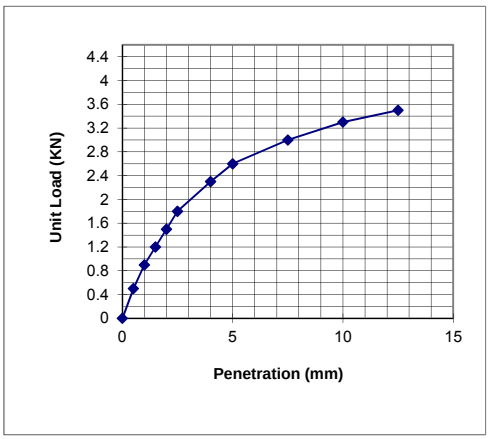
Soaking	Unsoaked
No.of Blows	55
Mould No.	25
Weight of Mould, W1 (gm)	7574
Weight of Mould + Soil, W2 (gm)	12444
Weight of Soil, W = W2 - W1 (gm)	4870
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.164
Container No.	91
Weight of Container W_c (gm)	32.45
Weight of Container + Wet Soil, $W3_{(gm)}$	178.95
Weight of Container + Dry Soil, $W4_{(gm)}$	159.12
Weight of Water W_w = W3 - W4 (gm)	19.83
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	126.67
Water Content, Wm (%)	15.65
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.871

CBR of Specimen at 2.5 mm Penetration	13.39
CBR of Specimen at 5 mm Penetration	12.90
CBR of Specimen in Percent	**13.39**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.8	13.44	13.39
5.0	2.6	20.16	12.90

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	0.9		1.0
1.5	1.2		1.5
2.0	1.5		2.0
2.5	1.8	1.8	2.5
4.0	2.3		4.0
5.0	2.6	2.6	5.0
7.5	3		7.5
10.0	3.3		10.0
12.5	3.5		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 404+500 RHS

Source of Materials: Test Pit Date of Testing :17.09.13

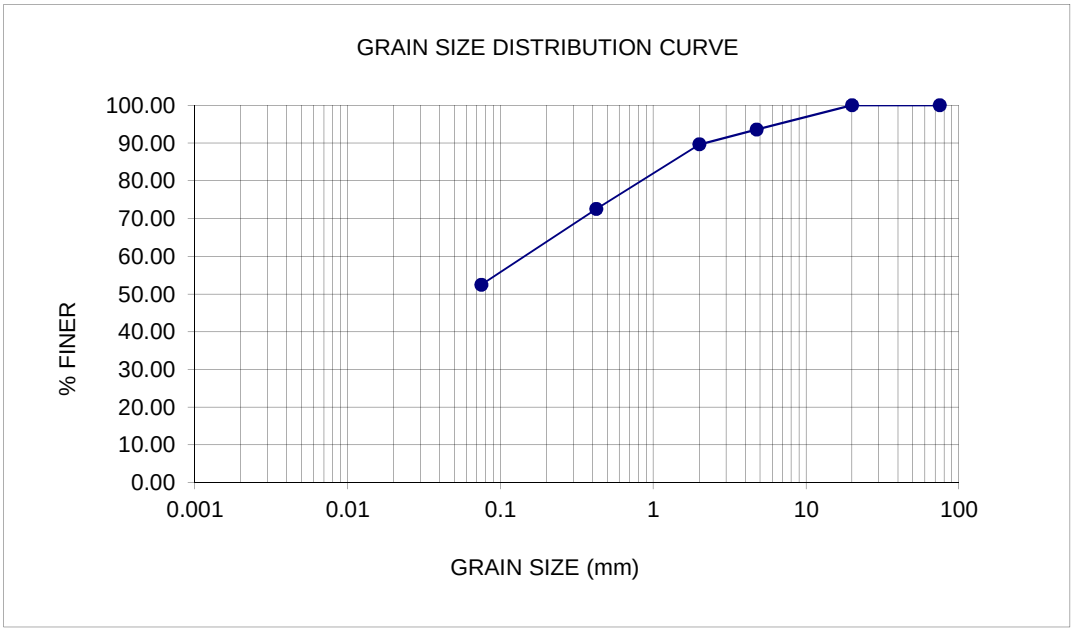
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	64.22	6.42	6.42	93.58
2 mm	2	39.6	3.96	10.38	89.62
425 m	0.425	170.89	17.09	27.47	72.53
75 m	0.075	201.25	20.13	47.60	52.40
Pan		524.04	52.40	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	6.42
Sand (%)	41.17
Fines (%)	52.40



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 404+500 RHS

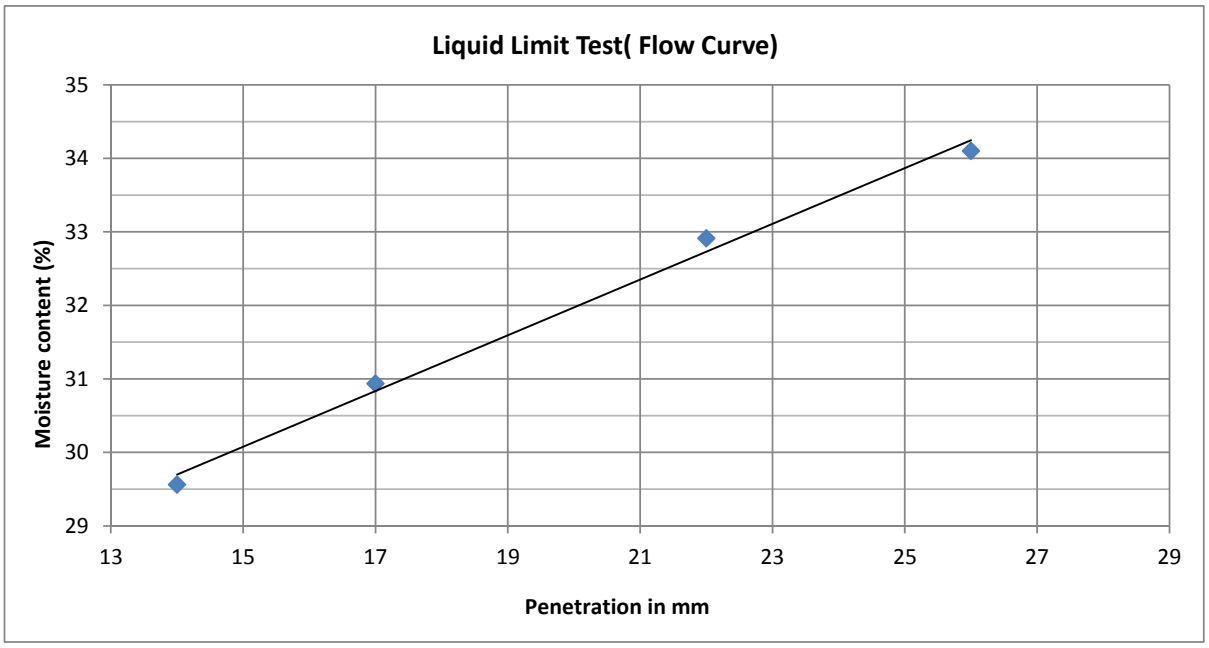
Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	14	17	22	26		
2	Container No.	226	158	135	146		
3	Mass of Container (gm)	31.87	30.26	33.23	33.61		
4	Mass of Wet Soil + Container (gm)	60.05	64.12	59.6	67.98		
5	Mass of Oven Dry Soil + Container (gm)	53.62	56.12	53.07	59.24	Non Plastic	
6	Mass of Water=(4-5) (gm)	6.43	8	6.53	8.74		
7	Mass of Oven Dry Soil =(5-3) (gm)	21.75	25.86	19.84	25.63		
8	Water Content (w=6/7*100) (%)	29.56	30.94	32.91	34.10		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 31.97 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 404+500 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 404+500 RHS

Source of Materials: Test Pit

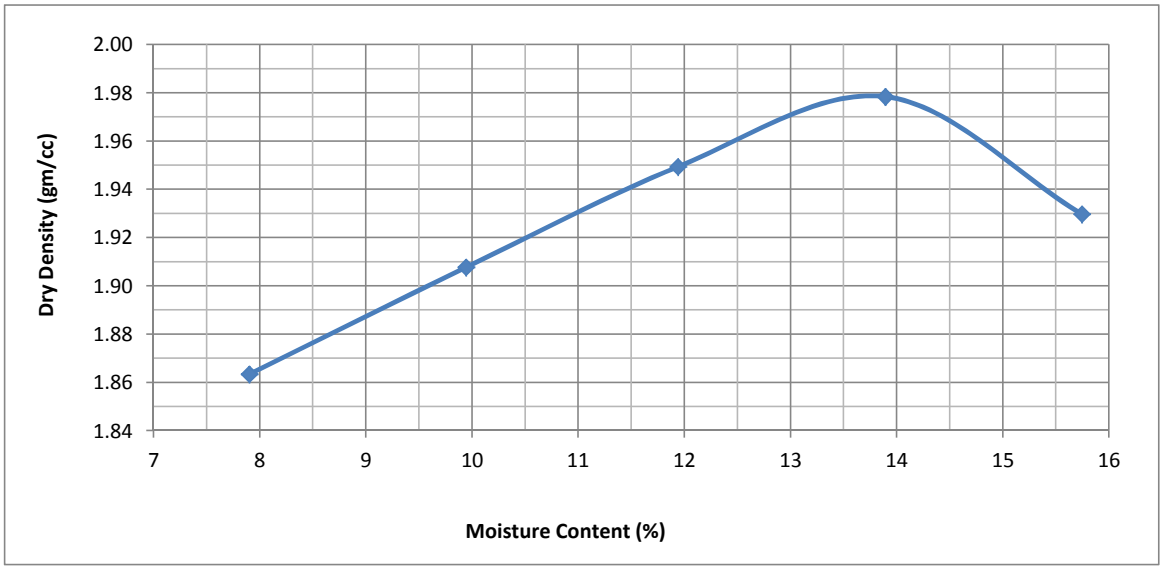
Type of Compation : Dynamic Date of Testing : 15.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	12205	12389	12569	12720	12678
Mass of Compacted Soil(M3=M2-M1) gm	4269	4453	4633	4784	4742
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2010.7	2097.4	2182.1	2253.3	2233.5
Container No.	75	209	83	150	254
Mass of Container (gm)	39.81	31.98	32.92	34.85	30.96
Mass of Wet Soil+Container (gm)	146.56	113.24	132.37	122.39	120.63
Mass of Oven Dry Soil +Container (gm)	138.74	105.89	121.76	111.71	108.43
Mass of Water (gm)	7.82	7.35	10.61	10.68	12.2
Water Content (%)	7.90	9.94	11.94	13.90	15.75
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.863	1.908	1.949	1.978	1.930

Remarks:



From Graph

Maximum Dry Density	1.980	gm/cc
Optimum Moisture Content	13.70	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 404+500 RHS

Source of Materials: Test Pit

MDD (gm/cc) 1.980

OMC (%) 13.70

Compaction (Type) Dynamic

Date of Casting : 16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	56	56	18	18	50	50
Weight of Mould, W1 (gm)	7378	7378	7242	7242	6622	6622
Weight of Mould + Soil, W2 (gm)	11935	12006	12045	12120	11739	11802
Weight of Soil, W = W2 - W1 (gm)	4557	4628	4803	4878	5117	5180
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.025	2.057	2.135	2.168	2.274	2.302
Container No.	256	154	154	300	97	198
Weight of Container W_c (gm)	35.88	33.35	33.35	36.96	33.20	31.85
Weight of Container + Wet Soil, $W3_{(gm)}$	143.11	118.44	139.99	131.63	120.8	119.36
Weight of Container + Dry Soil, $W4_{(gm)}$	130.36	107.15	127.45	119.15	110.25	107.85
Weight of Water W_w = W3 - W4 (gm)	12.75	11.29	12.54	12.48	10.55	11.51
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	94.48	73.80	94.10	82.19	77.05	76.00
Water Content, Wm (%)	13.49	15.30	13.33	15.18	13.69	15.14
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.785	1.784	1.884	1.882	2.000	1.999
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	3.0	6.0	8.9			
CBR of Specimen at 5 mm Penetration	3.0	5.5	8.4			
CBR of Specimen in Percent	**2.98**	**5.95**	**8.93**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 404+500 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.980
OMC (%) 13.70
Compaction (Type) Dynamic

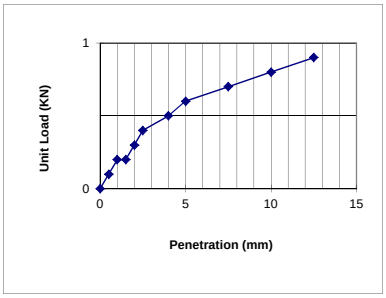
Date of Casting : 16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.6	20.16	2.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.5		4.0
5.0	0.6	0.6	5.0
7.5	0.7		7.5
10.0	0.8		10.0
12.5	0.9		12.5

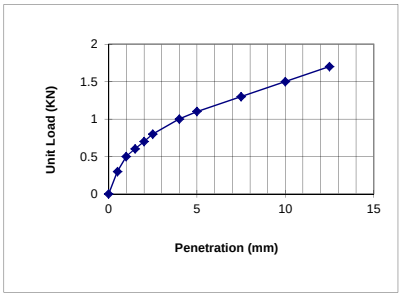


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.1	20.16	5.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.6		1.5
2.0	0.7		2.0
2.5	0.8	0.8	2.5
4.0	1		4.0
5.0	1.1	1.1	5.0
7.5	1.3		7.5
10.0	1.5		10.0
12.5	1.7		12.5

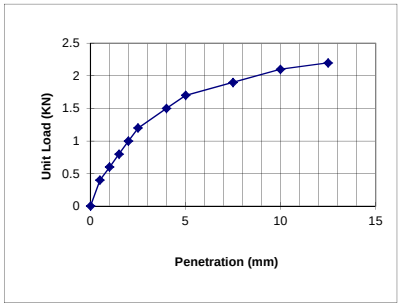


Sample-3

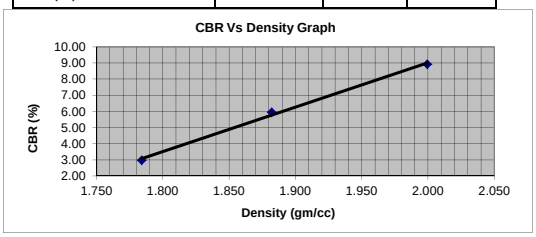
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.2	13.44	8.93
5.0	1.7	20.16	8.43

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.4		0.5
1.0	0.6		1.0
1.5	0.8		1.5
2.0	1		2.0
2.5	1.2	1.2	2.5
4.0	1.5		4.0
5.0	1.7	1.7	5.0
7.5	1.9		7.5
10.0	2.1		10.0
12.5	2.2		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.784	1.882	1.999
CBR (%)	2.98	5.95	8.93



97 % of Max Dry Density = 1.921
CBR corresponding to 97 % of Dry Density = 6.84

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 404+500 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.980
OMC (%) 13.70
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

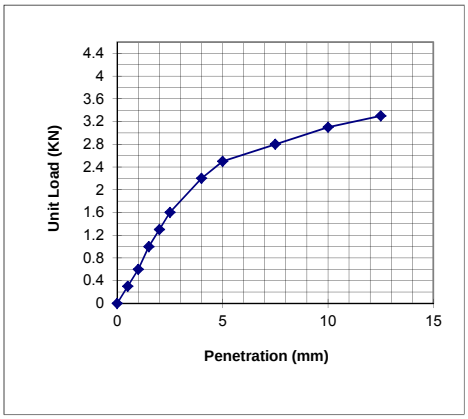
Soaking	Unsoaked
No.of Blows	55
Mould No.	50
Weight of Mould, W1 (gm)	6622
Weight of Mould + Soil, W2 (gm)	11676
Weight of Soil, W = W2 - W1 (gm)	5054
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.246
Container No.	9
Weight of Container W_c (gm)	33.72
Weight of Container + Wet Soil, W3 (gm)	148.95
Weight of Container + Dry Soil, W4 (gm)	135.12
Weight of Water W_w = W3 - W4 (gm)	13.83
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	101.40
Water Content, Wm (%)	13.64
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.977

CBR of Specimen at 2.5 mm Penetration	11.91
CBR of Specimen at 5 mm Penetration	12.40
CBR of Specimen in Percent	**12.40**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.5	20.16	12.40

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	1		1.5
2.0	1.3		2.0
2.5	1.6	1.6	2.5
4.0	2.2		4.0
5.0	2.5	2.5	5.0
7.5	2.8		7.5
10.0	3.1		10.0
12.5	3.3		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 407+900 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

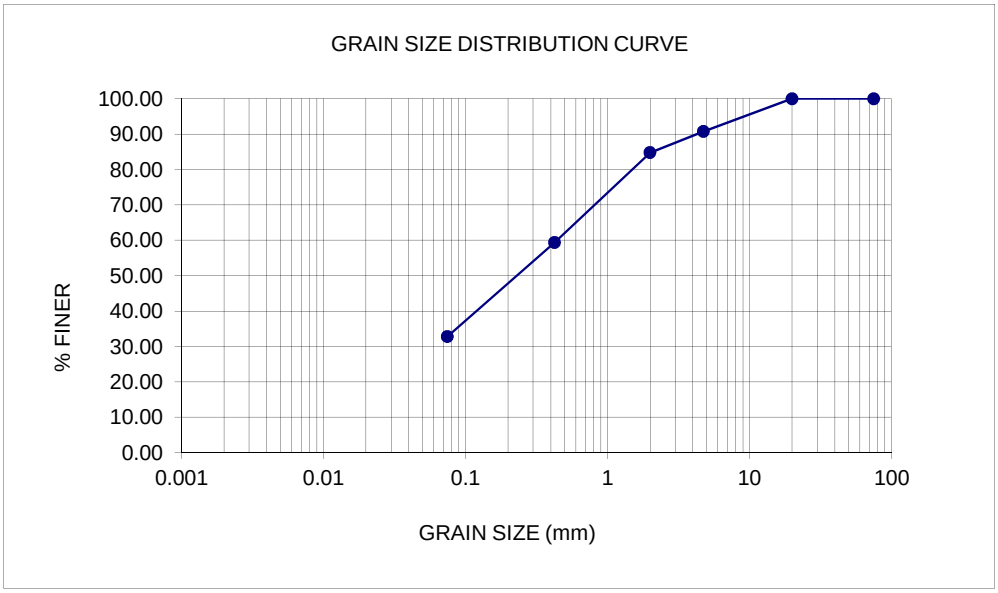
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	92.92	9.29	9.29	90.71
2 mm	2	59.84	5.98	15.28	84.72
425 m	0.425	254.02	25.40	40.68	59.32
75 m	0.075	264.98	26.50	67.18	32.82
Pan		328.24	32.82	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	9.29
Sand (%)	57.88
Fines (%)	32.82



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 407+900 RHS

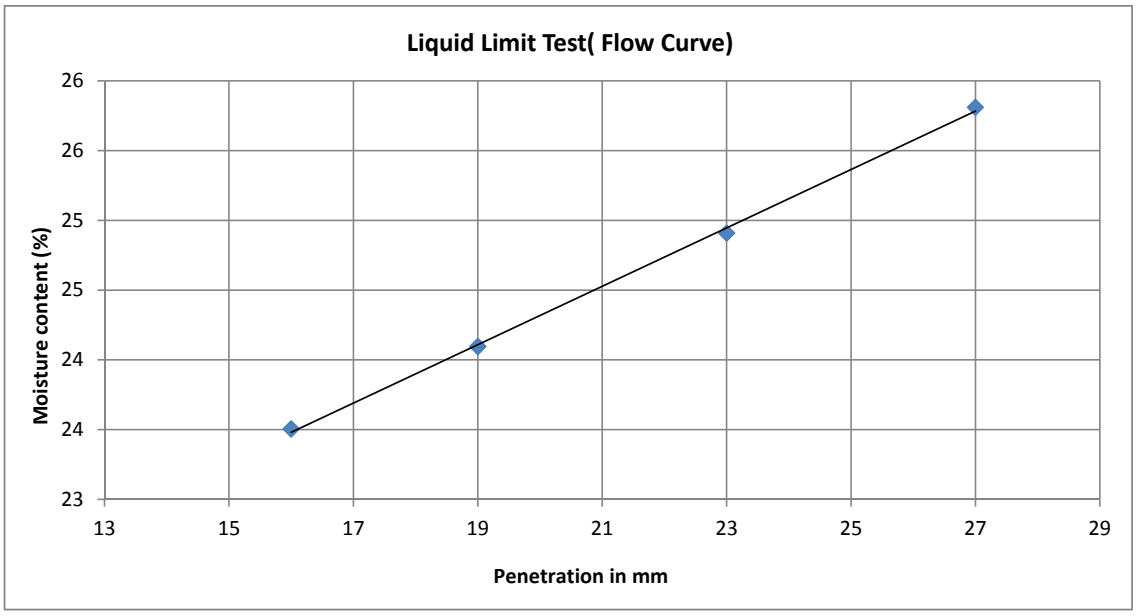
Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	16	19	23	27		
2	Container No.	244	197	98	140		
3	Mass of Container (gm)	34.09	35.18	33.82	32.2		
4	Mass of Wet Soil + Container (gm)	63.62	74.94	68.07	72.22		
5	Mass of Oven Dry Soil + Container (gm)	58	67.22	61.24	64.01	Non Plastic	
6	Mass of Water=(4-5) (gm)	5.62	7.72	6.83	8.21		
7	Mass of Oven Dry Soil =(5-3) (gm)	23.91	32.04	27.42	31.81		
8	Water Content (w=6/7*100) (%)	23.50	24.09	24.91	25.81		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 24.32 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 407+900 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :15.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	10.5
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	5.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 407+900 RHS

Source of Materials: Test Pit

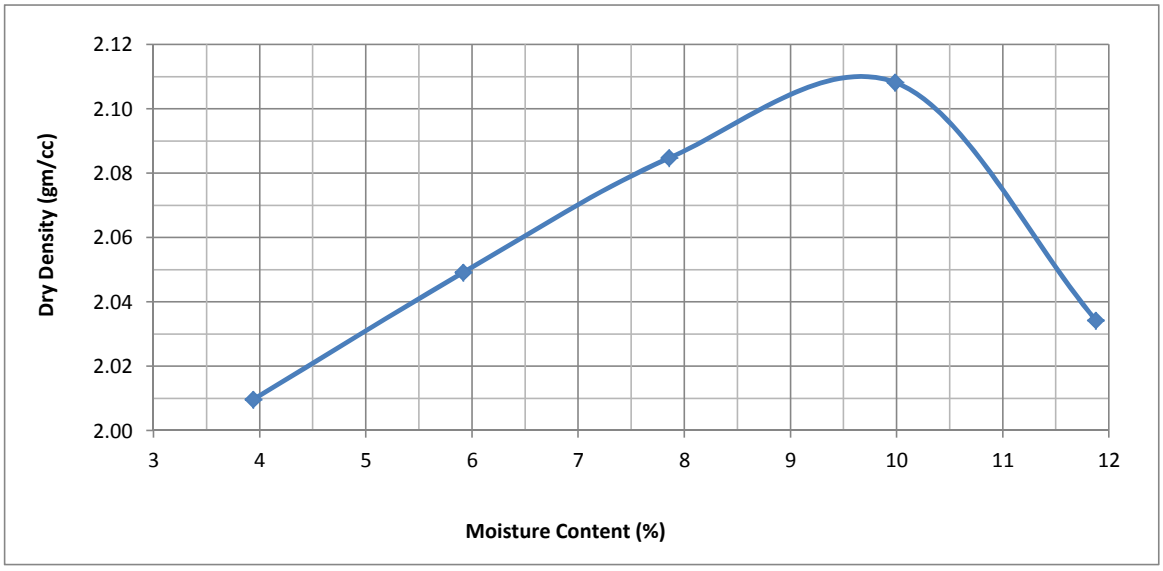
Type of Compation : Dynamic Date of Testing :14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	4	6	8	10	12
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	12315	12488	12654	12803	12712
Mass of Compacted Soil(M3=M2-M1) gm	4435	4608	4774	4923	4832
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2088.9	2170.4	2248.6	2318.7	2275.9
Container No.	87	119	196	150	48
Mass of Container (gm)	35.61	32.97	32.32	34.85	34.18
Mass of Wet Soil+Container (gm)	148.76	158.08	146.51	142.78	121.5
Mass of Oven Dry Soil +Container (gm)	144.47	151.09	138.19	132.98	112.23
Mass of Water (gm)	4.29	6.99	8.32	9.8	9.27
Water Content (%)	3.94	5.92	7.86	9.99	11.88
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	2.010	2.049	2.085	2.108	2.034

Remarks:



From Graph

Maximum Dry Density	2.110	gm/cc
Optimum Moisture Content	9.70	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 407+900 RHS

Source of Materials: Test Pit

MDD (gm/cc) 2.110

OMC (%) 9.70

Compaction (Type) Dynamic

Date of Casting : 17.09.13

Date of Testing : 21.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	71	71	68	68	51	51
Weight of Mould, W1 (gm)	7326	7326	7414	7414	6728	6728
Weight of Mould + Soil, W2 (gm)	12015	12105	12364	12455	11988	12078
Weight of Soil, W = W2 - W1 (gm)	4689	4779	4950	5041	5260	5350
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.084	2.124	2.200	2.240	2.338	2.378
Container No.	87	152	295	182	121	258
Weight of Container W_c (gm)	35.61	32.63	39.56	34.02	35.24	31.75
Weight of Container + Wet Soil, $W3_{(gm)}$	126.93	131.90	151.47	148.93	145.65	100.00
Weight of Container + Dry Soil, $W4_{(gm)}$	118.95	121.45	141.78	136.99	136.10	92.98
Weight of Water W_w = W3 - W4 (gm)	7.98	10.45	9.69	11.94	9.55	7.02
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	83.34	88.82	102.22	102.97	100.86	61.23
Water Content, Wm (%)	9.58	11.77	9.48	11.60	9.47	11.46
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.902	1.900	2.010	2.008	2.136	2.133
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	8.2	11.9	16.4			
CBR of Specimen at 5 mm Penetration	7.9	12.4	15.9			
CBR of Specimen in Percent	**8.18**	**12.40**	**16.37**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 407+900 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.110
OMC (%) 9.70
Compaction (Type) Dynamic

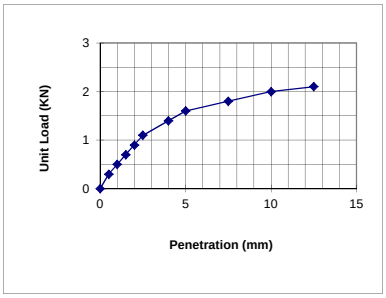
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.1	13.44	8.18
5.0	1.6	20.16	7.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.5		1.0
1.5	0.7		1.5
2.0	0.9		2.0
2.5	1.1	1.1	2.5
4.0	1.4		4.0
5.0	1.6	1.6	5.0
7.5	1.8		7.5
10.0	2		10.0
12.5	2.1		12.5

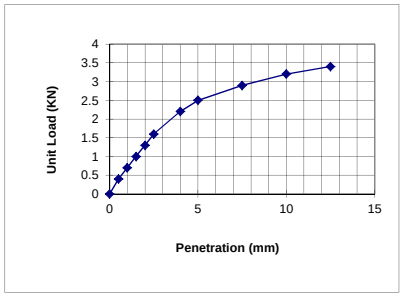


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.5	20.16	12.40

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.4		0.5
1.0	0.7		1.0
1.5	1		1.5
2.0	1.3		2.0
2.5	1.6	1.6	2.5
4.0	2.2		4.0
5.0	2.5	2.5	5.0
7.5	2.9		7.5
10.0	3.2		10.0
12.5	3.4		12.5

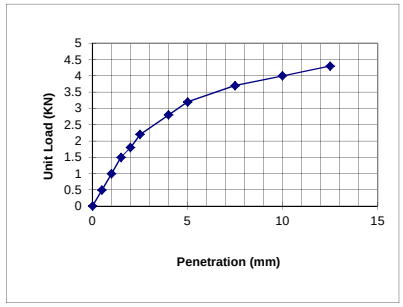


Sample-3

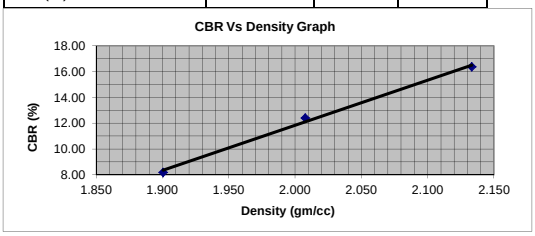
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.2	13.44	16.37
5.0	3.2	20.16	15.87

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	1		1.0
1.5	1.5		1.5
2.0	1.8		2.0
2.5	2.2	2.2	2.5
4.0	2.8		4.0
5.0	3.2	3.2	5.0
7.5	3.7		7.5
10.0	4		10.0
12.5	4.3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.900	2.008	2.133
CBR (%)	8.18	12.40	16.37



97 % of Max Dry Density = 2.047
CBR corresponding to 97 % of Dry Density = 13.47

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 407+900 RHS
Source of Materials: Test Pit
MDD (gm/cc) 2.110
OMC (%) 9.70
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

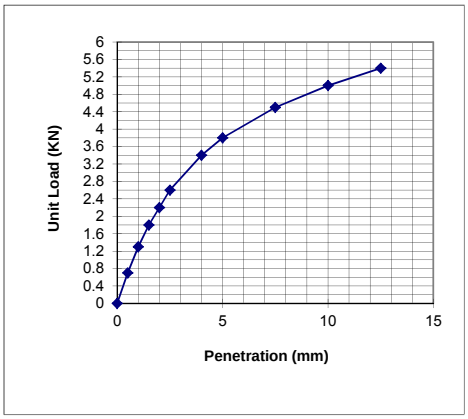
Soaking	Unsoaked
No.of Blows	55
Mould No.	51
Weight of Mould, W1 (gm)	6728
Weight of Mould + Soil, W2 (gm)	11915
Weight of Soil, W = W2 - W1 (gm)	5187
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.305
Container No.	124
Weight of Container W_c (gm)	32.44
Weight of Container + Wet Soil, W3 (gm)	147.65
Weight of Container + Dry Soil, W4 (gm)	137.75
Weight of Water W_w = W3 - W4 (gm)	9.90
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	105.31
Water Content, Wm (%)	9.40
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	2.107

CBR of Specimen at 2.5 mm Penetration	19.35
CBR of Specimen at 5 mm Penetration	18.85
CBR of Specimen in Percent	**19.35**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.6	13.44	19.35
5.0	3.8	20.16	18.85

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.7		0.5
1.0	1.3		1.0
1.5	1.8		1.5
2.0	2.2		2.0
2.5	2.6	2.6	2.5
4.0	3.4		4.0
5.0	3.8	3.8	5.0
7.5	4.5		7.5
10.0	5		10.0
12.5	5.4		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 411+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

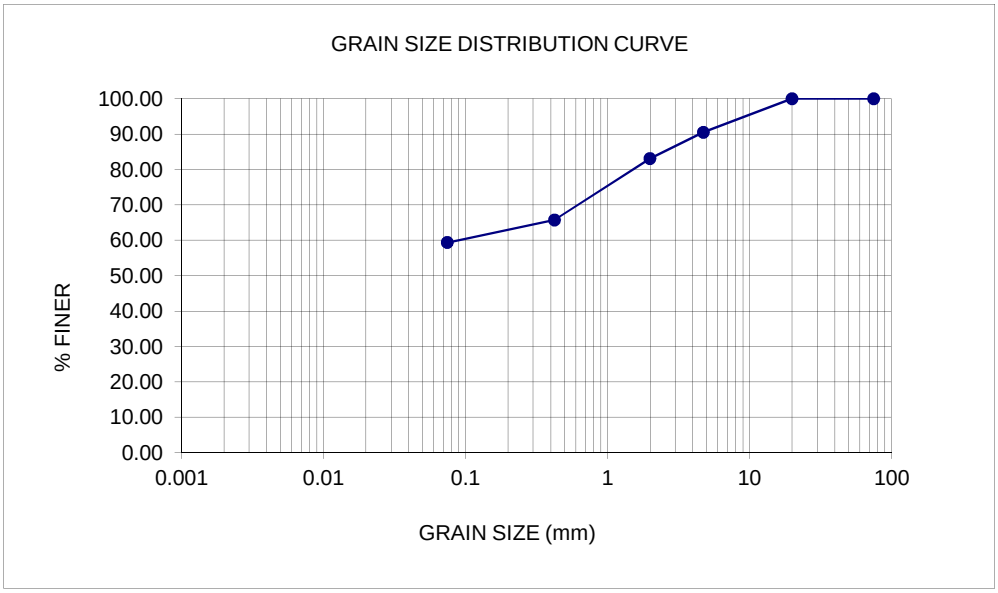
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	95.31	9.53	9.53	90.47
2 mm	2	73.84	7.38	16.92	83.09
425 m	0.425	173.82	17.38	34.30	65.70
75 m	0.075	63.73	6.37	40.67	59.33
Pan		593.3	59.33	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	9.53
Sand (%)	31.14
Fines (%)	59.33



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

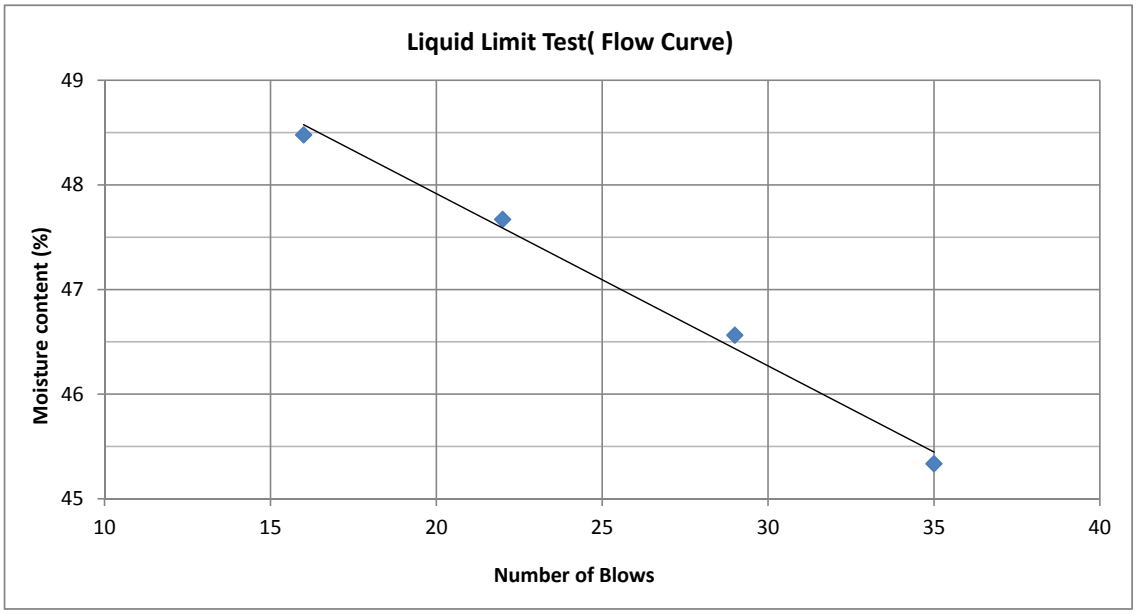
Sample Location: 411+000 LHS

Source of Materials: Test Pit Date of Testing :13.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	16	22	29	35		
2	Container No.	197	105	14	152	P16	P10
3	Mass of Container (gm)	35.18	32.5	31.41	32.63	57.27	54.12
4	Mass of Wet Soil + Container (gm)	61.98	65.77	63.17	66.74	73.18	70.83
5	Mass of Oven Dry Soil + Container (gm)	53.23	55.03	53.08	56.1	69.61	66.99
6	Mass of Water=(4-5) (gm)	8.75	10.74	10.09	10.64	3.57	3.84
7	Mass of Oven Dry Soil =(5-3) (gm)	18.05	22.53	21.67	23.47	12.34	12.87
8	Water Content (w=6/7*100) (%)	48.48	47.67	46.56	45.33	28.93	29.84

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 47.09 %

Plastic Limit 29.38 %

Platicity Index 17.71 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 411+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 411+000 LHS

Source of Materials: Test Pit

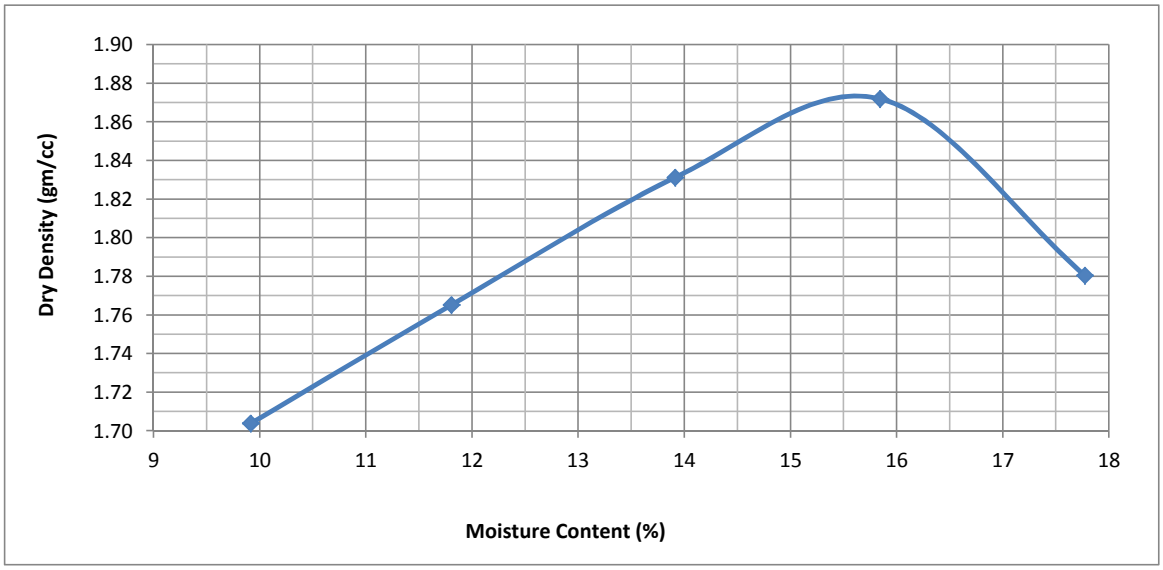
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11894	12108	12347	12522	12370
Mass of Compacted Soil(M3=M2-M1) gm	3976	4190	4429	4604	4452
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1872.7	1973.5	2086.1	2168.5	2096.9
Container No.	182	73	180	91	259
Mass of Container (gm)	34.02	35.9	32.7	32.45	35.77
Mass of Wet Soil+Container (gm)	121.26	107.4	127.33	101.84	108.46
Mass of Oven Dry Soil +Container (gm)	113.39	99.85	115.77	92.35	97.49
Mass of Water (gm)	7.87	7.55	11.56	9.49	10.97
Water Content (%)	9.92	11.81	13.92	15.84	17.77
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.704	1.765	1.831	1.872	1.780

Remarks:



From Graph

Maximum Dry Density 1.873 gm/cc

Optimum Moisture Content 15.70 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 411+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.873

OMC (%) 15.70

Compaction (Type) Dynamic

Date of Casting :16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	54	54	69	69	34	34
Weight of Mould, W1 (gm)	7538	7538	7362	7362	7384	7384
Weight of Mould + Soil, W2 (gm)	11926	11995	11985	12059	12315	12390
Weight of Soil, W = W2 - W1 (gm)	4388	4457	4623	4697	4931	5006
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.950	1.981	2.055	2.088	2.192	2.225
Container No.	155	195	21	6	220	271
Weight of Container W_c (gm)	35.16	30.88	36.14	39.13	33.23	38.43
Weight of Container + Wet Soil, $W3_{(gm)}$	125.82	115.71	135.43	147.88	133.56	112.18
Weight of Container + Dry Soil, $W4_{(gm)}$	113.65	103.12	122.25	131.85	120.05	101.35
Weight of Water $W_w = W3 - W4$ (gm)	12.17	12.59	13.18	16.03	13.51	10.83
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	78.49	72.24	86.11	92.72	86.82	62.92
Water Content, Wm (%)	15.51	17.43	15.31	17.29	15.56	17.21
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.688	1.687	1.782	1.780	1.896	1.898
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	2.2	6.0	9.7			
CBR of Specimen at 5 mm Penetration	2.5	6.0	9.4			
CBR of Specimen in Percent	**2.48**	**5.95**	**9.67**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 411+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.873
OMC (%) 15.70
Compaction (Type) Dynamic

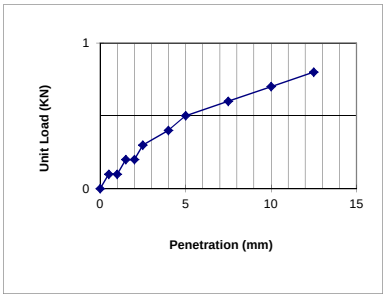
Date of Casting :16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.2		1.5
2.0	0.2		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

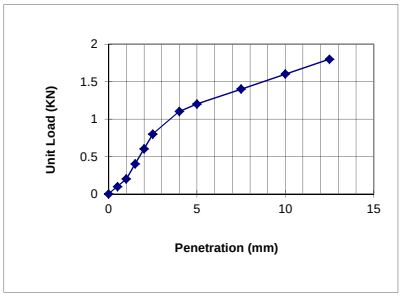


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.2	20.16	5.95

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.4		1.5
2.0	0.6		2.0
2.5	0.8	0.8	2.5
4.0	1.1		4.0
5.0	1.2	1.2	5.0
7.5	1.4		7.5
10.0	1.6		10.0
12.5	1.8		12.5

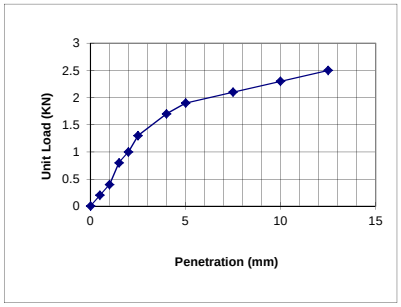


Sample-3

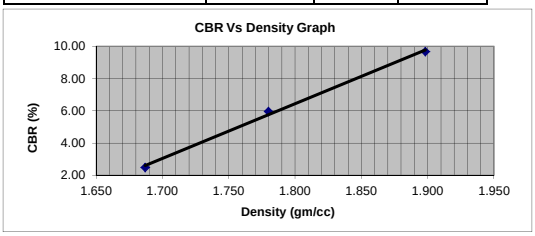
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.3	13.44	9.67
5.0	1.9	20.16	9.42

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.8		1.5
2.0	1		2.0
2.5	1.3	1.3	2.5
4.0	1.7		4.0
5.0	1.9	1.9	5.0
7.5	2.1		7.5
10.0	2.3		10.0
12.5	2.5		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.687	1.780	1.898
CBR (%)	2.48	5.95	9.67



97 % of Max Dry Density = 1.817
CBR corresponding to 97 % of Dry Density = 7.00

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 411+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.873
OMC (%) 15.70
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

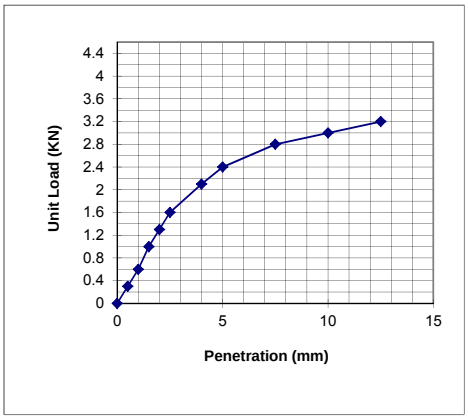
Soaking	Unsoaked
No.of Blows	55
Mould No.	69
Weight of Mould, W1 (gm)	7362
Weight of Mould + Soil, W2 (gm)	12221
Weight of Soil, W = W2 - W1 (gm)	4859
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.160
Container No.	65
Weight of Container W_c (gm)	27.99
Weight of Container + Wet Soil, W3 (gm)	132.56
Weight of Container + Dry Soil, W4 (gm)	118.46
Weight of Water W_w = W3 - W4 (gm)	14.10
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	90.47
Water Content, Wm (%)	15.59
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.868

CBR of Specimen at 2.5 mm Penetration	11.91
CBR of Specimen at 5 mm Penetration	11.91
CBR of Specimen in Percent	**11.91**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.4	20.16	11.91

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	1		1.5
2.0	1.3		2.0
2.5	1.6	1.6	2.5
4.0	2.1		4.0
5.0	2.4	2.4	5.0
7.5	2.8		7.5
10.0	3		10.0
12.5	3.2		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 415+000 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

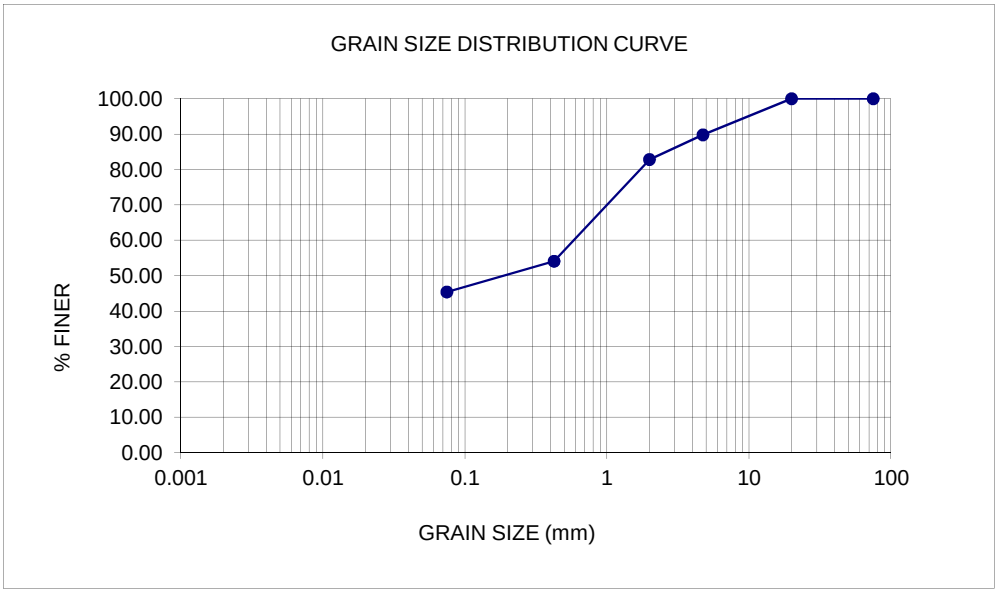
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	102.35	10.24	10.24	89.77
2 mm	2	69.63	6.96	17.20	82.80
425 m	0.425	287.44	28.74	45.94	54.06
75 m	0.075	86.96	8.70	54.64	45.36
Pan		453.62	45.36	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	10.24
Sand (%)	44.40
Fines (%)	45.36



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 415+000 LHS

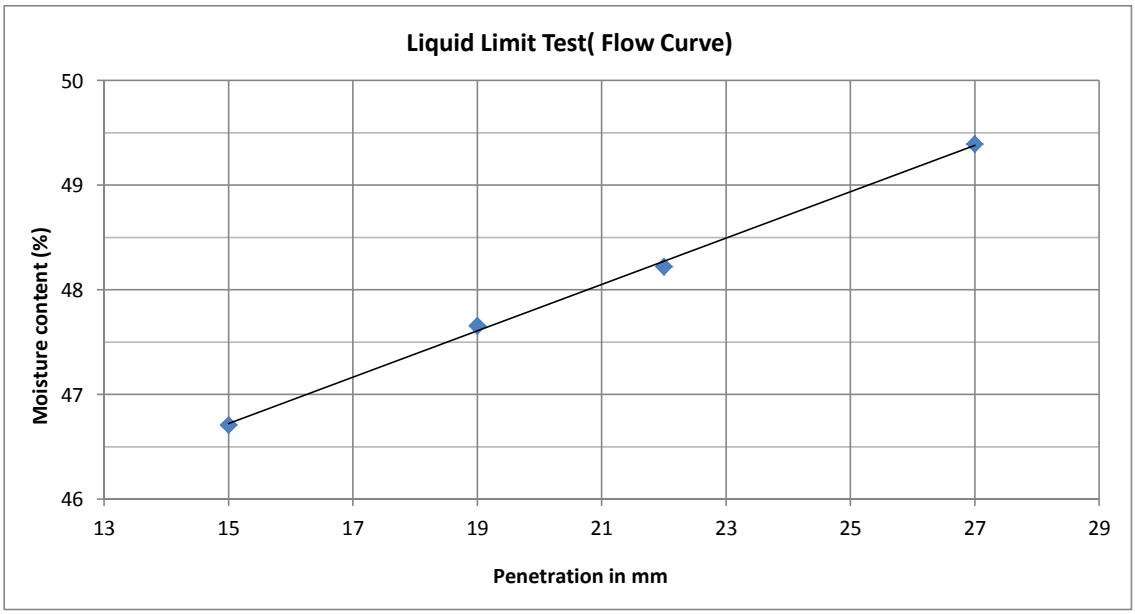
Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	15	19	22	27		
2	Container No.	144	198	14	248		
3	Mass of Container (gm)	33.9	31.85	31.41	31.7		
4	Mass of Wet Soil + Container (gm)	68.89	69.99	63.1	61.25		
5	Mass of Oven Dry Soil + Container (gm)	57.75	57.68	52.79	51.48	Non Plastic	
6	Mass of Water=(4-5) (gm)	11.14	12.31	10.31	9.77		
7	Mass of Oven Dry Soil =(5-3) (gm)	23.85	25.83	21.38	19.78		
8	Water Content (w=6/7*100) (%)	46.71	47.66	48.22	49.39		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 47.83 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 415+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :17.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 415+000 LHS

Source of Materials: Test Pit

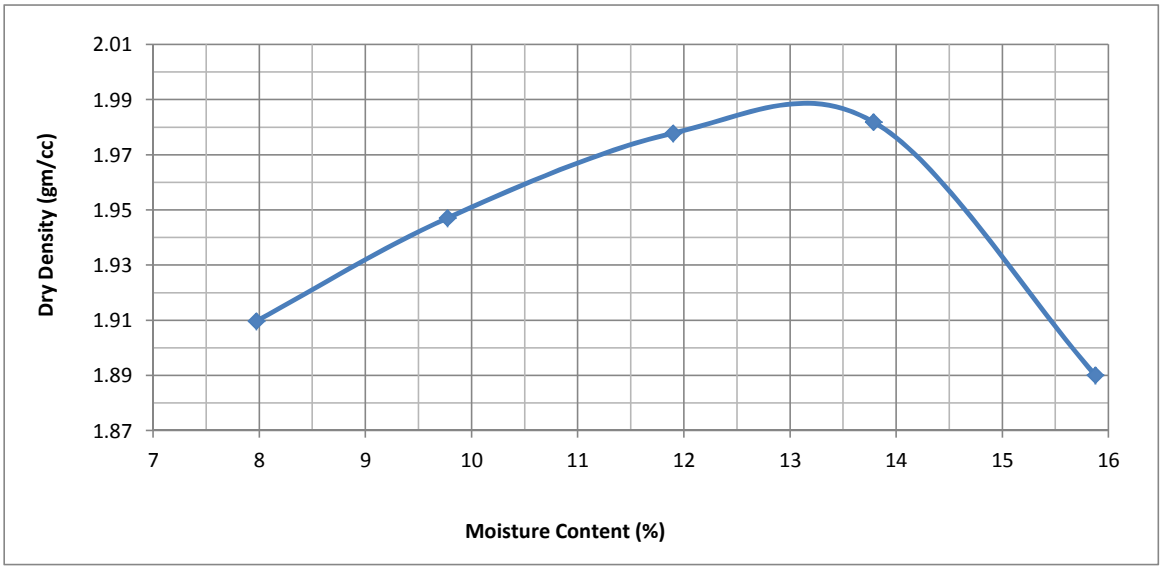
Type of Compation : Dynamic Date of Testing : 16.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	12258	12418	12579	12668	12530
Mass of Compacted Soil(M3=M2-M1) gm	4378	4538	4699	4788	4650
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	2062.0	2137.4	2213.2	2255.1	2190.2
Container No.	147	227	215	72	181
Mass of Container (gm)	34.21	32.17	32.94	31.7	32.31
Mass of Wet Soil+Container (gm)	139.96	134.71	134.96	123.4	146.24
Mass of Oven Dry Soil +Container (gm)	132.15	125.58	124.11	112.29	130.63
Mass of Water (gm)	7.81	9.13	10.85	11.11	15.61
Water Content (%)	7.97	9.77	11.90	13.79	15.88
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.910	1.947	1.978	1.982	1.890

Remarks:



From Graph

Maximum Dry Density	1.989	gm/cc
Optimum Moisture Content	13.20	%

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 415+000 LHS

Source of Materials: Test Pit

MDD (gm/cc) 1.989

OMC (%) 13.20

Compaction (Type) Dynamic

Date of Casting : 17.09.13

Date of Testing : 21.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	59	59	24	24	61	61
Weight of Mould, W1 (gm)	7194	7194	7434	7434	7044	7044
Weight of Mould + Soil, W2 (gm)	11772	11845	12278	12355	12170	12247
Weight of Soil, W = W2 - W1 (gm)	4578	4651	4844	4921	5126	5203
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.035	2.067	2.153	2.187	2.278	2.312
Container No.	6	45	240	101	233	211
Weight of Container W_c (gm)	39.13	29.46	32.80	31.75	28.61	31.47
Weight of Container + Wet Soil, $W3_{(gm)}$	166.03	118.30	111.3	119.69	104.32	132.35
Weight of Container + Dry Soil, $W4_{(gm)}$	151.25	106.58	102.15	108.12	95.45	119.16
Weight of Water W_w = W3 - W4 (gm)	14.78	11.72	9.15	11.57	8.87	13.19
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	112.12	77.12	69.35	76.37	66.84	87.69
Water Content, Wm (%)	13.18	15.20	13.19	15.15	13.27	15.04
Dry Density of Soil, $\gamma_d = \gamma_b$ / [1+(Wm/100)] (gm/cc)	1.798	1.794	1.902	1.899	2.011	2.010
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	3.7	6.7	10.4			
CBR of Specimen at 5 mm Penetration	3.5	6.9	10.9			
CBR of Specimen in Percent	**3.72**	**6.94**	**10.91**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 415+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.989
OMC (%) 13.20
Compaction (Type) Dynamic

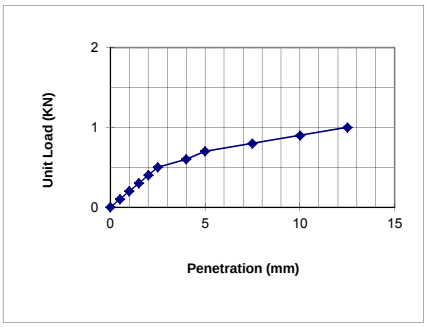
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	0.7	20.16	3.47

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.4		2.0
2.5	0.5	0.5	2.5
4.0	0.6		4.0
5.0	0.7	0.7	5.0
7.5	0.8		7.5
10.0	0.9		10.0
12.5	1		12.5

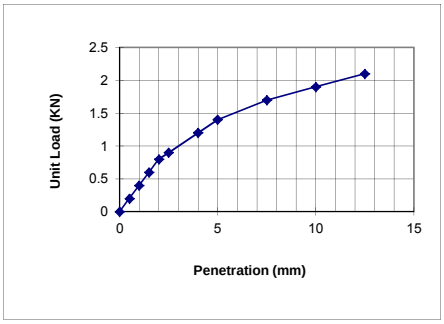


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.4	20.16	6.94

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.6		1.5
2.0	0.8		2.0
2.5	0.9	0.9	2.5
4.0	1.2		4.0
5.0	1.4	1.4	5.0
7.5	1.7		7.5
10.0	1.9		10.0
12.5	2.1		12.5

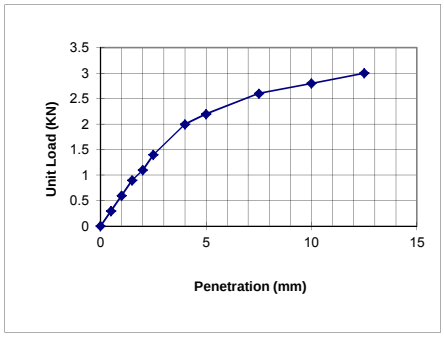


Sample-3

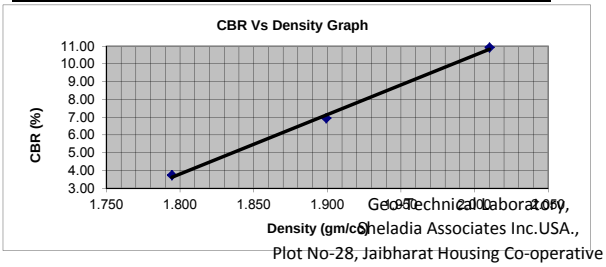
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.4	13.44	10.42
5.0	2.2	20.16	10.91

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	0.9		1.5
2.0	1.1		2.0
2.5	1.4	1.4	2.5
4.0	2		4.0
5.0	2.2	2.2	5.0
7.5	2.6		7.5
10.0	2.8		10.0
12.5	3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.794	1.899	2.010
CBR (%)	3.72	6.94	10.91



97 % of Max Dry Density = 1.929
CBR corresponding to 97 % of Dry Density = 8.13

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Jail Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 415+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.989
OMC (%) 13.20
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

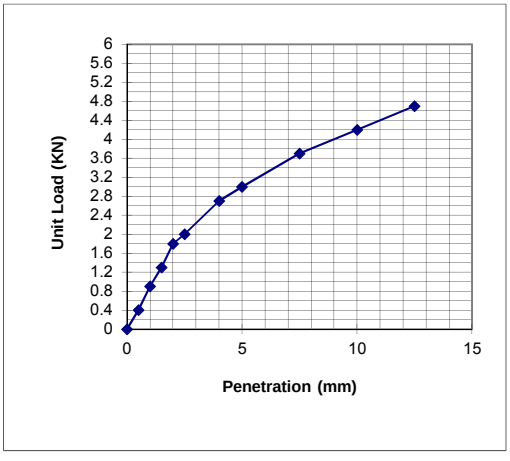
Soaking	Unsoaked
No.of Blows	55
Mould No.	24
Weight of Mould, W1 (gm)	7434
Weight of Mould + Soil, W2 (gm)	12499
Weight of Soil, W = W2 - W1 (gm)	5065
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.251
Container No.	6
Weight of Container W_c (gm)	39.13
Weight of Container + Wet Soil, W3 (gm)	109.56
Weight of Container + Dry Soil, W4 (gm)	101.22
Weight of Water W_w = W3 - W4 (gm)	8.34
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	62.09
Water Content, Wm (%)	13.43
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.985

CBR of Specimen at 2.5 mm Penetration	14.88
CBR of Specimen at 5 mm Penetration	14.88
CBR of Specimen in Percent	**14.88**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	2.0	13.44	14.88
5.0	3.0	20.16	14.88

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.4		0.5
1.0	0.9		1.0
1.5	1.3		1.5
2.0	1.8		2.0
2.5	2	2.0	2.5
4.0	2.7		4.0
5.0	3	3.0	5.0
7.5	3.7		7.5
10.0	4.2		10.0
12.5	4.7		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 417+000 LHS

Source of Materials: Test Pit Date of Testing :17.09.13

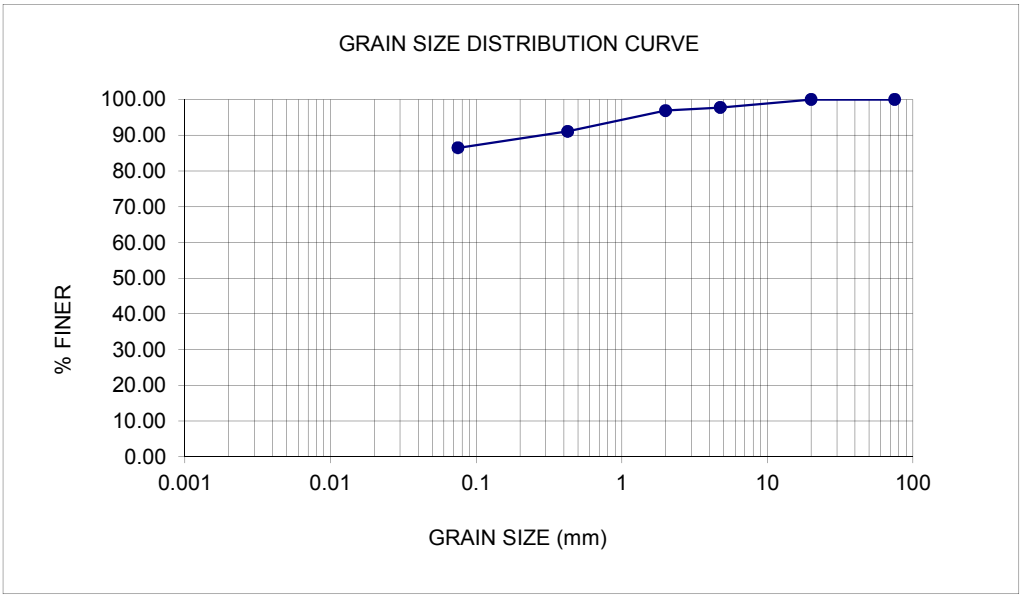
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	22.31	2.23	2.23	97.77
2 mm	2	8.66	0.87	3.10	96.90
425 m	0.425	58.35	5.84	8.93	91.07
75 m	0.075	45.88	4.59	13.52	86.48
Pan		864.8	86.48	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	2.23
Sand (%)	11.29
Fines (%)	86.48



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

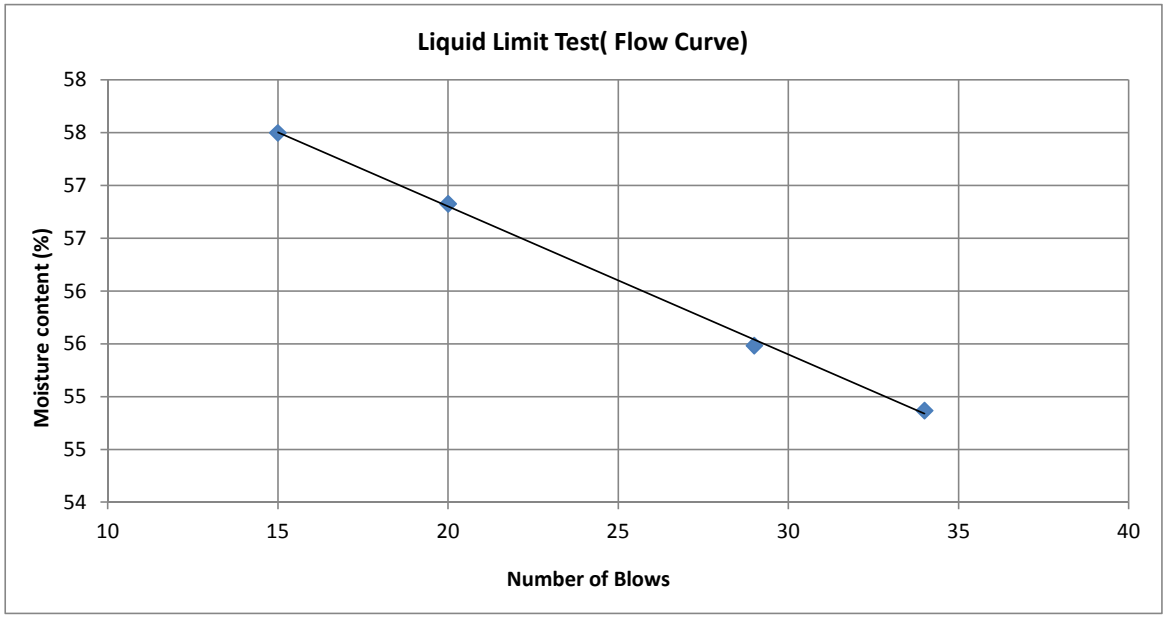
Sample Location: 417+000 LHS

Source of Materials: Test Pit Date of Testing :19.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	15	20	29	34		
2	Container No.	121	87	15	247		
3	Mass of Container (gm)	35.24	35.61	42.19	33.26		
4	Mass of Wet Soil + Container (gm)	69.37	65.36	76.49	65.38		
5	Mass of Oven Dry Soil + Container (gm)	56.91	54.58	64.25	54		
6	Mass of Water=(4-5) (gm)	12.46	10.78	12.24	11.38		
7	Mass of Oven Dry Soil =(5-3) (gm)	21.67	18.97	22.06	20.74		
8	Water Content (w=6/7*100) (%)	57.50	56.83	55.49	54.87		

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 56.10 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 417+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :19.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 417+000 LHS

Source of Materials: Test Pit

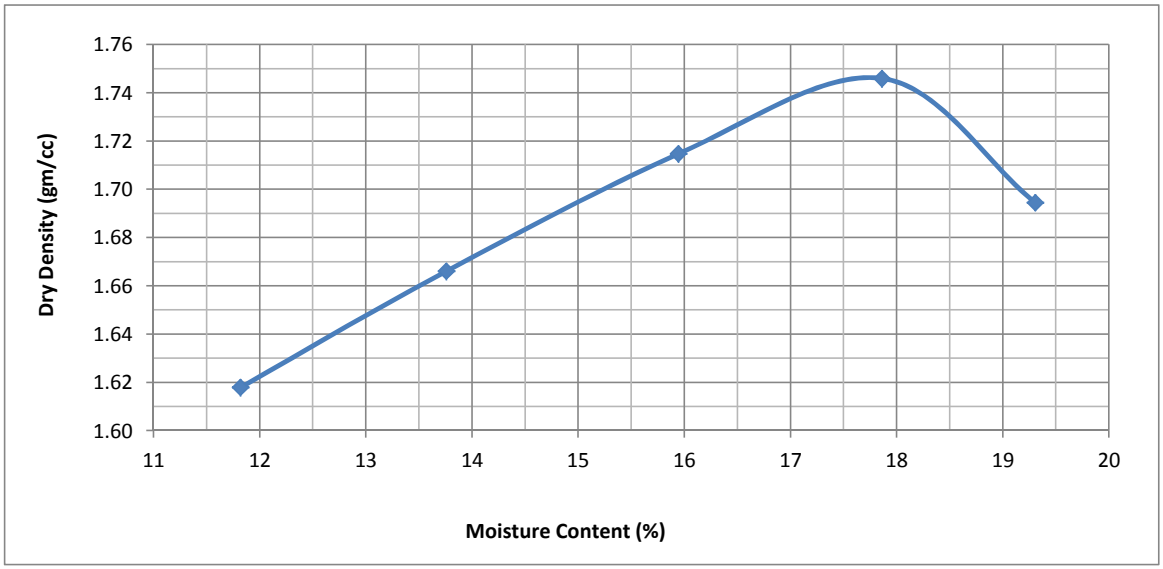
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	12	14	16	18	20
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11759	11942	12139	12287	12210
Mass of Compacted Soil(M3=M2-M1) gm	3841	4024	4221	4369	4292
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1809.1	1895.3	1988.1	2057.8	2021.5
Container No.	144	67	104	139	166
Mass of Container (gm)	33.9	35.9	35.95	29.22	34.63
Mass of Wet Soil+Container (gm)	125.29	115.85	114.99	107.87	111.38
Mass of Oven Dry Soil +Container (gm)	115.63	106.18	104.12	95.95	98.96
Mass of Water (gm)	9.66	9.67	10.87	11.92	12.42
Water Content (%)	11.82	13.76	15.95	17.86	19.31
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.618	1.666	1.715	1.746	1.694

Remarks:



From Graph

Maximum Dry Density	1.748	gm/cc
Optimum Moisture Content	17.70	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 417+000 LHS

Source of Materials: Test Pit — Date of Casting : 17.09.13

MDD (gm/cc) 1.748 — Date of Testing : 21.09.13

OMC (%) 17.70 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	41	41	19	19	67	67
Weight of Mould, W1 (gm)	7472	7472	7388	7388	7578	7578
Weight of Mould + Soil, W2 (gm)	11639	11722	11785	11868	12245	12309
Weight of Soil, W = W2 - W1 (gm)	4167	4250	4397	4480	4667	4731
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.852	1.889	1.954	1.991	2.074	2.103
Container No.	121	213	166	102	102	155
Weight of Container W_c (gm)	35.24	35.29	34.63	33.32	33.32	35.16
Weight of Container + Wet Soil, $W3_{(gm)}$	98.73	102.21	87.96	130.05	103.92	124.25
Weight of Container + Dry Soil, $W4_{(gm)}$	89.25	91.05	80.05	114.09	93.45	109.96
Weight of Water W_w = W3 - W4 (gm)	9.48	11.16	7.91	15.96	10.47	14.29
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	54.01	55.76	45.42	80.77	60.13	74.80
Water Content, Wm (%)	17.55	20.01	17.42	19.76	17.41	19.10
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.575	1.574	1.664	1.663	1.767	1.765

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	1.5	3.7	3.7
CBR of Specimen at 5 mm Penetration	2.0	3.5	5.0
CBR of Specimen in Percent	**1.98**	**3.72**	**4.96**

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 417+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.748
OMC (%) 17.70
Compaction (Type) Dynamic

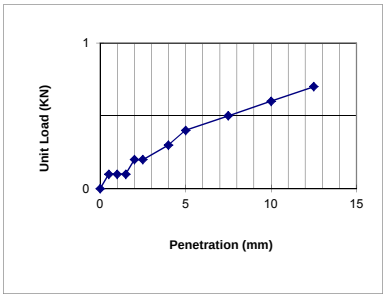
Date of Casting : 17.09.13
Date of Testing : 21.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.2	13.44	1.49
5.0	0.4	20.16	1.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.1		1.0
1.5	0.1		1.5
2.0	0.2		2.0
2.5	0.2	0.2	2.5
4.0	0.3		4.0
5.0	0.4	0.4	5.0
7.5	0.5		7.5
10.0	0.6		10.0
12.5	0.7		12.5

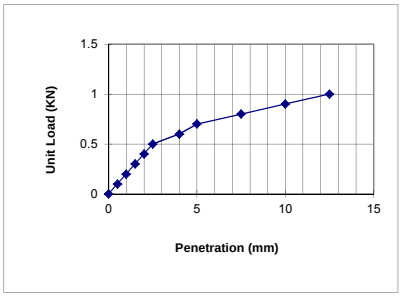


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	0.7	20.16	3.47

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.3		1.5
2.0	0.4		2.0
2.5	0.5	0.5	2.5
4.0	0.6		4.0
5.0	0.7	0.7	5.0
7.5	0.8		7.5
10.0	0.9		10.0
12.5	1		12.5

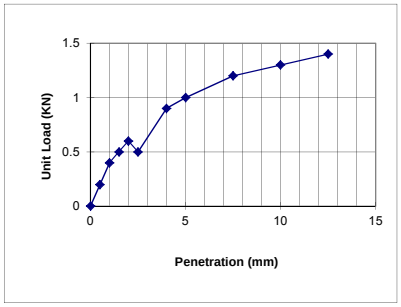


Sample-3

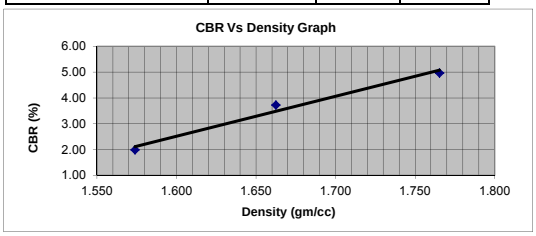
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.5	13.44	3.72
5.0	1.0	20.16	4.96

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.5		1.5
2.0	0.6		2.0
2.5	0.5	0.5	2.5
4.0	0.9		4.0
5.0	1	1.0	5.0
7.5	1.2		7.5
10.0	1.3		10.0
12.5	1.4		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.574	1.663	1.765
CBR (%)	1.98	3.72	4.96



97 % of Max Dry Density = 1.696
CBR corresponding to 97 % of Dry Density = 3.99

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 417+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.748
OMC (%) 17.70
Compaction (Type) Dynamic

Date of Casting : 17.09.13
Date of Testing : 17.09.13
Surcharge Weight :5 kg

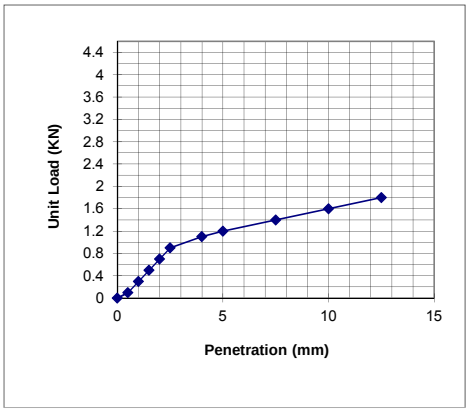
Soaking	Unsoaked
No.of Blows	55
Mould No.	19
Weight of Mould, W1 (gm)	7388
Weight of Mould + Soil, W2 (gm)	11986
Weight of Soil, W = W2 - W1 (gm)	4598
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.044
Container No.	59
Weight of Container W_c (gm)	32.08
Weight of Container + Wet Soil, W3 (gm)	111.56
Weight of Container + Dry Soil, W4 (gm)	99.86
Weight of Water W_w = W3 - W4 (gm)	11.70
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	67.78
Water Content, Wm (%)	17.26
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.743

CBR of Specimen at 2.5 mm Penetration	6.70
CBR of Specimen at 5 mm Penetration	5.95
CBR of Specimen in Percent	**6.70**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.2	20.16	5.95

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.9	0.9	2.5
4.0	1.1		4.0
5.0	1.2	1.2	5.0
7.5	1.4		7.5
10.0	1.6		10.0
12.5	1.8		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 420+000 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

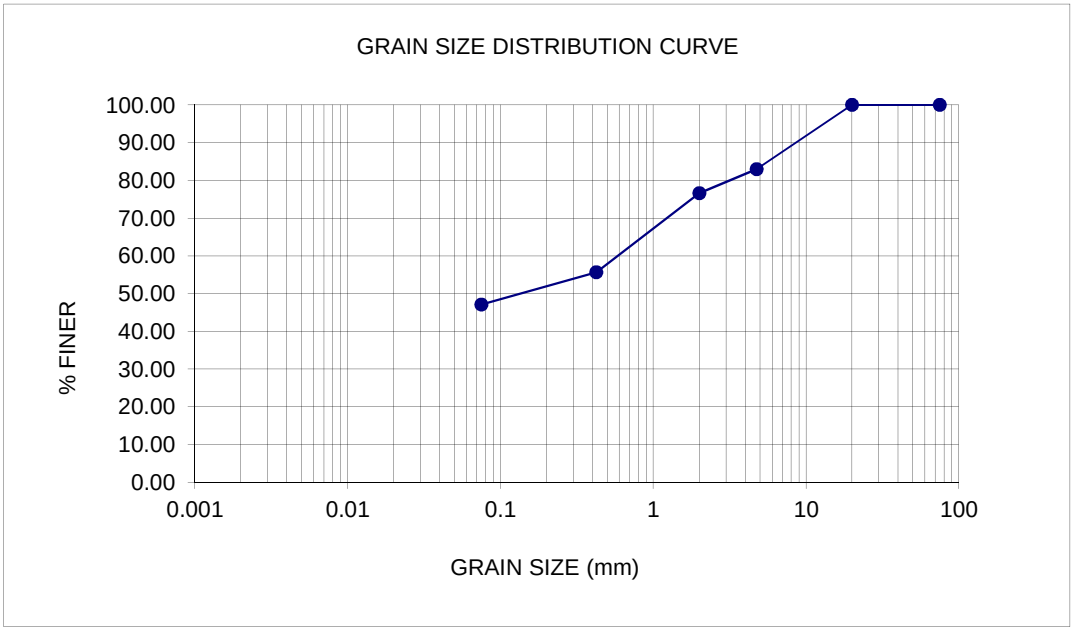
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	170.54	17.05	17.05	82.95
2 mm	2	63.18	6.32	23.37	76.63
425 m	0.425	209.81	20.98	44.35	55.65
75 m	0.075	85.75	8.58	52.93	47.07
Pan		470.72	47.07	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	17.05
Sand (%)	35.87
Fines (%)	47.07



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

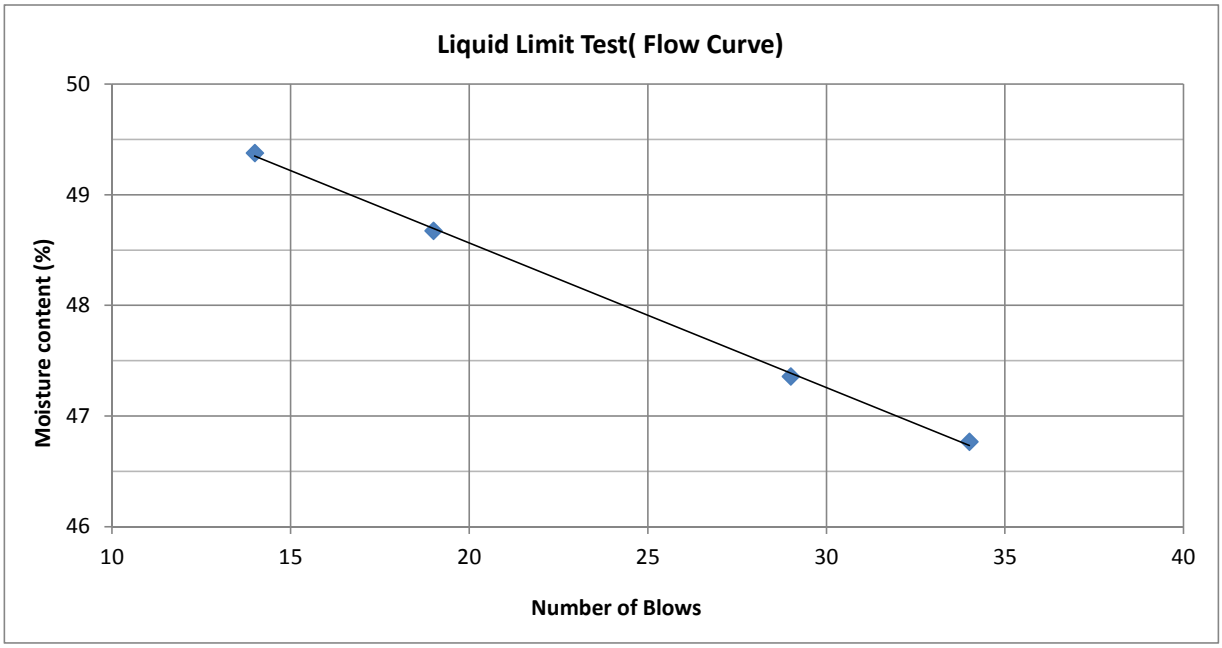
Sample Location: 420+000 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	14	19	29	34		
2	Container No.	8	107	175	290	260	P10
3	Mass of Container (gm)	38.59	30.58	23.32	36.85	43.59	54.12
4	Mass of Wet Soil + Container (gm)	72.02	66.96	53.97	66.1	62.98	77.57
5	Mass of Oven Dry Soil + Container (gm)	60.97	55.05	44.12	56.78	58.33	71.94
6	Mass of Water=(4-5) (gm)	11.05	11.91	9.85	9.32	4.65	5.63
7	Mass of Oven Dry Soil =(5-3) (gm)	22.38	24.47	20.8	19.93	14.74	17.82
8	Water Content (w=6/7*100) (%)	49.37	48.67	47.36	46.76	31.55	31.59

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 47.91 %

Plastic Limit 31.57 %

Platicity Index 16.34 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 420+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :15.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	13.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	30.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 420+000 RHS

Source of Materials: Test Pit

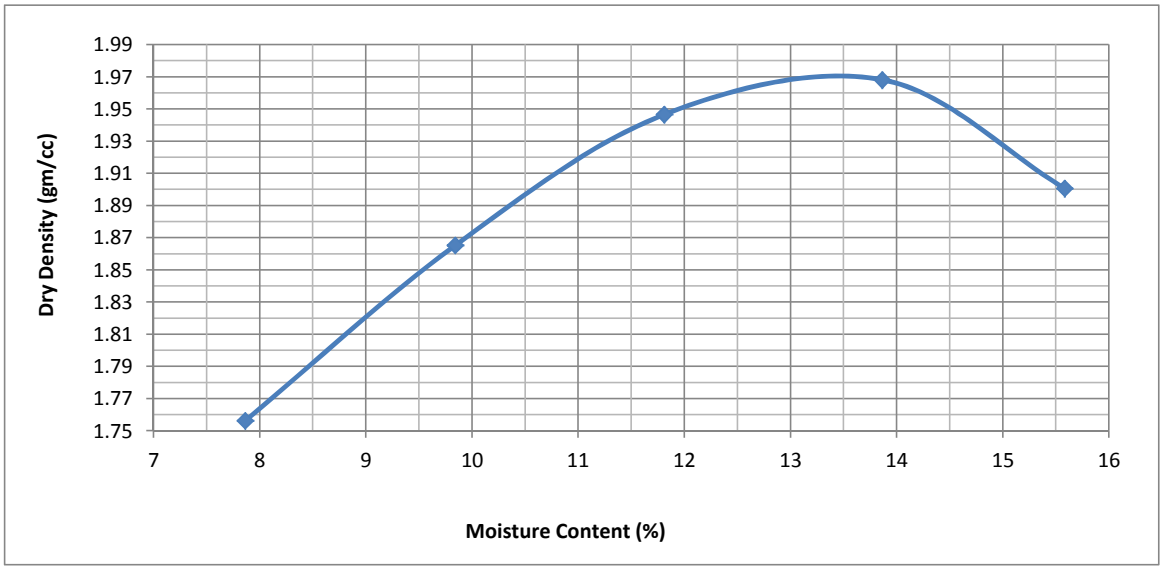
Type of Compation : Dynamic Date of Testing : 14.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	8	10	12	14	16
Mould No.	5	5	5	5	5
Mass of Mould (M1) gm	7880	7880	7880	7880	7880
Mass of mould+Compacted Soil (M2) gm	11902	12230	12501	12638	12544
Mass of Compacted Soil(M3=M2-M1) gm	4022	4350	4621	4758	4664
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1894.4	2048.9	2176.5	2241.0	2196.7
Container No.	129	260	295	62	219
Mass of Container (gm)	36.6	35.9	39.56	41.48	35.06
Mass of Wet Soil+Container (gm)	184.84	147.16	155.42	155.06	144.23
Mass of Oven Dry Soil +Container (gm)	174.03	137.19	143.18	141.23	129.51
Mass of Water (gm)	10.81	9.97	12.24	13.83	14.72
Water Content (%)	7.87	9.84	11.81	13.86	15.58
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.756	1.865	1.947	1.968	1.901

Remarks:



From Graph

Maximum Dry Density 1.970 gm/cc

Optimum Moisture Content 13.50 %

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 420+000 RHS

Source of Materials: Test Pit

MDD (gm/cc) 1.97

OMC (%) 13.50

Compaction (Type) Dynamic

Date of Casting : 16.09.13

Date of Testing : 20.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	11	11	64	64	47	47
Weight of Mould, W1 (gm)	7244	7244	7370	7370	7206	7206
Weight of Mould + Soil, W2 (gm)	11778	11845	12165	12215	12286	12346
Weight of Soil, W = W2 - W1 (gm)	4534	4601	4795	4845	5080	5140
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.015	2.045	2.131	2.153	2.258	2.284
Container No.	71	213	119	296	48	1
Weight of Container W_c (gm)	30.49	35.29	32.97	40.70	34.18	43.27
Weight of Container + Wet Soil, $W3_{(gm)}$	132.56	102.21	131.74	135.14	106.09	154.50
Weight of Container + Dry Soil, $W4_{(gm)}$	120.56	93.45	120.05	122.85	97.56	140.12
Weight of Water $W_w = W3 - W4$ (gm)	12.00	8.76	11.69	12.29	8.53	14.38
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	90.07	58.16	87.08	82.15	63.38	96.85
Water Content, Wm (%)	13.32	15.06	13.42	14.96	13.46	14.85
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.778	1.777	1.879	1.873	1.990	1.989

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	3.0	7.4	11.9
CBR of Specimen at 5 mm Penetration	3.0	7.4	11.4
CBR of Specimen in Percent	**2.98**	**7.44**	**11.91**

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 420+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.970
OMC (%) 13.50
Compaction (Type) Dynamic

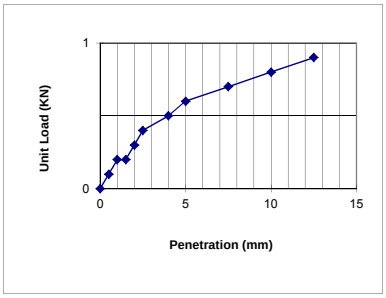
Date of Casting : 16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.6	20.16	2.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.5		4.0
5.0	0.6	0.6	5.0
7.5	0.7		7.5
10.0	0.8		10.0
12.5	0.9		12.5

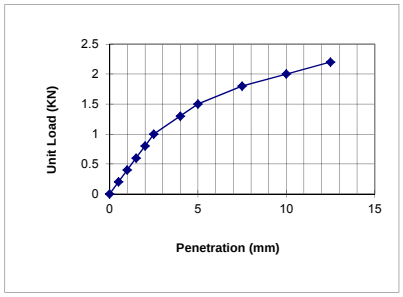


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.0	13.44	7.44
5.0	1.5	20.16	7.44

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.2		0.5
1.0	0.4		1.0
1.5	0.6		1.5
2.0	0.8		2.0
2.5	1	1.0	2.5
4.0	1.3		4.0
5.0	1.5	1.5	5.0
7.5	1.8		7.5
10.0	2		10.0
12.5	2.2		12.5

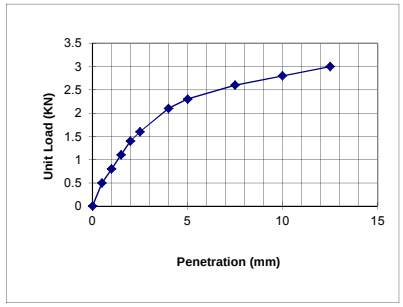


Sample-3

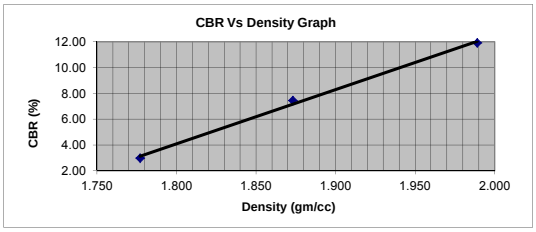
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.3	20.16	11.41

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	0.8		1.0
1.5	1.1		1.5
2.0	1.4		2.0
2.5	1.6	1.6	2.5
4.0	2.1		4.0
5.0	2.3	2.3	5.0
7.5	2.6		7.5
10.0	2.8		10.0
12.5	3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.777	1.873	1.989
CBR (%)	2.98	7.44	11.91



97 % of Max Dry Density = 1.911
CBR corresponding to 97 % of Dry Density = 8.75

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 420+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.970
OMC (%) 13.50
Compaction (Type) Dynamic

Date of Casting :16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

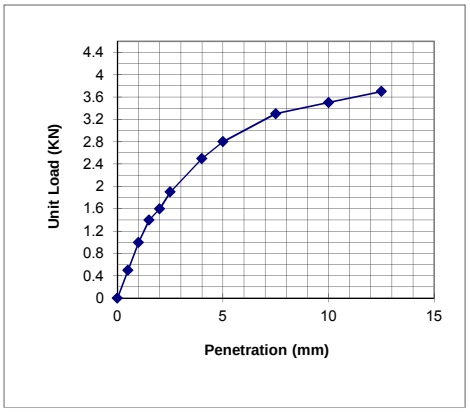
Soaking	Unsoaked
No.of Blows	55
Mould No.	47
Weight of Mould, W1 (gm)	7206
Weight of Mould + Soil, W2 (gm)	12225
Weight of Soil, W = W2 - W1 (gm)	5019
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.231
Container No.	121
Weight of Container W_c (gm)	35.24
Weight of Container + Wet Soil, W3 (gm)	165.56
Weight of Container + Dry Soil, W4 (gm)	150.22
Weight of Water W_w = W3 - W4 (gm)	15.34
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	114.98
Water Content, Wm (%)	13.34
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.968

CBR of Specimen at 2.5 mm Penetration	14.14
CBR of Specimen at 5 mm Penetration	13.89
CBR of Specimen in Percent	**14.14**

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.9	13.44	14.14
5.0	2.8	20.16	13.89

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.5		0.5
1.0	1		1.0
1.5	1.4		1.5
2.0	1.6		2.0
2.5	1.9	1.9	2.5
4.0	2.5		4.0
5.0	2.8	2.8	5.0
7.5	3.3		7.5
10.0	3.5		10.0
12.5	3.7		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 425+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

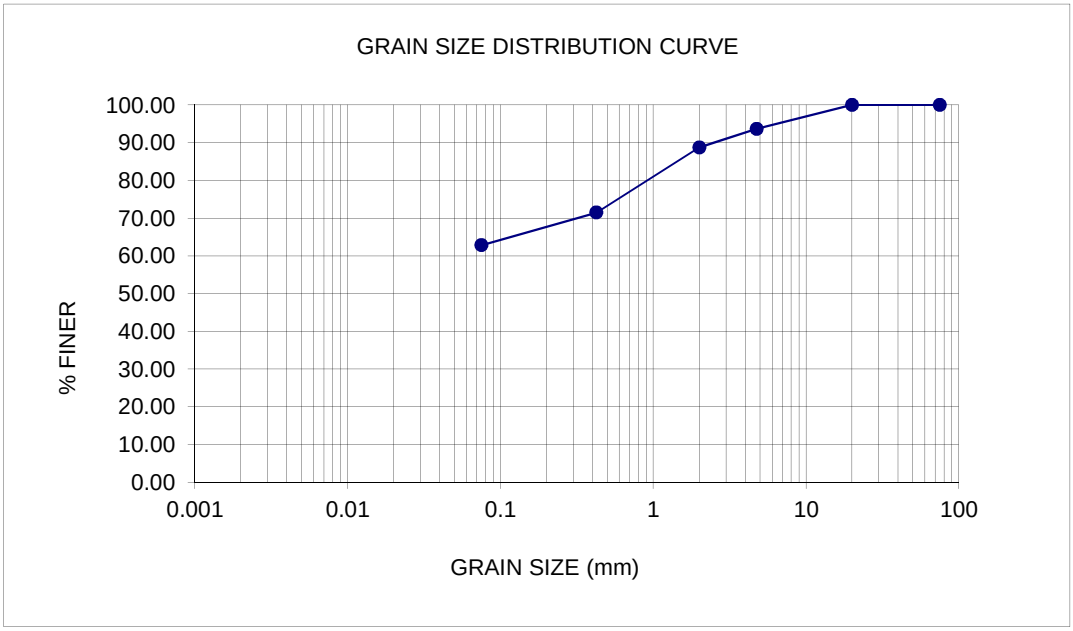
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	63.62	6.36	6.36	93.64
2 mm	2	49.18	4.92	11.28	88.72
425 m	0.425	172.56	17.26	28.54	71.46
75 m	0.075	86.44	8.64	37.18	62.82
Pan		628.2	62.82	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	6.36
Sand (%)	30.82
Fines (%)	62.82



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

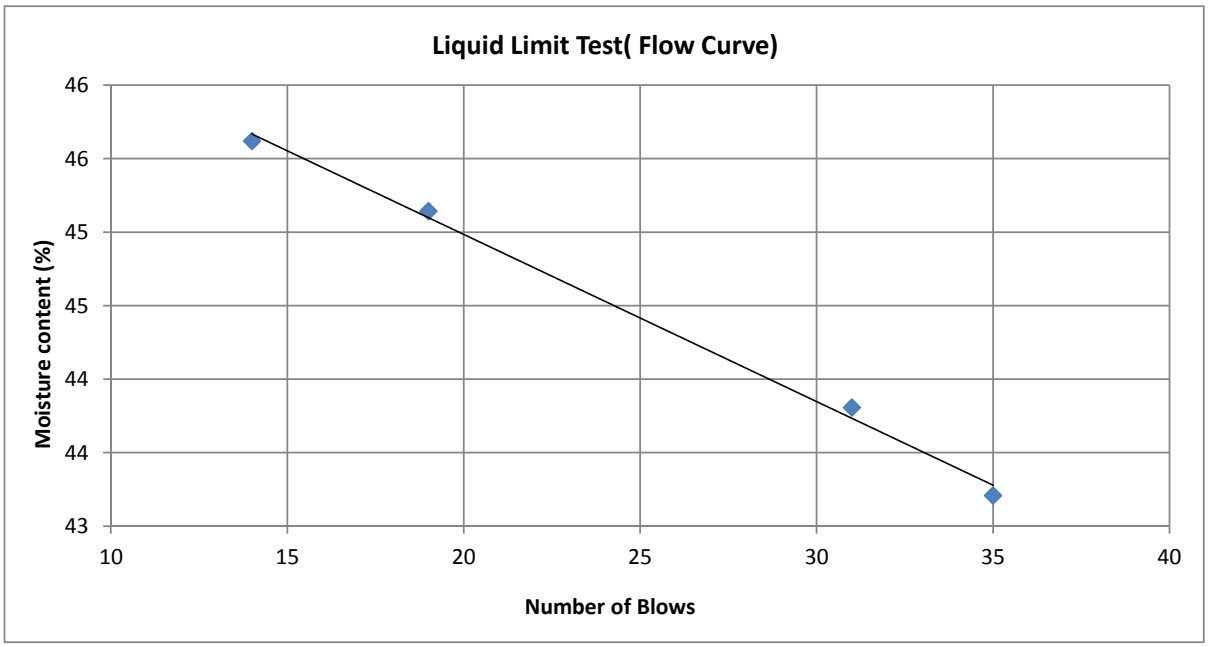
Sample Location: 425+000 LHS

Source of Materials: Test Pit Date of Testing :16.09.13

Wt of Sample Taken: 120 g

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	No.of Blows	14	19	31	35		
2	Container No.	52	53	267	159	293	265
3	Mass of Container (gm)	33.83	33.58	31.65	24.58	41.03	35.7
4	Mass of Wet Soil + Container (gm)	65.24	60.17	63	57.16	57.36	51.32
5	Mass of Oven Dry Soil + Container (gm)	55.4	51.9	53.45	47.33	53.69	47.79
6	Mass of Water=(4-5) (gm)	9.84	8.27	9.55	9.83	3.67	3.53
7	Mass of Oven Dry Soil =(5-3) (gm)	21.57	18.32	21.8	22.75	12.66	12.09
8	Water Content (w=6/7*100) (%)	45.62	45.14	43.81	43.21	28.99	29.20

Remarks:



Liquid Limit : Moisture Content at 25 Blows From Graph

Liquid Limit 44.42 %

Plastic Limit 29.09 %

Platicity Index 15.33 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 425+000 LHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :15.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	13.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	30.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 425+000 LHS

Source of Materials: Test Pit

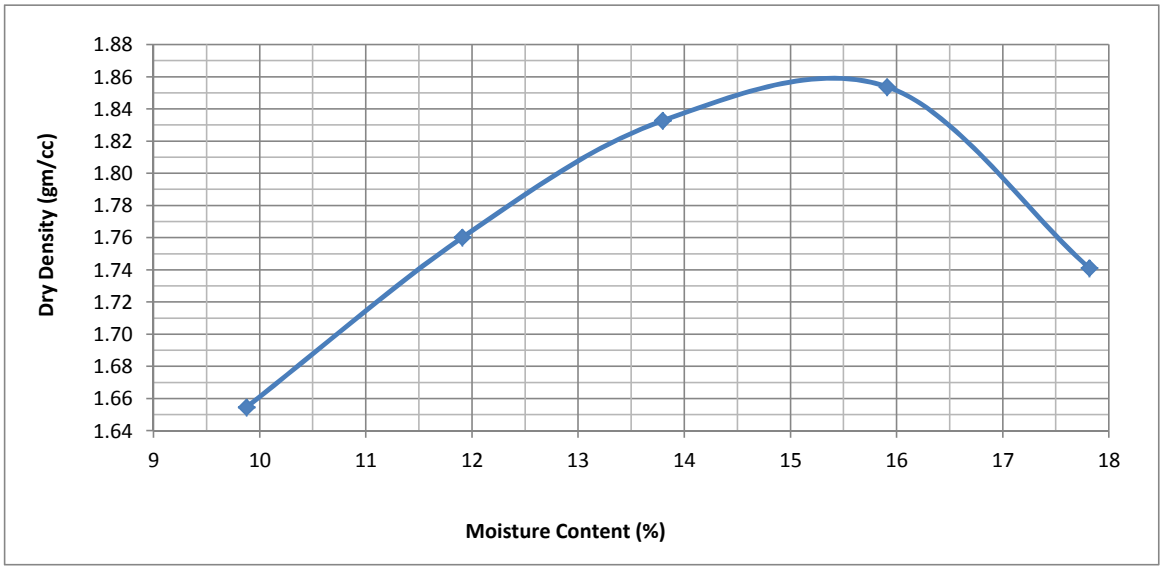
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	10	12	14	16	18
Mould No.	1	1	1	1	1
Mass of Mould (M1) gm	7936	7936	7936	7936	7936
Mass of mould+Compacted Soil (M2) gm	11796	12118	12364	12498	12291
Mass of Compacted Soil(M3=M2-M1) gm	3860	4182	4428	4562	4355
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1818.1	1969.7	2085.6	2148.7	2051.2
Container No.	72	137	227	211	215
Mass of Container (gm)	31.7	35.9	32.17	31.47	32.94
Mass of Wet Soil+Container (gm)	118.58	138.79	99.47	110.95	117.39
Mass of Oven Dry Soil +Container (gm)	110.77	127.84	91.31	100.04	104.62
Mass of Water (gm)	7.81	10.95	8.16	10.91	12.77
Water Content (%)	9.88	11.91	13.80	15.91	17.82
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.655	1.760	1.833	1.854	1.741

Remarks:



From Graph

Maximum Dry Density	1.860	gm/cc
Optimum Moisture Content	15.40	%

Geo-Technical Laboratory,
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Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 425+000 LHS

Source of Materials: Test Pit — Date of Casting : 16.09.13

MDD (gm/cc) 1.860 — Date of Testing : 20.09.13

OMC (%) 15.40 — Surcharge Weight : 5kg

Compaction (Type) Dynamic — Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	9	9	21	21	39	39
Weight of Mould, W1 (gm)	6864	6864	7404	7404	7700	7700
Weight of Mould + Soil, W2 (gm)	11216	11285	11996	12065	12588	12655
Weight of Soil, W = W2 - W1 (gm)	4352	4421	4592	4661	4888	4955
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.934	1.965	2.041	2.072	2.172	2.202
Container No.	222	185	96	299	105	127
Weight of Container W_c (gm)	34.50	32.87	32.83	34.11	32.50	38.70
Weight of Container + Wet Soil, $W3_{(gm)}$	136.85	112.56	132.56	136.58	109.43	147.81
Weight of Container + Dry Soil, $W4_{(gm)}$	123.26	100.85	119.25	121.55	99.12	131.85
Weight of Water $W_w = W3 - W4$ (gm)	13.59	11.71	13.31	15.03	10.31	15.96
Weight of Oven Dry Soil $W_d = W4 - W_c$ (gm)	88.76	67.98	86.42	87.44	66.62	93.15
Water Content, Wm (%)	15.31	17.23	15.40	17.19	15.48	17.13
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.677	1.676	1.769	1.768	1.881	1.880

No.of Blows	10	30	65
CBR of Specimen at 2.5 mm Penetration	2.2	6.0	8.9
CBR of Specimen at 5 mm Penetration	2.5	6.0	8.9
CBR of Specimen in Percent	**2.48**	**5.95**	**8.93**

Geo-Technical Laboratory,
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Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 425+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.860
OMC (%) 15.40
Compaction (Type) Dynamic

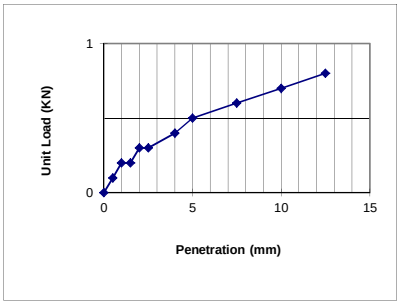
Date of Casting : 16.09.13
Date of Testing : 20.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.5	20.16	2.48

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.5	0.5	5.0
7.5	0.6		7.5
10.0	0.7		10.0
12.5	0.8		12.5

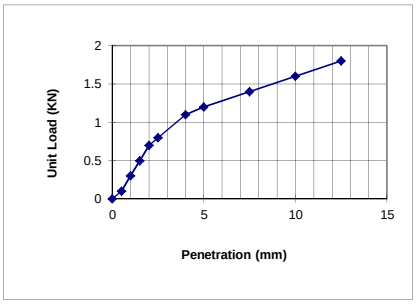


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.8	13.44	5.95
5.0	1.2	20.16	5.95

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.8	0.8	2.5
4.0	1.1		4.0
5.0	1.2	1.2	5.0
7.5	1.4		7.5
10.0	1.6		10.0
12.5	1.8		12.5

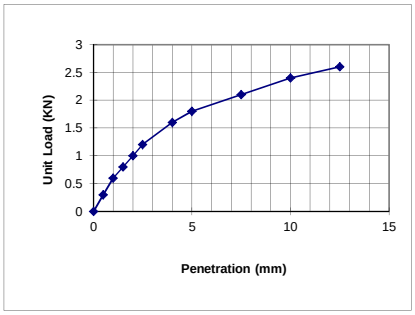


Sample-3

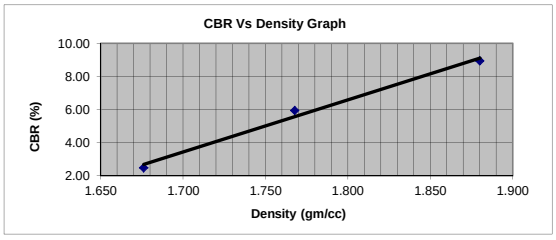
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.2	13.44	8.93
5.0	1.8	20.16	8.93

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.6		1.0
1.5	0.8		1.5
2.0	1		2.0
2.5	1.2	1.2	2.5
4.0	1.6		4.0
5.0	1.8	1.8	5.0
7.5	2.1		7.5
10.0	2.4		10.0
12.5	2.6		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.676	1.768	1.880
CBR (%)	2.48	5.95	8.93



97 % of Max Dry Density = 1.804
CBR corresponding to 97 % of Dry Density = 6.72

Geo-Technical Laboratory,
Sheladia Associates Inc.USA.,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad.

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 425+000 LHS
Source of Materials: Test Pit
MDD (gm/cc) 1.860
OMC (%) 15.40
Compaction (Type) Dynamic

Date of Casting : 16.09.13
Date of Testing : 16.09.13
Surcharge Weight :5 kg

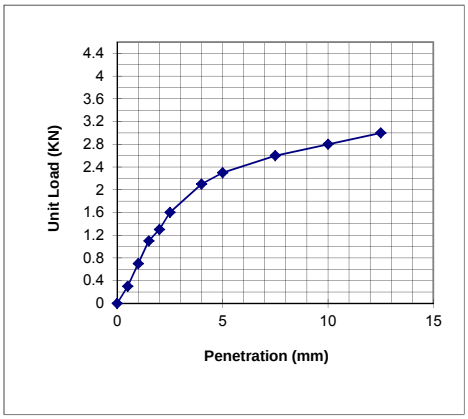
Soaking	Unsoaked
No.of Blows	55
Mould No.	21
Weight of Mould, W1 (gm)	7404
Weight of Mould + Soil, W2 (gm)	12221
Weight of Soil, W = W2 - W1 (gm)	4817
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.141
Container No.	65
Weight of Container W_c (gm)	27.99
Weight of Container + Wet Soil, W3 (gm)	126.45
Weight of Container + Dry Soil, W4 (gm)	113.35
Weight of Water W_w = W3 - W4 (gm)	13.10
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	85.36
Water Content, Wm (%)	15.35
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.856

CBR of Specimen at 2.5 mm Penetration	11.91
CBR of Specimen at 5 mm Penetration	11.41
CBR of Specimen in Percent	**11.91**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	1.6	13.44	11.91
5.0	2.3	20.16	11.41

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.3		0.5
1.0	0.7		1.0
1.5	1.1		1.5
2.0	1.3		2.0
2.5	1.6	1.6	2.5
4.0	2.1		4.0
5.0	2.3	2.3	5.0
7.5	2.6		7.5
10.0	2.8		10.0
12.5	3		12.5



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

GRAIN SIZE ANALYSIS (IS : 2720 Part 4 - 1985)

Sample Location: 428+000 RHS

Source of Materials: Test Pit Date of Testing :16.09.13

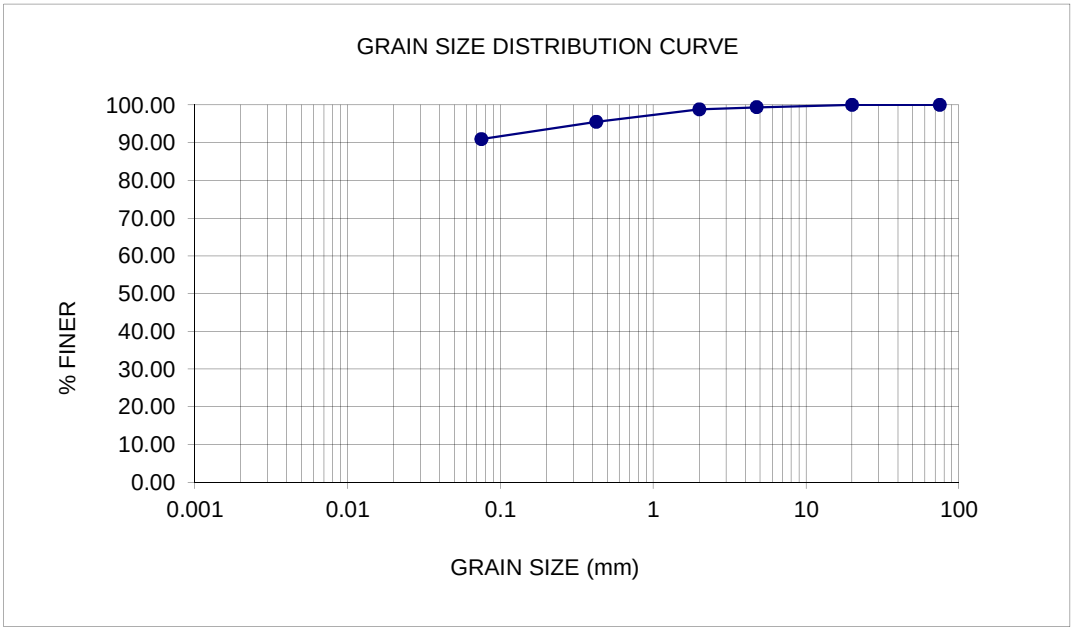
Weight of Sample Taken : 1.0 Kg

TEST RESULTS OF GRAIN SIZE ANALYSIS OF SOIL

Sieve Size	Seive opening (mm)	Weight Retained (gm)	Weight Retained (%)	Cum. Wt. Retained (%)	Passing (%)
75 mm	75	0	0.00	0.00	100.00
20 mm	20	0	0.00	0.00	100.00
4.75 mm	4.75	6.25	0.63	0.63	99.38
2 mm	2	5.21	0.52	1.15	98.85
425 m	0.425	33.4	3.34	4.49	95.51
75 m	0.075	45.83	4.58	9.07	90.93
Pan		909.31	90.93	100.00	0.00
TOTAL		1000			

Remarks:

Gravel (%)	0.63
Sand (%)	8.44
Fines (%)	90.93



Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

ATTERBERG LIMITS (IS : 2720, Part - 5)-1985

Sample Location: 428+000 RHS

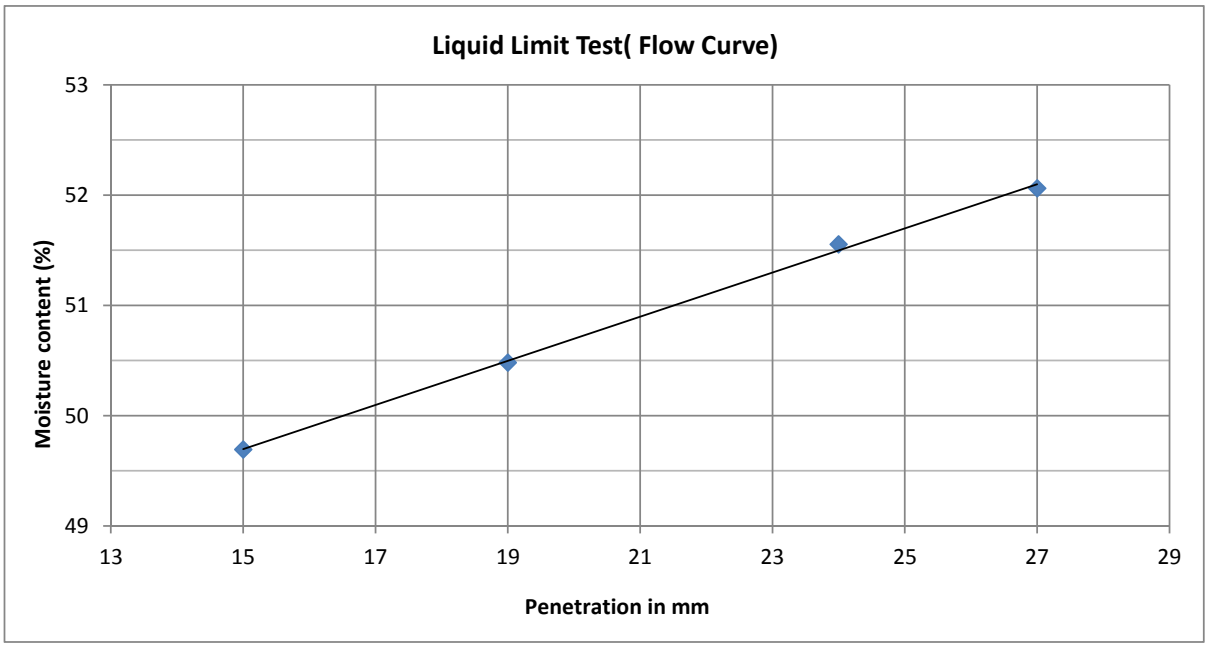
Source of Materials: Test Pit Date of Testing :13.09.13

Wt of Sample Taken: 200 g

Cone Penetration

	Determination No.	Liquid Limit				Plastic Limit	
		1	2	3	4	1	2
1	Penetration in mm	15	19	24	27		
2	Container No.	293	266	288	184		
3	Mass of Container (gm)	41.03	41.54	37.78	33.72		
4	Mass of Wet Soil + Container (gm)	72.66	69.68	70.47	62.49		
5	Mass of Oven Dry Soil + Container (gm)	62.16	60.24	59.35	52.64	Non Plastic	
6	Mass of Water=(4-5) (gm)	10.5	9.44	11.12	9.85		
7	Mass of Oven Dry Soil =(5-3) (gm)	21.13	18.7	21.57	18.92		
8	Water Content (w=6/7*100) (%)	49.69	50.48	51.55	52.06		

Remarks:



Liquid Limit : Moisture Content at 20 mm Penetration From Graph

Liquid Limit 50.70 %

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Determination of Free Swell Index of Soil (IS : 2720 Part 40 - 1977)

Sample Location: 428+000 RHS

Source of Materials: Test Pit

Weight of Sample Taken : 10 gm Date of Testing :14.09.13

S.No.	Description of Test	Readings
1	Vol. of Soil Specimen in Distilled Water in cc (Vd)	11.0
2	Vol. of Soil Specimen in Kerosene in cc (Vk)	10.0
3	Free Swell Index in Percentage ((Vd - Vk) / Vk) x 100	10.00

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

MOISTURE - DENSITY RELATIONSHIP (AASTHO Modified T-180)

Sample Location: 428+000 RHS

Source of Materials: Test Pit

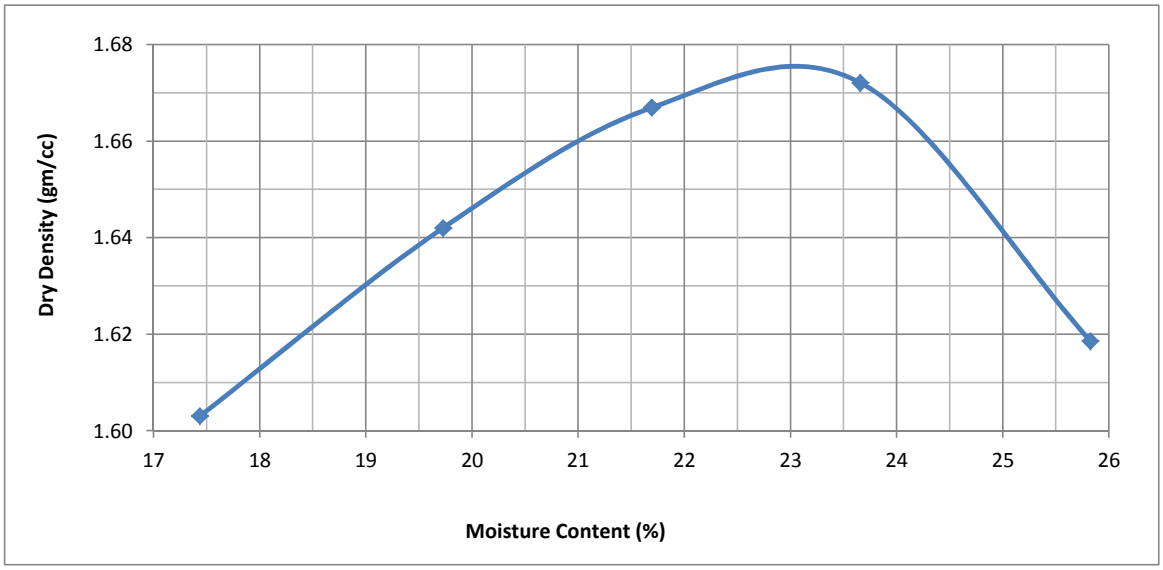
Type of Compation : Dynamic Date of Testing : 13.09.13

No of Blows : 55

No of Layers :05 Wt. Sample Taken : 6 Kg.

Determination No	1	2	3	4	5
Percentage of Water Taken(%)	18	20	22	24	26
Mould No.	2	2	2	2	2
Mass of Mould (M1) gm	7918	7918	7918	7918	7918
Mass of mould+Compacted Soil (M2) gm	11915	12092	12225	12308	12242
Mass of Compacted Soil(M3=M2-M1) gm	3997	4174	4307	4390	4324
Constant Value for Method B (AASTHO T 180)	471	471	471	471	471
Wet Density of Soil (Dw)=M3/V gm/cc	1882.6	1966.0	2028.6	2067.7	2036.6
Container No.	121	200	61	242	198
Mass of Container (gm)	35.24	35.9	29.7	33.45	31.85
Mass of Wet Soil+Container (gm)	122.86	115.22	103.07	115.2	109.61
Mass of Oven Dry Soil +Container (gm)	109.85	102.15	89.99	99.56	93.65
Mass of Water (gm)	13.01	13.07	13.08	15.64	15.96
Water Content (%)	17.44	19.73	21.70	23.66	25.83
Dry Density of Soil (Dd)=Dw/(1+w%) gm/cc	1.603	1.642	1.667	1.672	1.619

Remarks:



From Graph

Maximum Dry Density	1.675	gm/cc
Optimum Moisture Content	23.20	%

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 428+000 RHS

Source of Materials: Test Pit

MDD (gm/cc) 1.675

OMC (%) 23.20

Compaction (Type) Dynamic

Date of Casting : 14.09.13

Date of Testing : 18.09.13

Surcharge Weight : 5kg

Period of Soaking (4 Days)

Soaking	Before	After	Before	After	Before	After
No.of Blows	10		30		65	
Mould No.	37	37	5	5	20	20
Weight of Mould, W1 (gm)	6992	6992	7434	7434	7176	7176
Weight of Mould + Soil, W2 (gm)	11178	11246	11848	11914	11878	11925
Weight of Soil, W = W2 - W1 (gm)	4186	4254	4414	4480	4702	4749
Volume of Mould, V (cc)	2250	2250	2250	2250	2250	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	1.860	1.891	1.962	1.991	2.090	2.111
Container No.	215	21	197	62	248	300
Weight of Container W_c (gm)	32.94	36.14	35.18	41.48	31.70	36.96
Weight of Container + Wet Soil, W3 (gm)	99.91	117.30	114.62	154.21	108.67	110.73
Weight of Container + Dry Soil, W4 (gm)	87.30	100.89	99.65	131.55	94.10	96.05
Weight of Water W_w = W3 - W4 (gm)	12.61	16.41	14.97	22.66	14.57	14.68
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	54.36	64.75	64.47	90.07	62.40	59.09
Water Content, Wm (%)	23.20	25.34	23.22	25.16	23.35	24.84
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.510	1.508	1.592	1.591	1.694	1.691
No.of Blows	10	30	65			
CBR of Specimen at 2.5 mm Penetration	2.2	3.0	4.5			
CBR of Specimen at 5 mm Penetration	2.0	3.0	4.5			
CBR of Specimen in Percent	**2.23**	**2.98**	**4.46**			

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - AASHTO Method

Sample Location: 428+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.675
OMC (%) 23.20
Compaction (Type) Dynamic

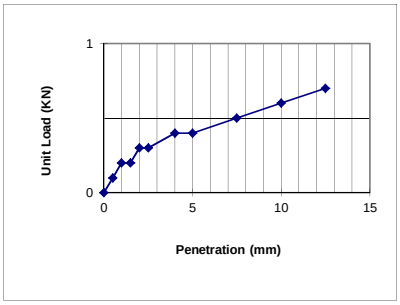
Date of Casting : 14.09.13
Date of Testing : 18.09.13
Surcharge Weight : 5kg

Sample-1

No of Blows 10
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.3	13.44	2.23
5.0	0.4	20.16	1.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.3	0.3	2.5
4.0	0.4		4.0
5.0	0.4	0.4	5.0
7.5	0.5		7.5
10.0	0.6		10.0
12.5	0.7		12.5

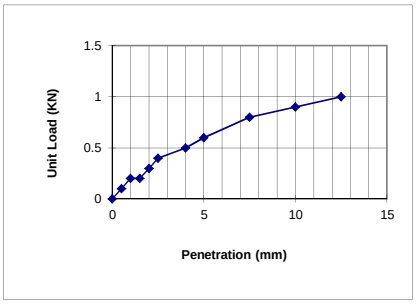


Sample-2

No of Blows 30
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.4	13.44	2.98
5.0	0.6	20.16	2.98

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.2		1.0
1.5	0.2		1.5
2.0	0.3		2.0
2.5	0.4	0.4	2.5
4.0	0.5		4.0
5.0	0.6	0.6	5.0
7.5	0.8		7.5
10.0	0.9		10.0
12.5	1		12.5

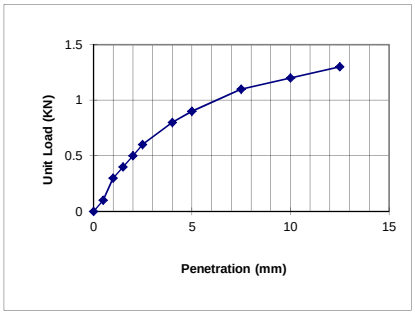


Sample-3

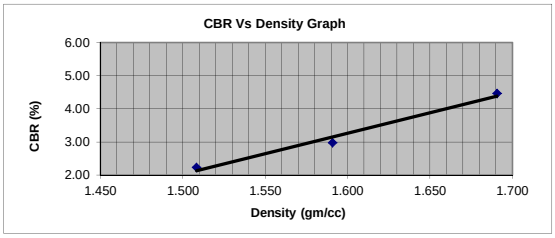
No of Blows 65
Correction 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.6	13.44	4.46
5.0	0.9	20.16	4.46

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.4		1.5
2.0	0.5		2.0
2.5	0.6	0.6	2.5
4.0	0.8		4.0
5.0	0.9	0.9	5.0
7.5	1.1		7.5
10.0	1.2		10.0
12.5	1.3		12.5



Type of Compaction	10 Blows	30 Blows	65 Blows
Dry Density	1.508	1.591	1.691
CBR (%)	2.23	2.98	4.46



97 % of Max Dry Density = 1.625
CBR corresponding to 97 % of Dry Density = 3.57

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Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

California Bearing Ratio - IS 2720 : Part 16

Sample Location: 428+000 RHS
Source of Materials: Test Pit
MDD (gm/cc) 1.675
OMC (%) 23.20
Compaction (Type) Dynamic

Date of Casting : 14.09.13
Date of Testing : 14.09.13
Surcharge Weight :5 kg

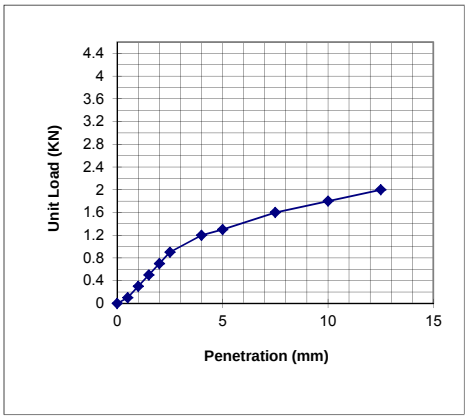
Soaking	Unsoaked
No.of Blows	55
Mould No.	37
Weight of Mould, W1 (gm)	6992
Weight of Mould + Soil, W2 (gm)	11636
Weight of Soil, W = W2 - W1 (gm)	4644
Volume of Mould, V (cc)	2250
Bulk Density of Soil, γ_b = W/V (gm/cc)	2.064
Container No.	125
Weight of Container W_c (gm)	32.60
Weight of Container + Wet Soil, W3 (gm)	132.82
Weight of Container + Dry Soil, W4 (gm)	113.90
Weight of Water W_w = W3 - W4 (gm)	18.92
Weight of Oven Dry Soil W_d = W4 - W_c (gm)	81.30
Water Content, Wm (%)	23.27
Dry Density of Soil, $\gamma_d = \gamma_b / [1+(Wm/100)]$ (gm/cc)	1.674

CBR of Specimen at 2.5 mm Penetration	6.70
CBR of Specimen at 5 mm Penetration	6.45
CBR of Specimen in Percent	**6.70**

No of Blows : 55
Correction : 0

Penetration (mm)	Unit Load (KN)	Standard Load (KN)	CBR (%)
2.5	0.9	13.44	6.70
5.0	1.3	20.16	6.45

Penetration (mm)	Unit Load (KN)	Corr. Unit Load (KN)	Corr. Penetration
0.0	0		0.0
0.5	0.1		0.5
1.0	0.3		1.0
1.5	0.5		1.5
2.0	0.7		2.0
2.5	0.9	0.9	2.5
4.0	1.2		4.0
5.0	1.3	1.3	5.0
7.5	1.6		7.5
10.0	1.8		10.0
12.5	2		12.5



ANNEXURE-2

(Volume – III)

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SPECIFIC GRAVITY AND WATER ABSORPTION (IS : 2386 , PART 3)

Source of Material : Imphal River(305+000 RHS)

Description of Sample : River Boulders

Aggregate size : 10mm 20mm Testing Date : 13.09.13

Specific Gravity of Coarse Aggregates - BASKET METHOD

Nominal Size of Agg. 20mm 12.5/10mm

sno	Description	2	3	Remarks
1	Weight of S.S.D. Aggregate in Air (w1) (gm)	1573	1370	
2	Weight of S.S.D. Aggregate in Water (w2) (gm)	985	855	
3	Weight of Oven Dried Aggregate in Air (w3) (gm)	1564	1360	
4	Bulk Specific Gravity = w3 / (w1 - w2)	2.66	2.64	
5	Apparent Specific Gravity = w3 / (w3 - w2)	2.70	2.69	
6	Water Absorption = [(w1 - w3) / w3] x 100 (%)	0.58	0.74	

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Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

AGGREGATE IMPACT VALUE (IS : 2386 , PART IV),1963

Source of Material : Imphal River(305+000 RHS)

Description of Sample : River Boulders Testing Date : 17.09.13

Test No.	1	2	3
Mass of Aggregates (Oven dry) passing IS Sieve 12.5 mm and is retained on IS Sieve 10.0 mm (Wa) (gm)	352	364	349
Mass of Fraction retained on IS Sieve 2.36 mm (Wb) (gm)	302	320	301
Mass of Fraction passing IS Sieve 2.36 mm (Wc) = Wa - Wb (gm)	50	44	48
A.I.V. = Wc / Wa x 100 (%)	14.20	12.09	13.75
Average A.I.V. (%)	**13.35**		
Remarks :			

Geo-Technical Laboratory
Sheladia Associates Inc., USA,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SPECIFIC GRAVITY AND WATER ABSORPTION (IS : 2386 , PART 3)

Sample Location: 350+000 LHS & 385+000 LHS (From Wangjing village to (via Machi village) appx Km.45 Lead)

Source of Material :Quarry Material

Description of Sample :

Aggregate size : 40mm 12.5/10mm Testing Date : 17.10.13

Specific Gravity of Coarse Aggregates - BASKET METHOD

Nominal Size of Agg. 40mm 12.5/10mm

sno	Description	2	3	Remarks
1	Weight of S.S.D. Aggregate in Air (w1) (gm)	2533	2165	
2	Weight of S.S.D. Aggregate in Water (w2) (gm)	1581	1320	
3	Weight of Oven Dried Aggregate in Air (w3) (gm)	2522	2152	
4	Bulk Specific Gravity = w3 / (w1 - w2)	2.65	2.55	
5	Apparent Specific Gravity = w3 / (w3 - w2)	2.68	2.59	**2.63**
6	Water Absorption = [(w1 - w3) / w3] x 100 (%)	0.44	0.60	**0.52**

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Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

AGGREGATE IMPACT VALUE (IS : 2386 , PART IV),1963

Sample Location: 350+000 LHS & 385+000 LHS (From Wangjing village to (via Machi village) appx Km.45 Lead)

Source of Material :Quarry Material

Description of Sample : Testing Date : 16.10.13

Test No.	1	2	3
Mass of Aggregates (Oven dry) passing IS Sieve 12.5 mm and is retained on IS Sieve 10.0 mm (Wa) (gm)	305	308	305
Mass of Fraction retained on IS Sieve 2.36 mm (Wb) (gm)	270	273	270
Mass of Fraction passing IS Sieve 2.36 mm (Wc) = Wa - Wb (gm)	35	35	35
A.I.V. = Wc / Wa x 100 (%)	11.48	11.36	11.48
Average A.I.V. (%)	**11.44**		
Remarks :			

Geo-Technical Laboratory
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Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Aggregate Stripping Value(IS:6241)

Sample Location: 350+000 LHS & 385+000 LHS (From Wangjing village to (via Machi village) appx Km.45 Lead)

Date of Testing: 21.10.13

S.No.	Description	Trial 1	Trial 2
1	Size of Aggregates	20 to 12.5mm	
2	Temperature of Aggregate at mixing	160°	
3	Temperature of Bitumen at mixing	150°	
4	Constant temperature of the water bath maintained	40º	
5	Observation made after 24 hours of water submergence	Yes	
6	Grade of Bitumen Used	VG-30	
7	Wt.of agg taken, g	200	
8	Wt.of Bitumen added, g	10	
10	Coating Retained	100%	100%
11	Stripping Value	100%	100%

Remarks: Specification Limit as per MORTH Table 500-14:Retained Coating ≥ 95%

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Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SIEVE ANALYSIS (IS: 383)

(FOR COARSE AGGREGATE)

Source of Material : Santosh Stone Crusher(309+000 LHS)

Description of Sample : Crusher Material(River Boulder)

Wt. Of Sample : 12428 gms Date of Testing : 12.09.13

Nominal Size: 40 mm

I.S. Sieve (mm)	Weight Retained (g)	Percentage Retained	Cumulative Percentage Retained	Percentage Passing	Percentage Passing for Single sized aggregate of nominal size as per table 2 of IS: 383			
					40mm	20mm	12.5mm	10mm
63mm	0	0	0	0	100	100	100	100
40mm	0	0.00	0.00	100.000	85 - 100	100	100	100
20mm	10748	86.48	86.48	13.518	0 - 20	85 - 100	100	100
16mm		0.00	86.48	13.518	-	-	100	100
12.5mm		0.00	86.48	13.518	-	-	85 - 100	100
10mm	1680	13.52	100.00	0.000	0 - 5	0 - 20	0 - 45	85 - 100
4.75mm	0	0.00	100.00	0.000	-	0 - 5	0 - 10	0 - 20
Total	12428							

Remarks :

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Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SIEVE ANALYSIS (IS: 383)

(FOR COARSE AGGREGATE)

Source of Material : Santosh Stone Crusher(309+000 LHS)

Description of Sample : Crusher Material(River Boulder)

Wt. Of Sample : 11604 gms

Date of Testing : 12.09.13

Nominal Size: 20 mm

I.S. Sieve (mm)	Weight Retained (g)	Percentage Retained	Cumulative Percentage Retained	Percentage Passing	Percentage Passing for Single sized aggregate of nominal size as per table 2 of IS: 383			
					40mm	20mm	12.5mm	10mm
63mm	0				100	100	100	100
40mm	0	0.000	0.000	100.000	85 - 100	100	100	100
20mm	8992	77.491	77.491	22.509	0 - 20	85 - 100	100	100
16mm		0.000	77.491	22.509	-	-	100	100
12.5mm		0.000	77.491	22.509	-	-	85 - 100	100
10mm	2470	21.286	98.776	1.224	0 - 5	0 - 20	0 - 45	85 - 100
4.75mm	142	1.224	100.000	0.000	-	0 - 5	0 - 10	0 - 20
Total	11604							

Remarks :

Geo-Technical Laboratory,
Sheladia Associates Inc., USA,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SIEVE ANALYSIS (IS: 383)

(FOR COARSE AGGREGATE)

Source of Material : Santosh Stone Crusher(309+000 LHS)

Description of Sample : Crusher Material(River Boulder)

Wt. Of Sample : 6300 gms

Date of Testing : 12.09.13

Nominal Size: 10 mm

I.S. Sieve (mm)	Weight Retained (g)	Percentage Retained	Cumulative Percentage Retained	Percentage Passing	Percentage Passing for Single sized aggregate of nominal size as per table 2 of IS: 383			
					40mm	20mm	12.5mm	10mm
63mm	0				100	100	100	100
40mm	0	0.000	0.000	100.000	85 - 100	100	100	100
20mm	0	0.000	0.000	100.000	0 - 20	85 - 100	100	100
16mm	0	0.000	0.000	100.000	-	-	100	100
12.5mm	0	0.000	0.000	100.000	-	-	85 - 100	100
10mm	1754	27.841	27.841	72.159	0 - 5	0 - 20	0 - 45	85 - 100
4.75mm	4546	72.159	100.000	0.000	-	0 - 5	0 - 10	0 - 20
Total	6300							

Remarks :

Geo-Technical Laboratory,
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Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SPECIFIC GRAVITY AND WATER ABSORPTION (IS : 2386 , PART 3)

Source of Material : Santosh Stone Crusher(309+000 LHS)

Description of Sample : Crusher Material(River Boulder)

Aggregate size : 40mm 20mm 10mm Testing Date :13.09.13

Specific Gravity of Coarse Aggregates - BASKET METHOD

Nominal Size of Agg. 40mm 20mm 12.5/10mm

sno	Description	1	2	3	Remarks
1	Weight of S.S.D. Aggregate in Air (w1) (gm)	2990	2756	1639	
2	Weight of S.S.D. Aggregate in Water (w2) (gm)	1855	1704	1004	
3	Weight of Oven Dried Aggregate in Air (w3) (gm)	2960	2728	1620	
4	Bulk Specific Gravity = w3 / (w1 - w2)	2.61	2.59	2.55	
5	Apparent Specific Gravity = w3 / (w3 - w2)	2.68	2.66	2.63	
6	Water Absorption = [(w1 - w3) / w3] x 100 (%)	1.01	1.03	1.17	

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

FLAKINESS AND ELONGATION INDICES (IS : 2386 , PART I),1963

Source of Material : Santosh Stone Crusher(309+000 LHS)

Testing Date : 17.09.13

Description of Sample : Crusher Material(River Boulder)

Sieve Size (mm)		Weight Retained (gm) (A)	Weight of Agg. Retained on Thickness Guage (gm) (B)	Weight of Agg. Passing Thickness Guage (gm) ©	Weight of Agg. Retained on Length Guage after retaining onThickness Guage (gm) (D)	Remarks (No of Pieces)
Passing	Retained					
63.0	50.0	0	0	0	0	0
50.0	40.0	0	0	0	0	0
40.0	25.0	5681	4485	1196	0	200
25.0	20.0	3252	2879	373	551	200
20.0	16.0	1824	1649	175	485	200
16.0	12.5	398	348	50	168	85
12.5	10.0	332	218	114	63	200
10.0	6.3	126	65	61	39	200
TOTAL		11613	9644	1969	1306	

Combined Flakeness and Elongation Indices = (E / C)*100 + (F / D) * 100 = 30.50

Remarks:

Geo-Technical Laboratory,
Sheladia Associates Inc., USA,
Plot No-28, Jaibharat Housing Co-operative Colony,
Dairy Farm Road, Lal Bazar,
Tirumalghery, Secunderabad

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

AGGREGATE IMPACT VALUE (IS : 2386 , PART IV),1963

Source of Material : Santosh Stone Crusher(309+000 LHS)

Testing Date : 17.09.13

Description of Sample : Crusher Material(River Boulder)

Test No.	1	2	3
Mass of Aggregates (Oven dry) passing IS Sieve 12.5 mm and is retained on IS Sieve 10.0 mm (Wa) (gm)	327	331	326
Mass of Fraction retained on IS Sieve 2.36 mm (Wb) (gm)	289	287	286
Mass of Fraction passing IS Sieve 2.36 mm (Wc) = Wa - Wb (gm)	38	44	40
A.I.V. = Wc / Wa x 100 (%)	11.62	13.29	12.27
Average A.I.V. (%)	**12.39**		
Remarks :			

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Aggregate Stripping Value(IS:6241)

Source of Material : Santosh Stone Crusher(309+000 LHS)

Description of Sample : Crusher Material(River Boulder) Date of Testing: 21.10.13

S.No.	Description	Trial 1	Trial 2
1	Size of Aggregates	20 to 12.5mm	
2	Temperature of Aggregate at mixing	160°	
3	Temperature of Bitumen at mixing	150°	
4	Constant temperature of the water bath maintained	40º	
5	Observation made after 24 hours of water submergence	Yes	
6	Grade of Bitumen Used	VG-30	
7	Wt.of agg taken, g	200	
8	Wt.of Bitumen added, g	10	
9	Stripping Percentage	0%	0%
10	Coating Retained	100%	100%
11	Stripping Value	100%	100%

Remarks: Specification Limit as per MORTH Table 500-14:Retained Coating ≥ 95%

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Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

SIEVE ANALYSIS (IS: 383)

(FOR FINE AGGREGATE)

Source of Materials : Thoubal River
Description of sample : River Sand
Wt. Of Sample : 2000 gms

Date Tested : 17.09.13

I.S. Sieve (mm)	Weight Retained (gm)	Weight Retained (%)	Cumulative weight Retained (%)	Percentage Passing for				
				Passing %	I.S. Requirement for			
					Zone-I	**Zone-II**	Zone-III	Zone-IV
10	0	0.00	0.00	100.00	100	100	100	100
4.75	241.07	12.07	12.07	87.93	90 - 100	90 - 100	90 - 100	95 - 100
2.36	343.99	17.22	29.29	70.71	60 -95	75 - 100	85 - 100	95 - 100
1.18	241.1	12.07	41.35	58.65	30 - 70	55 - 90	75 - 100	90 - 100
0.6	118.11	5.91	47.27	52.73	15 - 34	35 - 59	60 - 79	80 - 100
0.3	361.64	18.10	65.37	34.63	5 - 20	8 - 30	12 - 40	15 - 50
0.15	549.35	27.50	92.86	7.14	0 -10	0 - 10	0 - 10	0 - 15
0.075	135.77	6.80	99.66	0.34	Maximum 3%			
Pan	6.78	0.34	100.00	0	----			
Total	1997.81				----			
Fineness Modulus (In Ratio)				**2.88**	2 - 3.5			

Silt Content : 5.9% by weight

Remarks :

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Specific Gravity of Fine Agggregate - Pycnometer Method

(FOR FINE AGGREGATE)

Source of Materials : Thoubal River
Description of sample : River Sand
Wt. Of Sample : 500 g

Date Tested : 20.09.13

S.No	Description	Sample 1	Sample	Remarks
1	Mass of S.S.D Aggregate in Air (gm)	502	503	
2	Mass of Oven Drried Aggregate in Air (gm)	485	486	
3	Mass of Pycnometer bottle filled twith water (gm)	1522	1521	
4	Mass of Pycnometer bottle + water+Sample (gm)	1841	1845	
5	Bulk Specific Gravity	2.65	2.72	2.68
6	Apparent Specific Gravity	2.92	3.00	2.96
7	Water Absorption (%)	**3.51**	**3.50**	3.50

Project Name: Indo-Mayanmar Road Section from Imphal-Moreh (TA No.8116-IND)

Bulk Density (IS:2386)

(FOR FINE AGGREGATE)

Source of Materials : Thoubal River

Description of sample : River Sand

Date Tested : 18.09.13

S.No	Description	Sample 1	Sample2	Remarks
1	Weight of Empty Cylinder (gm)	3416	3416	
2	weight of Cylinder with sample (gm)	8521	8513	
3	Weight of sample (Loose) (W) (gm)	5105	5097	
4	Volume of the Cylinder (V) (cc)	3003	3003	
5	Bulk Density of Sample(W/V) (gm/cc)	1.700	1.697	
6	Average Bulk Density of sample (gm/cc)	1.699		