BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, NEW DELHI
ORIGINAL APPLICATION NO. 596 OF 2025

IN THE MATTER OF:

National Media Centre Co-operative House Building Society Ltd. & Ors. …Applicant(s)

Versus

State of Haryana & Ors. ….Respondent(s)

N.D.O.H.: 10.04.2026

INDEX FOR VOLUME-IV

S.NO	PARTICULARS	PAGES
6.	**ANNEXURE-R2 (COLLY)** Copies of the 1st EIA Report and 2nd EIA Report submitted by DLF.	592 – 790

FILED BY:

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PLACE: NEW DELHI
DATED: 30.03.2026

LIST OF FIGURES

LIST OF TABLES

1 Introduction

1.1 Background

DLF intends to develop A-Grade office complex along with a mall as an extension of Cyber City in Sector 25A of Gurgaon. Sector 25A is located along NH 8 near Delhi Haryana Border and can be accessed through NH 8 service road. Location of the site is critical due to prevailing traffic congestion. Considering this DLF intends to understand the impact on traffic flowing at present and once the Downtown is operational along with measures that can be adopted for smooth entry and exit. Considering this DLF has appointed AECOM to carry out traffic study and give recommendations.

1.2 Study Context

Understanding the impact on existing transport network due to proposed development it is important to understand the future efforts required to enhance the road network connectivity to the proposed development. Considering the scale of development, huge amount of traffic will be generated and this may require the augmentation of existing network in terms of road widening, location of basement entry and exit ramps, drop off locations, cab/ taxi halting areas and other traffic management measures.

1.3 Study Area

As described above the Study Area for present assignment will include site of proposed DLF Down-Town located in Sector 25A and surrounding network involving NH-8 service road, access to surrounding properties, internal network of Moulsari Avenue.

1.4 Scope of Work

The scope of work as per Terms of Reference (TOR) is as follows:

External Traffic Analysis

- Undertake data collection, traffic count, traffic movement, peak traffic flows and traffic type.
- Review the impact of traffic movements of adjoining developed sites.
- Review, advise and analyse proposed traffic generation of the site, its impact on the local infrastructure and preferred traffic management solutions for reducing traffic congestion.
- Provide advice and design solutions on the integration of the nearby Rapid Metro Stations including pedestrian movement considerations between this site and other nearby points of interest.

Internal Traffic Analysis

- Review and advise internal road design including ramps, parking, cross grades, traffic circulation, drop-off areas, integration and

location of basement parking ramps, roundabouts, queuing lengths, ingress and egress to site.

Concept Design

During the Concept Design, the Traffic Consultant is responsible for the following tasks:

- Full analytical Traffic Analysis both internal and external to the site.
- Review and propose solutions with respect to integration with the Rapid Metro and pedestrian movement to this site and adjacent sites.
- Undertake traffic counts, existing condition analysis and assessment of surrounding properties traffic movements and possible impact on development site.
- Provide necessary advice for internal traffic management and car-park maximisation.
- Provide necessary advice and drawings at the Concept Design Stage for any proposed modifications to the external traffic network.

Schematic Design

- Ensure Traffic Consultants requirements are incorporated in the Architectural Schematic Design.

Design Development

- Prepare a Final Traffic Report that incorporates all key elements and design decisions/ implications from a Traffic Management perspective.
- Ensure design development for their area of responsibility meets the functional requirements of the brief and is in accordance with the project budget.

1.5 Structure of Report

The report is structured into 6 Chapters as per following

i) Chapter 1-Indroduction: presents an introduction to the study and context;

ii) Chapter 2-Study Area Characteristics: describes the characteristics of Site in terms of area, land use, population, employment, existing connectivity, etc;

iii) Chapter 3- Issues and Concerns: describes the critical bottlenecks and capacity analysis of surrounding network;

iv) Chapter 4- Traffic Circulation Options: describes options for traffic circulation;

2 Study Area Characteristics

2.1 Location and Surrounding

DLF Down-Town is proposed to be developed in Sector 25A of DLF City Phase-3 in Gurgaon. The site is located adjacent to Ambience Mall on NH 8. Site can be accessed through NH 8. Refer **Figure 2-1**.

Figure 2-1 Location of Cyber Park

2.2 Surrounding Developments

Surrounding developments include Ambience Mall located adjacent to Downtown Site. DLF City Phase 3 Road (Maulsari Rd.) is the main external roads serving the project site, connect to National Highway 48 (NH 48) to the west and National Highway 148A (NH 148A) to the south.

Rapid Metro Station is located immediately south of project boundary, it is already operational and connects to Delhi's Yellow Metro Line at Sikanderpur Station. Within 400m, there is bus stop to the other areas of Gurgaon City.

Figure 2-2: Proposed Developments

The proposed site area is 36.36-acre and will be developed in two phase. Phase-I will comprise of MLCP, Building-2, Building-3 and Building-4. Phase-II will comprise of Mall of India, Gurgaon.

Table 2-1 Details of Phase-I and Phase-II

Phase	Built-Area (sq.mt)
Phase-I	230122
Phase-II	485511

2.3 Existing Circulation

Both Cyber City and DT are located on NH 48, Left side towards Jaipur. Prime access is provided though the NH 48 Service Road. For accessing DT from Jaipur Side, Under Ground U Turn near Ambience Mall shall be used. For exiting towards Delhi, elevated U turn near DLF Square shall be used.

Figure 2-3 Downtown – Existing Access

3 Issues and Concerns

3.1 Background

Once operational, Downtown will further add traffic to already congested NH-8 Service Road. Therefore, in order to frame proposals a broad traffic generation analysis was carried out along with ground counts for understanding the actual traffic flow. The total traffic generation will help in finding out the critical locations and accordingly solutions will be framed.

3.2 Traffic Flows

3.2.1 Existing Traffic Flows and Network Analysis

Based on currently available traffic count data, it is understood that traffic levels in 2018 were as shown in **figure below**.

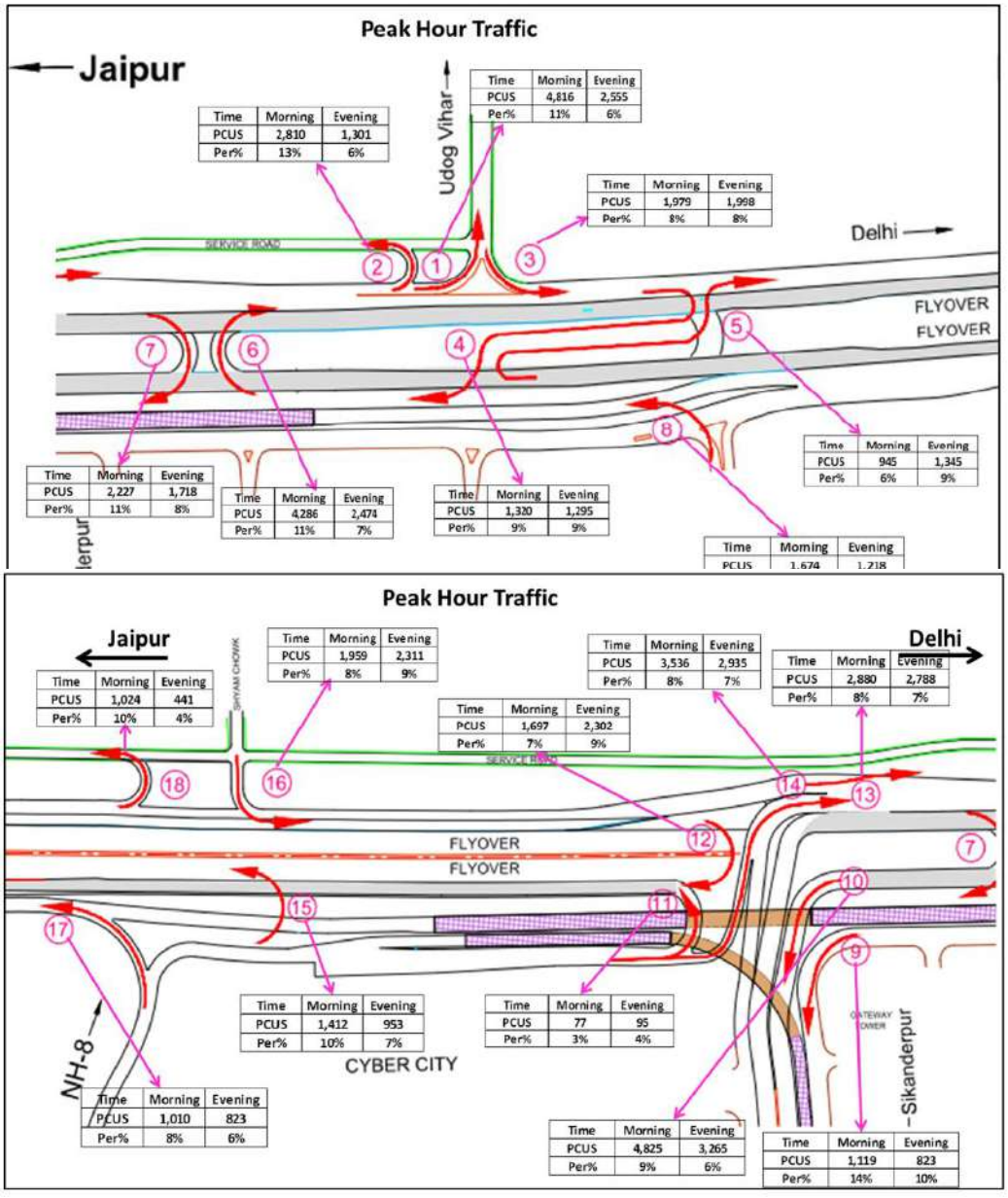


Figure 3-1 Peak Hour Traffic (2018)

As per IRC-106, the maximum amount of traffic that can pass along a single traffic lane in free flow conditions is 1,200 PCUs per hour.

On review of this information, the existing traffic in peak hour for NH-8 service road towards Gurgaon is found to be 6304 PCU.

3.2.2 Estimation of Development Traffic Flows

Based on the current development proposals, it is understood that peak hour traffic demand for the development will be in accordance with **Table 3-1** below.

Table 3-1 Total Traffic Generation (in PCU)

Type of Mode	Phase-I and II	
	Employee Traffic	Visitor Traffic
Cars	5941	2788
Cabs	4754	2233
Company Operated Buses	2848	1020
P T Buses	838	158
Auto Rickshaw	5034	2920
Total Traffic in PCU	**19415**	**9119**

The peak hour share for each land-use is given **Table 3-2**

Table 3-2 Predicted Development Peak Hour Share

Land-use Type	Morning Peak Hour Share		Evening Peak Hour Share	
	Employee	Visitor	Employee	Visitor
Commercial Offices	35%	5%	35%	2%
Retail	25%	2%	20%	2%
Hotels	15%	2%	20%	2%

The morning and evening peak hour traffic flow for the proposed site in terms of PCUs is given in **Table-3-3**

Table 3-3 Predicted Development Peak Hour Traffic (in PCU)

Type of Mode		Peak Hour Share	Cars	Cabs	Company Operated Buses	P T Buses	Auto Rickshaw	Total Traffic in PCU
Commercial Offices	Employee	Morning	2079	1664	997	243	1597	6580
	Visitor		9	8	0	2	7	26
	Employee	Evening	2079	1664	997	243	1597	6580
	Visitor		9	8	0	2	7	26
Retail	Employee	Morning	0	0	0	29	94	123
	Visitor		47	37	20	3	51	158
	Employee	Evening	0	0	0	29	94	123
	Visitor		47	37	20	3	51	158
Hotels	Employee	Morning	0	0	0	0	0	0
	Visitor		2	2	1	0	2	7
	Employee	Evening	0	0	0	0	1	1
	Visitor		1	0	0	0	1	2

The morning and evening peak hour traffic generated by the development will be 6894 PCU and 6890 PCU respectively.

It is understood that the above types of traffic will be accommodated in different ways as follows:

- Cars will access the car parking within the basement of the development.
- Taxis and buses will all use the pickup – drop off facilities at the ground level of the development.
- There will be no facilities within the site to accommodate auto rickshaws.

On this basis, **Table 3-4** shows the distribution of traffic within the site.

Table 3-4 Predicted Development Peak Hour Traffic Flows in Parking

Type of Mode	Morning Peak Traffic (PCUs)	Evening Peak Traffic (PCUs)
To Basement Parking	2137	2136
To Pick Up / Drop Off	2729	2726
Total Traffic (PCUs)	**4866**	**4862**

The access options for the development has been considered on the basis of the above assessment of expected traffic flows.

3.3 Issues and Conclusions

In order to move forward critical locations are required to be identified where network improvement proposals will be worked out. Some of the conclusions of above analysis and issues are summarised below:

- The prime access of Site is from NH-8.
- The NH-8 service road towards Gurgaon carries heavy traffic.
- Entry into the Downtown has to be controlled by providing kerb separator.
- Right turn on the road opposite to the proposed entry has to be restricted.
- Exit has to be planned such so that traffic smoothly exits on NH 8 thereby reducing the probability of congestion inside the site during evening peak hours.

4 Proposed Traffic Circulation

4.1 Background

The chapter considers the potential access option for the development. The option that have been developed have used the assumptions set out in the previous sections of this report as a starting point to develop access and egress options for the Downtown and provide a discussion of the limitations of each option in light of these assumptions.

DLF has provided a number of directives on what could be considered as part of any optioneering process and as such, AECOM have not considered the following:

- Any construction of highway infrastructure off-site and not directly associated with the development (for example, additional highway links, bypasses, new public highway).
- Any design requiring third party land away from the immediate vicinity of the development site.

AECOM has explained to DLF that the above stipulations significantly reduce the opportunity to resolve the potential traffic flow issues.

4.2 Recommendations

This option provides a minimum intervention approach and seeks to retain as much of the currently proposed infrastructure in the latest designs, whilst considering how the expected levels of traffic can better be accommodated.

The internal circulation within the site is one-way proposal with only one entry for both Downtown and Mall of India. The traffic circulation within the Downtown building will be in clockwise direction whereas, the traffic circulation in Mall of India will be in anti-clockwise direction Refer **Figure 4-1.**

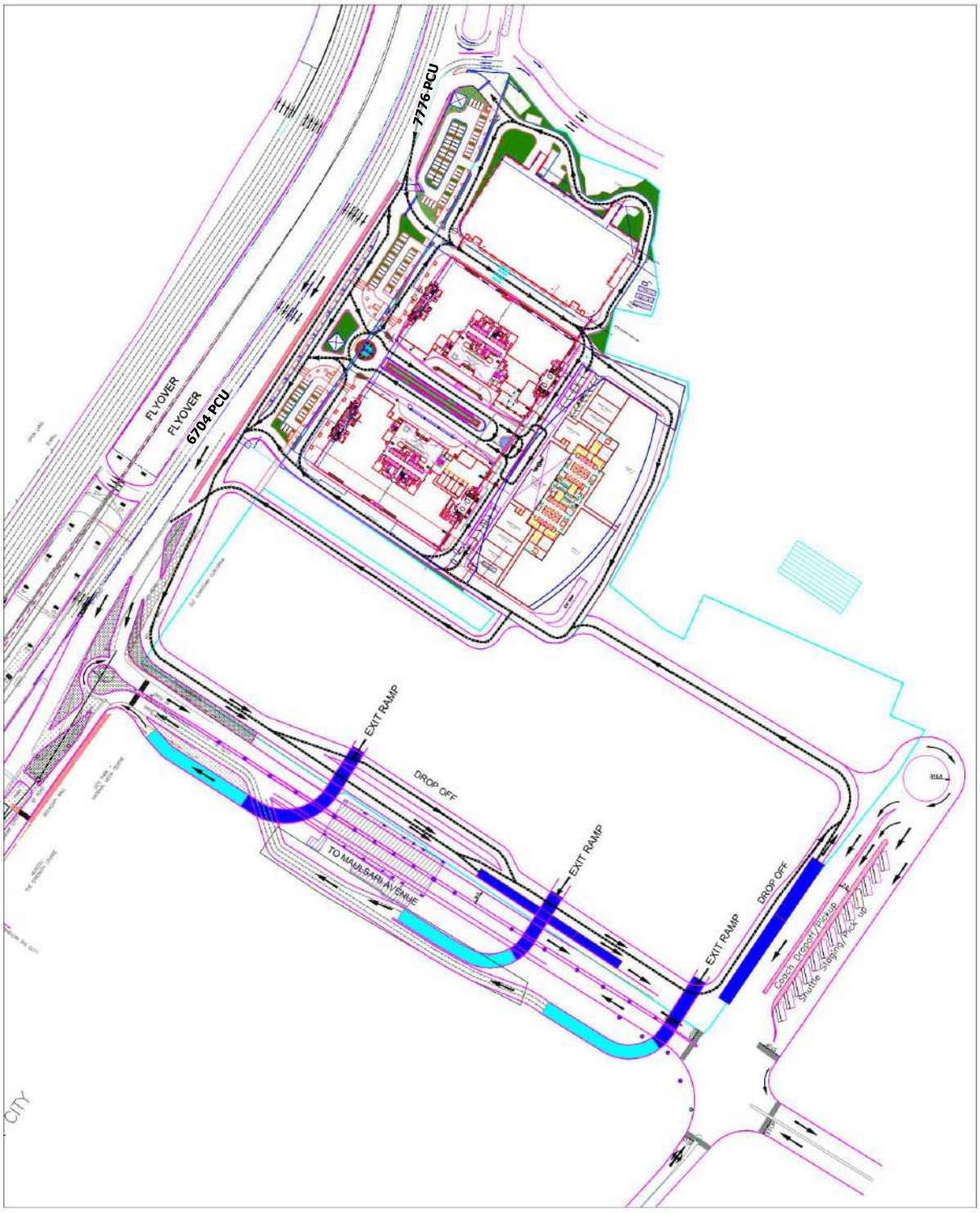


Figure 4-1 Traffic Circulation

4.2.1 Development Access Junctions and Internal Traffic Circulation for Downtown

At this stage, the inbound junction has been shown as 11m wide road as per the existing proposals. The benefit of retaining 11m wide road is that it provides an opportunity for vehicles to appropriately position themselves to turn into either a route for the pickup/ drop off area or for the car park as shown in **Figure 4-1**

and Figure 4-2. The outbound junction has also been shown as 11m wide road as per the existing layout. Refer **Figure 4-1.**

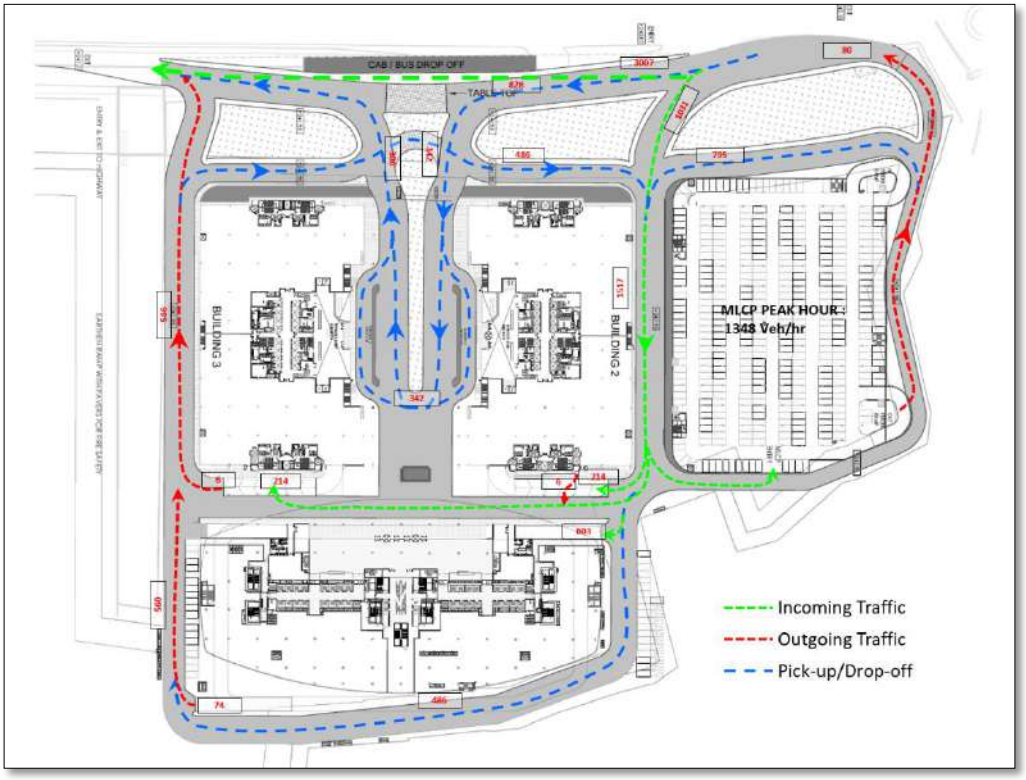


Figure 4-2 Morning Peak Hour Traffic Circulation for Downtown

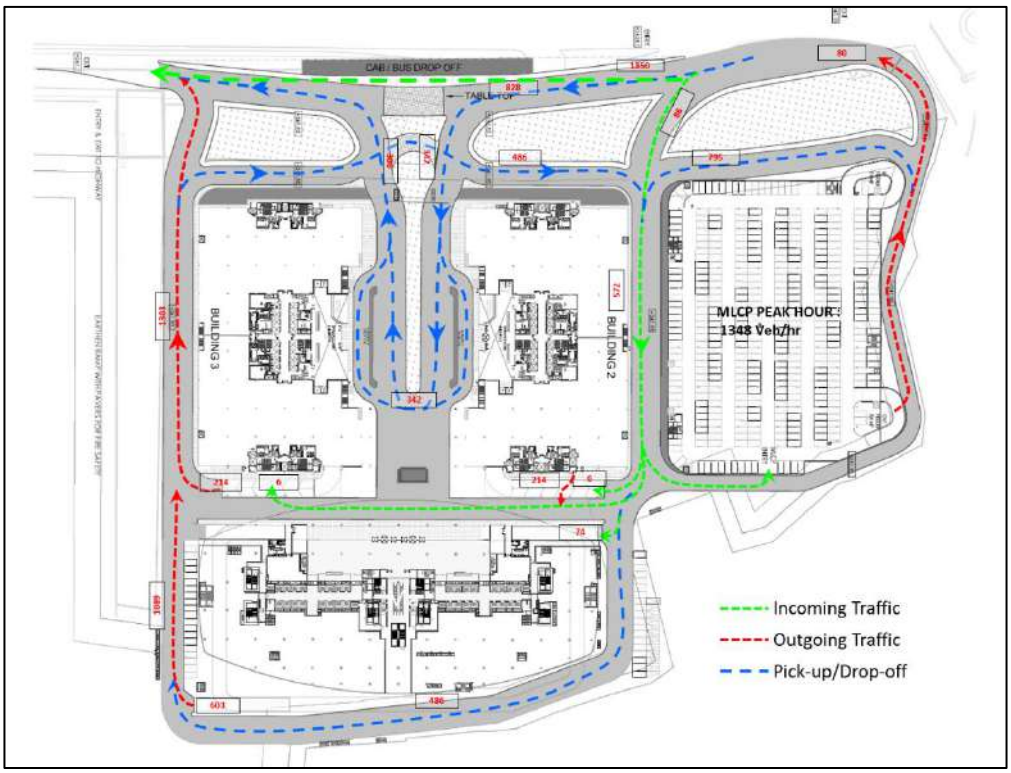


Figure 4-3 Evening Peak Hour Traffic Circulation for Downtown

4.2.2 Development Access Junctions and Internal Traffic Circulation for Downtown

The traffic for Mall of India will come from single entry passing the entry and exit of Downtown and will enter through 12m wide ramp as per the existing proposals. The traffic circulation for the Mall of India will be in anti-clockwise direction. The cars will access the car parking within the basement of the development and will leave the development on the Moulsari Avenue Road from the underground ramps.

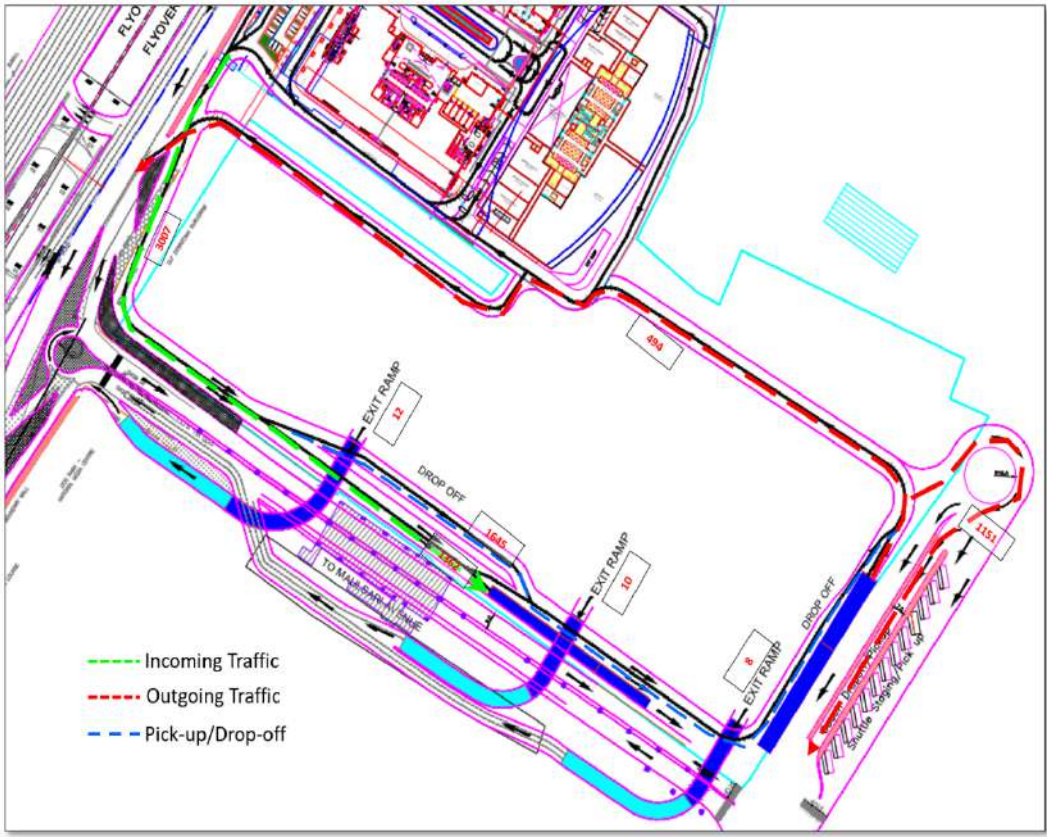


Figure 4-4 Morning Peak hour Traffic Circulation for Mall of India

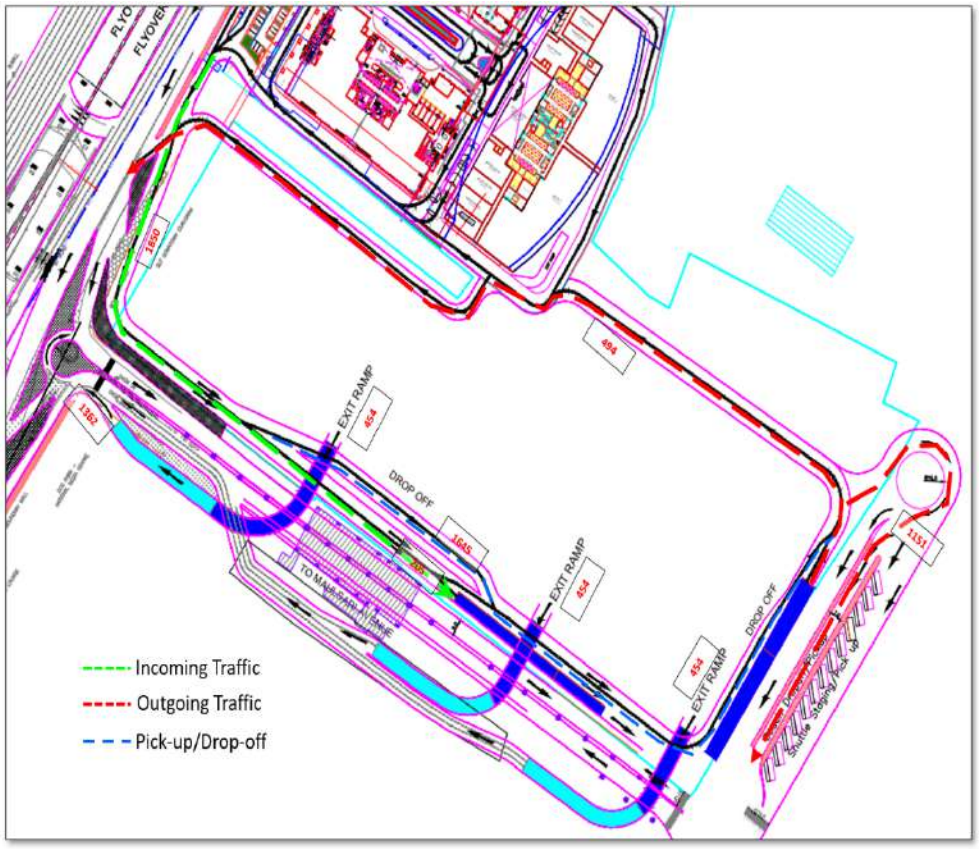


Figure 4-5 Evening Peak hour Traffic Circulation for Mall of India

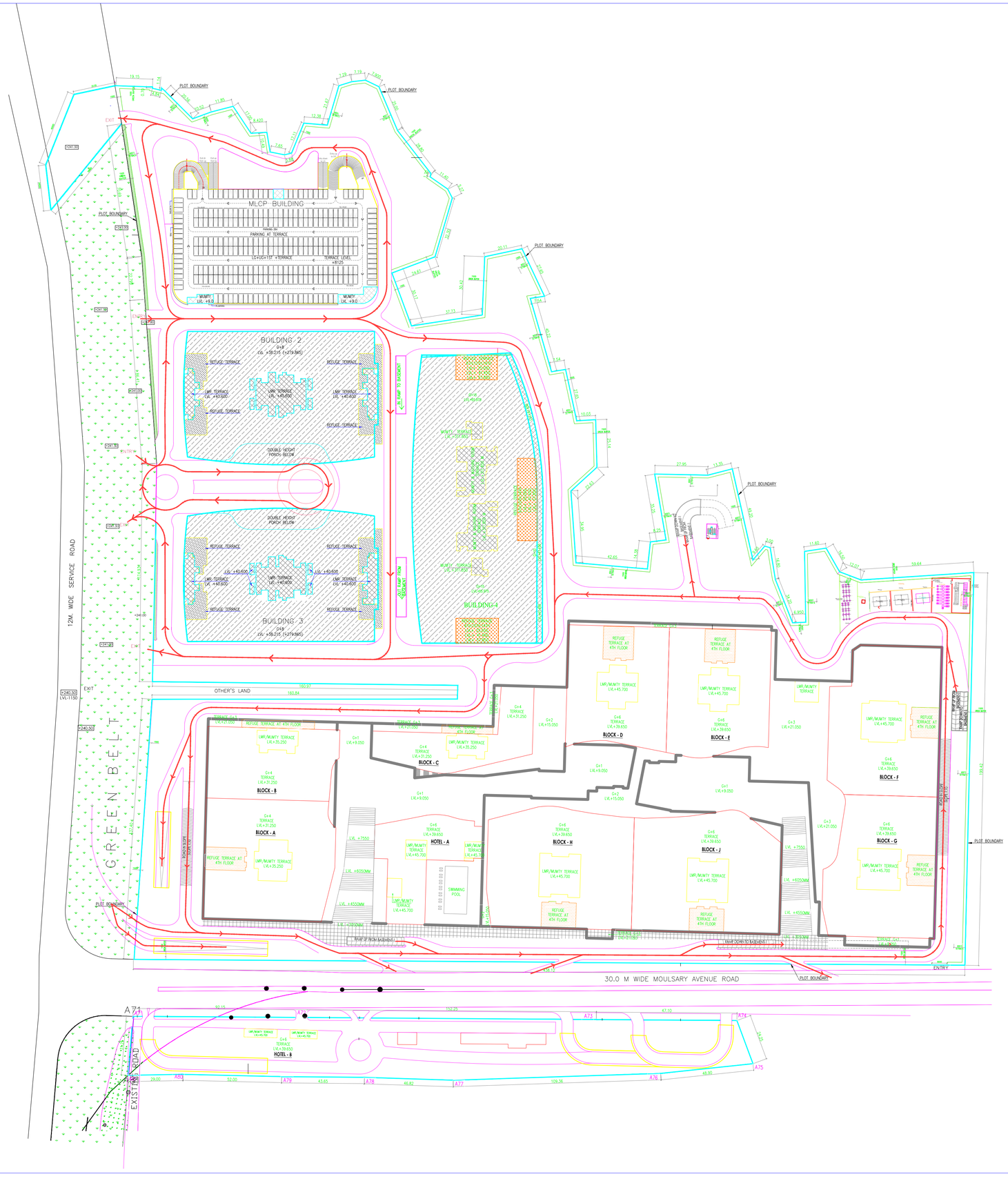
4.3 Impact Assessment

Traffic estimated in the previous section for proposed development will be added to the projected normal traffic of NH-8. It will be then assigned on the horizon year network to understand the capacity augmentation requirements.

Table 4-1 Impact Assessment for Proposed Site

Location	Volume	Capacity	V/C	LOS
NH-8	6300	8400	0.75	C
Capacity at Morning Peak Hour	13194	15400	0.86	D
Capacity at Evening Peak Hour	13190	15400	0.86	D

After the proposed development the Level of Service on the NH-8 service road will be D



Note :-

1. BUILDING HAS AUTOMATIC SPRINKLER SYSTEM WHEREVER REQUIRED BY NBC.
2. BUILDING WILL BE DESIGNED (STRUCTURES) AS PER RELEVENT IS CODES FOR EARTH QUAKE RESISTANCE.
3. BUILDING IS ARTIFICIALLY LIGHTED MECHANICALLY VENTILATED & CENTRALLY AIRCONDITIONED WITH 100% POWER BACKUP

ARCOP ASSOCIATES PVT. LTD.
Plot no – 36B, Sector – 32
Gurgaon, Haryana – 122001
Tel : +91-124-4595500

Project:

PROPOSED /REVISED BUILDING PLAN OF COMMERCIAL
COLONY AREA MEASURING 32.36 ACRES PART OF RESIDENTIAL PLOTTED COLONY NAMELY DLF CITY,PHASE I,II &III AND INDEPENDENT COMMERCIAL COLONY 4.00 ACRES (LICENCE NO.59 OF 2018
DATED 07.09.2018) BY MAKING TOTAL AREA MEASURING 36.36 ACRES UNDER TOD ZONE IN SECTOR -24 & 25A GURUGRAM MANESAR URBAN COMPLEX BEING DEVELOPED BY DLF LIMITED AND OTHERS.

OWNER: DLF LIMITED
(THE SHOPPING MALL COMPLEX ,ARJUN MARG, DLF CITY,PHASE-I ,GURGAON – 122002 , HARYANA.)

DRAWING TITLE:–

SITE PLAN

TRAFFIC CIRCULATION PLAN

REVISION	JOB NO:–	DRG NO.	NORTH:–
	SCALE:–	DATE:–	
FILE:–	DEALT BY:–	CHECKED BY:	APPROVED BY:–
ARCHITECT'S SEAL & SIGNATURE		OWNER'S SEAL & SIGNATURE	

ANNEXURE – 6

Geotechnical Investigation Report

Report by :

CENGRS GEOTECHNICA PVT. LTD.
SOIL AND FOUNDATION EXPERTS

Final Report on:

Geotechnical Investigation for Proposed DLF Downtown Commercial Complex at NH-8, Gurugram, Haryana

Submitted to:

M/s. DLF City Centre Limited
2nd Floor, DLF Gateway Tower, Cyber City, Phase-III, Gurgaon-122 002, Haryana

Project No. 219055 | Date: 10th September, 2019 | Revision: 2

10th September, 2019 Project No. 219055-R2

M/s. DLF City Centre Limited
2nd Floor, DLF Gateway Tower
Cyber City, Phase-III
Gurgaon-122 002, Haryana

Kind Attention: **Mr. Vinay Gambhir**

Subject: **Geotechnical Investigation for Proposed DLF Downtown Commercial Complex, at NH-8, Gurugram, Haryana.**

We have carried out the captioned study in accordance to our proposal for the captioned project vide letter No. DCCL/CGPL/CWO-002/MOIG/19 dated 4th June, 2019. We thank you for your business, and hope that you are satisfied with our services rendered.

This report presents the field and laboratory test data, along with our geotechnical engineering recommendations, which shall help you in deciding the optimum foundation arrangement for use on site.

We have prepared this report based on our findings on site, as well as our experience gained in over 6000 projects completed over the past 29 years. We welcome you to involve us during the detailed foundation design, construction and testing phases, so that we may serve you better.

We are pleased to have been of service to you on this project and will be glad to consult further with you and your design team.

Yours faithfully,
CENGRS GEOTECHNICA PVT. LTD.

Sanjay Gupta
Managing Director

Ravi Sundaram
Director

EXECUTIVE SUMMARY

<table>
<tr><th>Topic</th><th colspan="4">Summary of Results</th></tr>
<tr><td>Project Name
(Refer Section 1.1)</td><td colspan="4">Geotechnical Investigation for Proposed DLF Downtown Commercial Complex at NH-8, Gurugram, Haryana.</td></tr>
<tr><td>Location</td><td colspan="4">Gurugram, Haryana</td></tr>
<tr><td>Scope of Work
(Refer Section 1.3)</td><td colspan="4">Drilling five (5) boreholes up to 40-60 m depth</td></tr>
<tr><td rowspan="7">Stratigraphy
(Refer Section 4.3)</td><td rowspan="2">Stratum</td><td colspan="2">Depth,m</td><td rowspan="2">Description</td><td rowspan="2">Range of N-Values</td></tr>
<tr><td>From</td><td>To</td></tr>
<tr><td>1</td><td>0</td><td>3</td><td rowspan="4">Sandy silt</td><td>8-11</td></tr>
<tr><td>2</td><td>3</td><td>6</td><td>14-24</td></tr>
<tr><td>3</td><td>6</td><td>10</td><td>29-36</td></tr>
<tr><td>4</td><td>10</td><td>16</td><td>37-46</td></tr>
<tr><td>5</td><td>16</td><td>28</td><td>Silty fine sand</td><td>48-80</td></tr>
<tr><td>6</td><td>28</td><td>60</td><td>Sandy silt</td><td>85-100+</td></tr>
<tr><td>Groundwater
(Refer Section 4.4)</td><td colspan="4">Groundwater was not met at the time of our field investigation (May-June, 2019)</td></tr>
<tr><td>Liquefaction Susceptibility Assessment
(Refer Section 5.2)</td><td colspan="4">Liquefaction is not likely to occur in event of earthquake.</td></tr>
<tr><td>Foundation Recommendations
(Refer Section 5.6)</td><td colspan="4">As per information provided to us the area has been divided into three block (Block-2, 3 &4), the proposed development shall consist of G+10 to 11 upper storeys with 5 basements in Block-4. As conveyed to us, the basement floor slab will be at about 27.5 m below existing ground level (RL-213.0m) in Block-4, foundation level for Block-2&3 at 7.5 m depth (RL-233.0 m) and foundation level for STP at 14 m depth (RL-226.5). We suggest that isolated beam with connecting beams/raft foundations be provided to support the structural loads of the multi-storeyed towers. As per the drawing provided to us the finished ground level considered as RL-236.8 m.

For lightly loaded structures, isolated foundations with interconnecting beams may be provided at 1.5-2.0 m depth.

Please refer to Section 5.6 for our recommendation on isolated foundation and raft foundations.</td></tr>
<tr><td>Foundation Construction Considerations
(Refer Section 6.0)</td><td colspan="4">Please refer to Section 6.0 of this report for general foundation construction considerations on excavation, foundation level preparation and chemical attack.</td></tr>
</table>

TABLE OF CONTENTS

ILLUSTRATIONS

DEFINITION OF ACRONYMS

CENGRS	Cengrs Geotechnica Pvt. Ltd.
UTM	Universal Transverse Mercator coordinates system
NABL	National Accreditation Board for Testing and Calibration Laboratories
ISO	International Standards Organization
BIS	Bureau of Indian Standards
EGL	Existing Ground Level
NGL	Natural Ground Level
RL	Reduced Level
SPT	Standard Penetration Test
NCEER	National Center for Earthquake Engineering Research
UUT	Unconsolidated undrained triaxial shear test
DS	Consolidated drained direct shear test

BIS REFERENCES

- Compendium of Indian Standard on Soil Engineering (***Part-2, Field Testing of Soils for Civil Engineering Purposes) SP36 (Part-2:1988) RA 2006***
- Compendium of Indian Standard on Soil Engineering ***(Part-1, Laboratory Testing of Soils for Civil Engineering Purposes) SP36 (Part-1:1987) RA 2006***

1.0 INTRODUCTION

1.1 Project Description

M/s. DLF City Centre Ltd. is planning to construct a commercial complex at NH-8 Gurugram, Haryana. The site is located about 150 m east of Delhi-Jaipur expressway and covers an area of approx 36.5 acres.

As per the current project planning, the proposed development shall consist of G+ 10 to 11 upper storeys with 5 basements. The total height of tower is about 40.8 m above the existing ground level. M/s. Cengrs Geotechnica Pvt. Ltd. has carried out the geotechnical investigation at the project site.

A layout plan indicating the locations of our field investigation is presented on Plate 1.

1.2 Purposes of Study

The overall purposes of this study are to conduct a geotechnical investigation to evaluate the stratigraphy at the site and to develop geotechnical recommendations for foundation design and construction.

To accomplish these purposes, the study is being conducted in the following phases:

(i) drilling five (5) boreholes to the specified depth or as instructed on site (1 borehole up to 46.5 m, 2 borehole up to 50 m, 2 borehole up to 60 m) in order to evaluate the stratigraphy at the site, and to collect soil & water samples for laboratory testing;

(ii) testing selected soil and water samples in the laboratory to determine pertinent index and engineering properties; and

(iii) analyzing all field and laboratory data to develop geotechnical recommendations for foundation and design construction.

1.3 Scope of Work

Details of the field investigations carried out at the site are tabulated below:

S. No.	Borehole Designation	UTM Coordinates, m (Zone 43-R)		Reduce Level of Boreholes, m	Borehole Termination Depth, m
		Easting	Northing		
1	BH-2	705156	3154826	240.9	50.0
2	BH-4	705143	3154816	240.5	60.0
3	BH-6	705014	3154720	240.5	46.5
4	BH-8	705167	3154673	240.5	50.0
5	BH-9	705101	3154655	240.5	60.0

- A layout plan showing locations of our field investigations is presented on Plate 1.
- The borehole locations were marked on the field by the client representative and recorded by us using a hand-held Global Positioning System (GPS). A satellite image indicating the locations (as recorded by GPS) is presented on Plate 2.

2.0 FIELD INVESTIGATIONS

2.1 Soil Boring

The boreholes were progressed using mechanized shell and auger drilling rig to the specified depth. The diameter of the borehole was 150 mm. Where caving of the borehole occurred, casing was used to keep the borehole stable. The work was in general accordance with IS: 1892-1979 RA-2007.

Standard Penetration Tests (SPT) were conducted in the boreholes at 1.5 m depth interval. The test was conducted by connecting a split spoon sampler to 'A' rods and driving it by 45 cm using a 63.5 kg hammer falling freely from a height of 75 cm. The tests were conducted in accordance with IS: 2131-1981 RA 2002. The SPT 'N'-values are described as follows:

i. The number of blows for each 15 cm of penetration of the split spoon sampler is recorded.

ii. The blows required to penetrate the initial 15 cm of the split spoon for seating the sampler is ignored due to the possible presence of loose materials or cuttings from the drilling operation.

iii. The cumulative number of blows required to penetrate the balance 30 cm of the 45 cm split spoon sampler is termed the SPT value or the 'N' value. For example, a SPT value reported as "20" means that 20 blows were imparted to penetrate the split spoon sampler by the last 30 cm.

iv. Where the number of blows required to penetrate the balance 30 cm of the split spoon sampler exceeds 100, the number of blows is presented along with the corresponding penetration. For example, an SPT value reported as "101 / 5 cm" means that 101 blows were imparted to penetrate the split spoon sampler by 5 cm after the first 15 cm initial (seating) penetration.

v. Where refusal (N>100) to further penetration of the split spoon sampler is encountered in the first 15 cm of seating penetration itself, SPT test could not be completed and "*Ref*" is indicated in the bore logs, along with the penetration achieved. For example, an SPT value reported as "Ref / 5 cm" means that more than 100 blows were imparted to penetrate the split spoon sampler by a total of 5 cm only, and the 15 cm seating penetration could not be achieved.

Disturbed samples were collected from the split spoon after conducting SPT. Undisturbed soil samples were collected by attaching 75 mm diameter thin walled 'Shelby' tubes and driving the sampler by light-hammering using a 63.5 kg hammer in accordance with IS: 2132-1986 RA 2002. The tubes were sealed with wax at both ends. Where undisturbed samples slipped from the thin wall tube during sampling, disturbed samples were collected. All samples were transported to our NABL-accredited laboratory at Noida for further examination and testing.

2.2 Groundwater

Groundwater level was measured in the boreholes after drilling and sampling was completed. The measured water levels are recorded on the individual soil profiles.

3.0 LABORATORY TESTS

The laboratory testing has been carried out in our NABL accredited laboratory. The quality procedures in our laboratory conform to ISO/IEC-17025-2005.

Laboratory tests were conducted on selected soil samples to determine their physical and engineering properties. The testing procedures were in accordance with current applicable IS specifications.

The following tests were conducted on selected soil samples recovered from the boreholes:

Laboratory Test		IS Code Referred
Bulk Density		By calculations
Natural moisture content		IS : 2720 (Part-2)-1973, RA-2010
Specific Gravity		IS : 2720 (Part-3)-1980, RA-2007
Grain size analysis		IS : 2720 (Part-4)-1985, RA-2010
Liquid Limit and Plastic Limit		IS : 2720 (Part-5)-1985, RA-2010
Unconsolidated undrained triaxial shear test		IS : 2720 (Part-11)-1993, RA-2007
Unconfined Compression Test		IS : 2720 (Part-10)-1991, RA-2006
Consolidated drained direct shear test		IS : 2720 (Part-13)-1986, RA-2010
Chemical Analysis of water*	pH value	IS : 3025 (Part-11)-1983, RA-2006
	Sulphates	IS : 3025 (Part-24)-1986, RA-2009
	Chlorides	IS : 3025 (Part-32)-1988, RA-2009
Chemical Analysis of soil*	pH value	IS : 2720 (Part 26)-1987, RA-2007
	Sulphates	IS : 2720 (Part-27)-1977, RA-2010
	Chlorides	IS : 3025 (Part-32)-1988, RA-2009

* outside NABL scope

Engineering terms used to describe soils are explained on Plate 3. A note on our NABL accreditation together with the uncertainty in laboratory measurements is presented on Plate 4.

4.0 GENERAL SITE CONDITIONS

4.1 Site Description

The site is situated at Sector-25A, Gurugram, Haryana and lies at 28°30'14.38"N latitude and 77° 5'46.10"E longitude The site is located about 150 m east of Delhi-Jaipur expressway. The site is barren land covered with minor vegetation across the site. Many sheds for temporary office and construction scrap material existing on the site.

4.2 Regional Geology

The deposits in the project area belong to the “Indo Gangetic Alluvium” and are river deposits of the Yamuna, and its tributaries. The alluvial tract[(1)] is in the nature of a synclinal basin formed concomitantly with the elevation of the Himalayas to its north. It was formed during the later stages of the Himalayan Orogeny by the buckling down of the northern border of the peninsular shield beneath the sediments thrust over it from the north.

The Pleistocene and Recent Deposits of the Indo-Gangetic Basin are composed of gravels, sands, silts and clays with remains of animal and plants. A generalized description of geological formations encountered in Gurgaon and Delhi is as follows:

(1) Krishnan, M.S. (1986), ***“Geology of India & Burma”***, CBS Publishers, New Delhi.

Period	Formation	Description
Recent	Newer Alluvium (Younger alluvium)	Unconsolidated, inter-bedded lenses of sand, silt gravel and clay confined to flood plains of Yamuna river.
Quaternary	Older Alluvium	Unconsolidated inter-bedded, inter-fingering deposit sand, clay and kankar, moderately sorted, thickness variable, at places more than 300 m.
Pre-Cambrian	Pegmatite and Quartz Veins Quartzites and minor Schist Bands	Well stratified, thick-bedded brown to buff colour, hard and compact, intruded locally by pegmatite and quartz veins inter-bedded with mica schists.

The older alluvium is rather dark colored (locally called “Bhanger”) and is generally, rich in concretions or nodules of impure calcium carbonate (kankars). The kankars are of all shapes and sizes, varying from small sand sized grains to big grains and big lumps. The age of the “Bhanger” alluvium is Middle to Upper Pleistocene.

The newer alluvium (locally called “Khadar”) is light colored and poor in concretions. It contains lenticular beds of sand and gravel as well as peat beds. It is merged by insensible gradations into the Recent or deltaic alluvia and its age is Upper Pleistocene to Recent.

4.3 Site Stratigraphy

The natural soils at the site generally consist of sandy silt about 16.5 m depth. Minor localized fill also encountered about 1.0 depth in BH-2. Below this, silty fine sand is encountered in BH- 6, 8 & 9 from 16.5 to 28.5 m depth. Below this, sandy silt is met to maximum explored depth of 40-60 m.

Field SPT values generally range from 8 to 11 to about 3.0 m depth. Below this SPT values ranges from 14-24 about 6 m depth. Below this, the field SPT values generally range from 29 to 36 to the depth of 10.0 m and from 37-46 is encountered to the depth of 16.0 m. In the underlying soils, SPT values range from 48 to 80 to about 28 m depth with some lower value and from 82 to 100+ to the final explored depth of 60.0 m.

A summary of the borehole profiles is illustrated on Plate 3. Plots of field and corrected SPT values versus depth are presented on Plate 4 & 5.

4.4 Groundwater

Based on our measurements in the completed boreholes, groundwater was not met to 60 m depth during the period of our field investigation (May-June, 2019). We anticipate groundwater level in this locality to be fairly deep.

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

5.1 General

A suitable foundation for any structure should have an adequate factor of safety against exceeding the bearing capacity of the supporting soils. Also the vertical movements due to compression of the soils should be within tolerable limits for the structure. We consider that foundation designed in accordance with the recommendations given herein will satisfy these criteria.

5.2 Liquefaction Susceptibility Assessment

Liquefaction is defined as the transformation of a granular material from a solid to a liquefied state as a consequence of increased pore-water pressure and reduced effective stress (Marcuson,1978[2]). Increased pore pressure may be induced by the tendency of granular materials to compact when subjected to cyclic shear deformation, such as in the event of an earthquake.

As per IS: 1893 (Part 1) – 2016, liquefaction is likely in loose fine sand (SP) below the water table. The following points are highlighted for the soils with regard to liquefaction susceptibility assessment:

1. The natural soils at the site generally consist of sandy silt to about 16.0 m depth. Below this, silty fine sand is encountered in BH- 6, 8 & 9 from 16.5 to 28.5 m depth. Below this, sandy silt is met to maximum explored depth of 40-60 m.

2. Field SPT-N values generally range from 8 to 24 about 6.0 m depth. Below this, SPT values exceed 24.

3. Groundwater was not met at the time of our field investigation up to maximum explored depth of 60 m (May-June, 2019).

Reviewing the soil gradation, N-values and groundwater level, we are of the opinion that the soils at this site are not likely to liquefy in the event of the design earthquake.

According to Fig.1 of IS: 1893 (Part-1)-2016 showing seismic zones, the project site falls under Zone-IV. The design for seismic forces should be done considering the project site in Zone-IV.

5.3 Foundation Type & Depth

As per information provided to us the area has been divided into three block (Block-2, 3 &4), the proposed development shall consist of G+10 to 11 upper storeys with 5 basements in Block-4. As conveyed to us, the basement floor slab will be at about 27.5 m below existing ground level (RL-213.0m) in Block-4, foundation level for Block-2&3 at 7.5 m depth (RL-233.0 m) and foundation level for STP at 10 m depth (RL-226.5). We suggest that isolated beam with connecting beams/raft foundations be provided to support the structural loads of the multi-storeyed towers. As per the drawing provided to us the finished ground level considered as RL-236.8 m.

Our recommendations for isolated foundations with connecting beams/raft foundations are presented in Section 5.6.

5.4 Concepts for Analysis

Bearing capacity analysis for raft foundations has been done in general accordance with IS: 6403-1981. The bearing capacity equation used is as follows:

$$q_{net\ safe} = \frac{1}{F}\left[cN_c\zeta_c d_c + q(N_q-1)\,\zeta_q d_q + 0.5\,B\,\gamma\,N_\gamma\zeta_\gamma d_\gamma R_w\right]$$

where:

$q_{net\ safe}$ = safe net bearing capacity of soil based on the shear failure criterion.
q = overburden pressure

(2) Marcuson, W.F. (III) (1978), "***Definition of terms related to liquefaction***", J. Geotech Engg. Div,, ASCE, 104(9), 1197-1200.

R_w = water table correction factor,
F = Factor of safety, taken as equal to 2.5 in accordance with IS: 1904-1986.
$\zeta_c, \zeta_q, \zeta_\gamma$ = Shape factors. For Strip footings, $\zeta_c = \zeta_q = \zeta_\gamma = 1$
For Square footing, $\zeta_c = 1.3$, $\zeta_q = 1.2$, $\zeta_\gamma = 0.6$
d_c, d_q, d_γ = Depth factors
For $\phi \leq 10$, $d_c = 1 + 0.2 \tan(45 + \phi/2)\, D/B$, $d_q = d_\gamma = 1$
For $\phi > 10$, $d_q = d_\gamma = 1 + 0.1 \tan(45 + \phi/2)\, D/B$

Appropriate values have been substituted into the bearing capacity equation given above to compute the safe net bearing capacity. The values have been checked to determine the settlement of the foundation under the safe bearing pressure. The allowable bearing pressure has been taken as the lower of the two values computed from the bearing capacity shear failure criterion as well as that computed from the tolerable settlement criterion.

Settlement analysis has been performed based on SPT values in accordance with Clause 9.1.4 of IS 8009 (Part 1)-1976 RA 2003 Fig.9. The values have been cross checked with the settlement computed of immediate settlement. Since water table is not encountered on the site up to maximum explored depth of 60 m. The consolidation settlement is expected to be negligible on the site.

The immediate settlement has been computed using the following equation [Clause 9.2.3 of IS 8009 Part 1-1976 RA 2003[3].

$$S_i = \frac{qB'(1-\mu^2)}{E} I d_f d_r$$

where:

S_i = immediate (elastic) settlement
B = foundation width, $B' = B/2$
μ = Poisson's ratio
q = applied bearing pressure
E = modulus of elasticity
d_f = depth factor
d_r = rigidity factor
I = influence factor at corner of rectangular loaded area (B'x L')

5.5 Design Parameters

Reviewing the soil characteristics, the following soil parameters have been selected for foundation settlement analysis:

Depth , m		Soil Classification	c, T/m^2	$\phi°$	γ, T/m^3	Modulus of Elasticity, T/m^2
From	To					
0	10	Sandy silt	10	4	1.80	1500
10	16	Sandy silt	16	5	1.90	2200
16	28	Silty fine sand	0	33	1.95	3500
28	60	Sandy silt	26	6	2.00	5000

(3) Bowles, J.E. (1996),"***Foundation Analysis and Design***", The McGraw Hill Companies Inc., International Edition, pp. 303-317.

where:

c	=	cohesion intercept
ϕ	=	angle of internal friction
γ	=	Bulk density of soil

5.6 Net Allowable Bearing Pressure For Isolated / Raft Foundations

The following table presents our recommended values of net allowable bearing pressures for isolated foundations with connecting beams/ raft foundations for the structure planned:

Location	Type of Foundation	Foundation Embedment Depth below EGL, m	RL of foundation, m	Recommended Net Allowable Bearing Pressure, T/m^2		Corresponding Gross Allowable Bearing Pressure, T/m^2		Modulus of Subgrade Reaction, k, kN/m^3
				Total settlement = 50 mm	Total settlement = 75 mm	Total settlement = 50 mm	Total settlement = 75 mm	
Block-2 & 3	Isolated Foundations**	7.5	233.0	29.0	-	42.5	-	5800
	Raft Foundations	7.5	233.0	29.0	40.9*	42.5	50.8*	5800
STP	Raft Foundations	14.0	226.5	44.0	61.9*	67.6*	67.6*	12400
Block-4	Isolated Foundations for extended basement**	10.0	230.5	36.0	-	54.0	-	7200
		12.0	228.5	40.0	-	61.8	-	8000
		14.0	226.5	44.0	-	69.6	-	8800
	Raft Foundations	10.0	230.5	36.0	54.0	54.0	63.0*	7200
		12.0	228.5	40.0	59.5*	61.8	63.3*	8000
		14.0	226.5	44.0	61.9*	67.6*	67.6*	8800
		27.5	213.0	75.0	112.5	126.8	142.6*	15000

* Restricted from shear creation
** Isolated foundation with connecting beams at basement level may be provided

The following points are highlighted with regard to the above recommended net bearing pressures:

1. The above bearing pressures include a bearing capacity safety factor of 2.5.
2. The appropriate values of net bearing pressure may be selected as per the permissible settlement criterion.
3. Net bearing pressures for foundations at intermediate depths may be interpolated linearly between the values given above.
4. The soils at foundation level should be compacted thoroughly using a heavy roller. It should be ensured that there are no loose pockets at foundation level.

5. The suggested modulus of sub grade reaction (k) has been estimated as the ratio of the computed net bearing pressure and corresponding total settlement, and is applicable at the centre of the loaded area[4].

Lightly loaded foundations outside the basement area may bear at minimum 1.5 m depth. For foundations not exceeding 2 m width, we recommend net allowable bearing pressures of 10.0 T/m^2 at 1.5 m depth. This value includes a bearing capacity safety factor of 2.5. Total settlement of such foundations is expected to be less than 50 mm.

5.7 Definition of Gross and Net Bearing Pressures

For the purposes of this report, the net allowable bearing pressure should be calculated as the difference between total load on the foundation and the weight of the soil overlying the foundation divided by the effective area of the foundation. The gross bearing pressure is the total pressure at the foundation level including overburden pressure and surcharge load. The following equations may be used -

$$q_{net} = [(P_s + W_f + W_s) / A_f] - S_v$$
$$q_{gross} = q_{net} + S_v = (P_s + W_f + W_s)/A_f$$

where:

q_{net}	=	net allowable bearing pressure
q_{gross}	=	gross bearing pressure
P_s	=	superimposed static load on foundation
W_f	=	weight of foundation
W_s	=	weight of soil overlying foundation
A_f	=	effective area of foundation
S_v	=	overburden pressure at foundation level prior to excavation for foundation.

It may please be noted that safe bearing pressures recommended in this report refer to **"net values".** The gross bearing pressure may be computed by adding the overburden pressure to the net bearing pressure. Fill placed above EGL should be treated as a surcharge load.

5.8 Basement Design

The basement should be designed to resist lateral earth pressure as well as hydrostatic pressure. Groundwater was not met at the time of our field investigations. Since the foundation depth is planned to be at about 27.5 m depth, the permanent groundwater table is not likely to exert hydrostatic pressures on the basement floor slab.

However, there may be a potential for temporary saturation of the soils due to seepage of water from external sources. For the worst condition, we suggest that a hydrostatic uplift equivalent to 1 m head of water be considered for the design of the basement slabs. The basement floor slab should be checked to ensure it shall resist the consequent nominal hydrostatic uplift with an adequate factor of safety.

We suggest the following preliminary values of coefficients of lateral earth pressure for design of basement retaining walls:

Depth below EGL, m		$\phi°$	k_a	k_p	k_0
From	To				
0.0	5.0	29	0.34	2.90	0.51

[4] Bowles, J.E. (1996), **"*Foundation Analysis and Design Fifth Edition*",** The McGraw-Hill Companies Inc., pp. 503

Depth below EGL, m		$\phi°$	k_a	k_p	k_0
From	To				
5.0	9.0	30	0.33	3.00	0.50
9.0	22.0	31	0.32	3.12	0.48

where:

k_a = Co-efficient of active earth pressure
k_p = Co-efficient of passive earth pressure
k_0 = Co-efficient of earth pressure at rest

A suitable safety factor should be applied on the passive earth pressures in the design of the wall.

6.0 FOUNDATION CONSTRUCTION CONSIDERATIONS

6.1 Excavation

Temporary excavations for foundation construction may be cut using the following side slopes:

Tower	Depth, m		Slopes for temporary excavations	Remarks
	From	To		
Block- 2,3 and STP	0.0	3.0	Nearly vertical (1V:0.1~0.2H)	Horizontal berms, at least 1.5 m wide, should be provided at 3 & 7 m depths
	3.0	7.0	1-vertical on 0.2~0.4 horizontal	
	7.0	10~14	1-vertical on 0.3~0.6 horizontal	Horizontal berms, 1.0 m wide, should be provided at 10 m depth
Block-4	0.0	27.5	Since deep excavation is planned, we suggest the provision of diaphragm walls or contiguous piles. Multi-stage sheet piles are also a feasible option. The excavation should be taken up after the lateral support is installed.	

The excavation slopes as given above are expected to remain stable except during rains. The engineer should monitor the slopes during excavations. In case, excessive sloughing or caving occurs, the slope may be flattened further to ensure stability.

6.2 Foundation Level Preparation

The area shall be excavated up to the foundation level. All loose soils should be removed and the exposed foundation bearing surface should be watered and compacted properly using rammers / rollers.

In case mechanical means like excavators are deployed for excavations, the excavations should be carried out up to 0.5 m above the proposed level. The last 0.5 m depth of excavation should be carried out manually, so that the founding soils are not disturbed / loosened.

The surface should be protected from disturbances due to construction activities so that the foundations may bear on the natural undisturbed ground. We recommend the placement of a 75 to 100 mm thick “blinding layer” of lean concrete to facilitate placement of reinforcing steel and to protect the soils from disturbance.

6.3 Chemical Attack

Results of chemical test on selected soil samples are presented on Plate 60. The results indicate that the soil contains about 0.08-0.11 percent sulphates and about 0.01-0.02 percent chlorides.

The pH value of soil is about 7.6-8.2 indicating nearly neutral condition. Groundwater was not met to the maximum explored depth of 60 m.

IS: 456-2000 recommends that precautions should be taken against chemical degradation of concrete if:

- sulphates content of the soils exceeds 0.2 percent, or
- groundwater contains more than 300 mg /litre of sulphates (SO_3).

Comparing the test results with these specified limits, the sulphate content of the soil is within the specified limit. Groundwater was not met at the time of our field investigations (May-June, 2019). Therefore, strata at the site may be treated in Class-1 category as described on IS: 456-2000.

We recommend the following measures to limit the potential for chemical attack on foundation concrete:

i. Foundation concrete should contain minimum cement content of 280 kg/m^3 of cement.

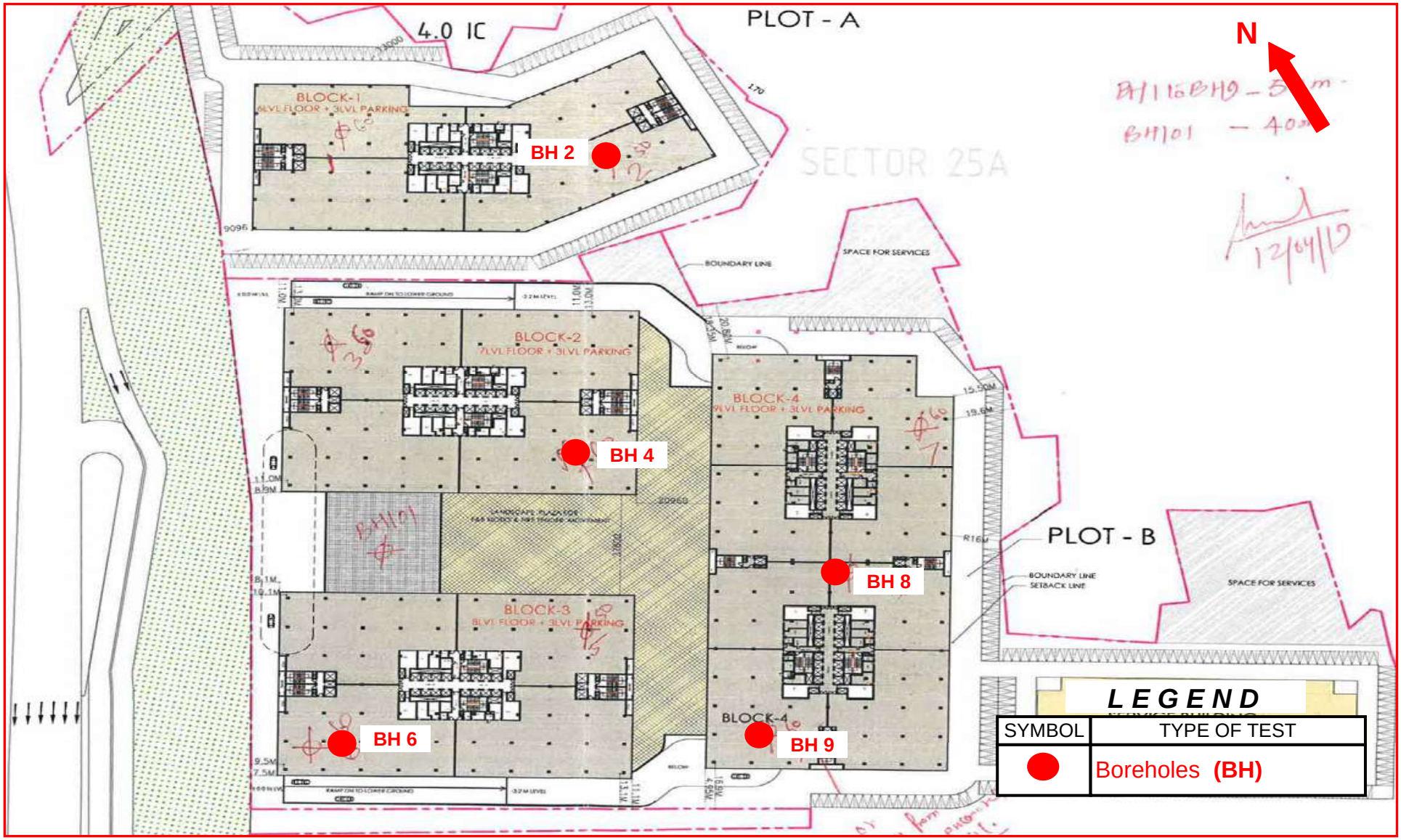
ii. Water cement ratio in foundation concrete should not exceed 0.55.

iii. A clear concrete cover over the reinforcement steel of at least 50 mm should be provided for all foundations.

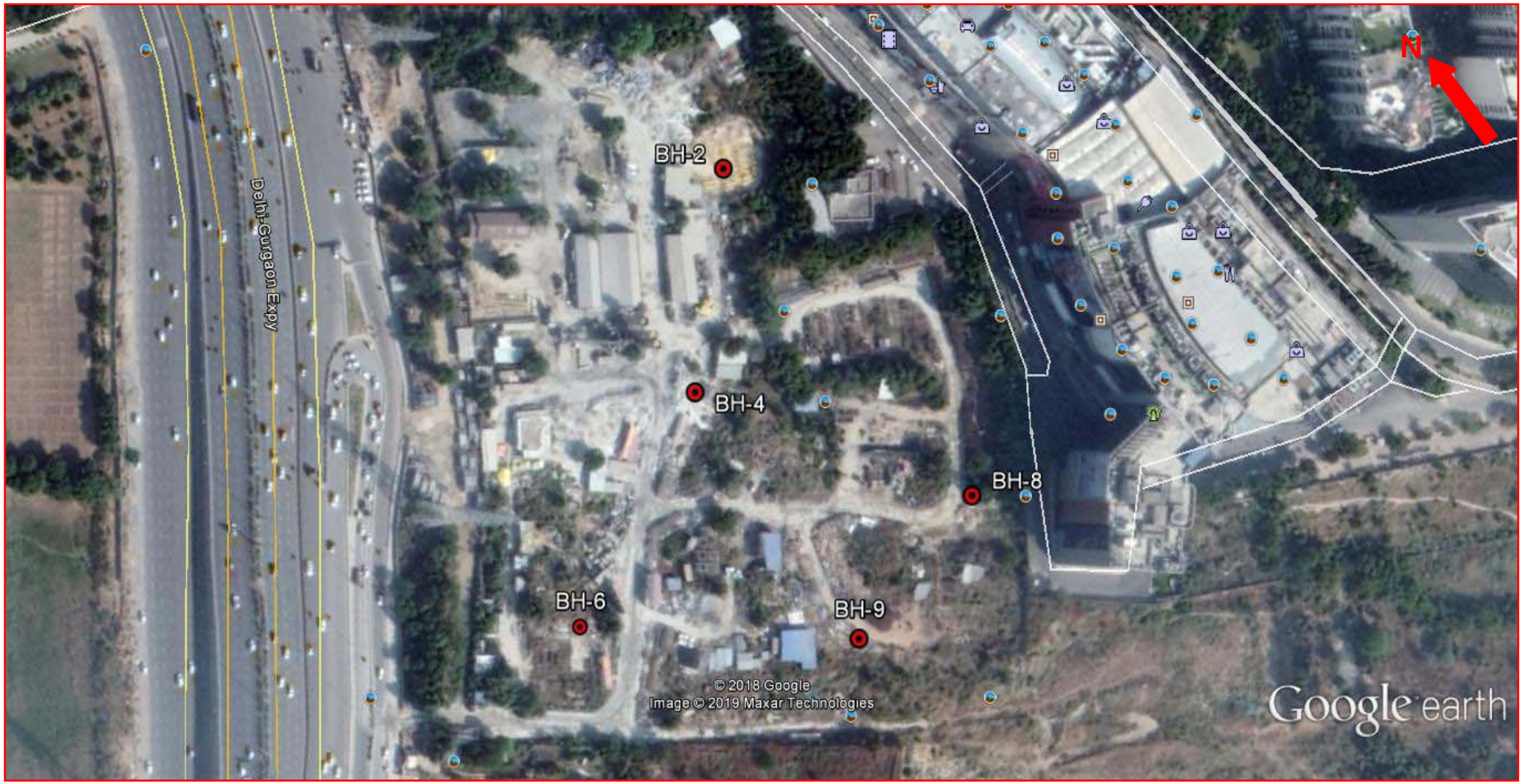
iv. Foundation concrete should be densified adequately using a vibrator so as to form a dense impervious mass.

7.0 CLOSURE

We appreciate the opportunity to conduct this investigation for you and have pleasure in submitting this interim report. We emphasize here that the recommendations in this report are preliminary and subject to change. Laboratory tests are currently in progress on site. Our final report shall be submitted after completion of all field and laboratory tests. In the meantime, if you need any clarifications, please do not hesitate to contact us.



Plan of Field Investigation



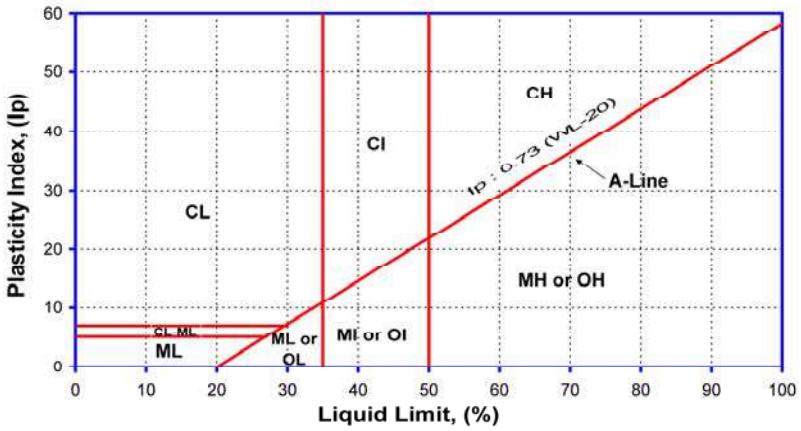
- Satellite image taken from Google Earth®
- Test Locations marked as per GPS coordinates taken on site using hand-held Garmin ® device
- Accuracy of hand-held GPS device generally ranges from 4-6m, and varies depending on the availability of satellite connection at the site

Satellite Image of Site and Test Locations

Plasticity of Clay

Plasticity	Liquid Limit
Low Plastic	< 35
Medium Plastic	35 to 50
High Plastic	> 50

Plasticity Chart



Consistency of Cohesive Soils

Consistency	Cohesion Intercept, kg/sq.cm	SPT (N) Value
Very Soft	< 0.1	0 to 2
Soft	0.1 to 0.25	2 to 4
Firm/Medium	0.25 to 0.5	4 to 8
Stiff	0.5 to 1.0	8 to 15
Very Stiff	1.0 to 2.0	15 to 30
Hard	> 2.0	> 30

Density Condition of Granular Soils

Density Descriptor	SPT (N) Value	Static Cone Tip Resistance kg/sq.cm
Very Loose	0 to 4	< 20
Loose	4 to 10	20 to 40
Medium Dense	10 to 30	40 to 120
Dense	30 to 50	120 to 200
Very dense	> 50	> 200

Degree of Expansion of Fine Grained Soils

Liquid Limit	Plasticity Index	Shrinkage Index	Free Swell Percent	Degree of Expansion	Degree of Severity
20 - 35	< 12	< 15	< 50	Low	Non-critical
35 - 50	12 - 23	15 -30	50 -100	Medium	Marginal
50 - 70	23 - 32	30 - 60	100 - 200	High	Critical
70 - 90	> 32	> 60	> 200	Very High	Severe

Engineering Description of Soils

NABL Accredited Laboratory

Our laboratory is accredited to **National Accreditation Board for Testing and Calibration Laboratories (NABL)**, New Delhi. The quality procedures in our laboratory conform to the International Standard **ISO/IEC: 17025-2005.**

The accreditation assures our clients of work quality in conformance with international norms and practices. It authorizes us to use the NABL logo on test results.

To maintain the necessary level of quality and reliability in all measurements on a continual basis, we indulge in the following:

- Use of calibrated equipment, regular maintenance and good housekeeping are a part of our work culture.
- Inter-laboratory comparison, proficiency testing and replicate testing, continuing education - ensure uniform quality of results.
- Internal Audit of quality procedures is done by our qualified ISO 17025 auditors to maintain the requisite standards. NABL conducts external audit.

Uncertainty

Every measurement entails an uncertainty. It is well known that no measuring instrument can determine the true value of any measurement. The cumulative effect of factors such as sensitivity of equipment, accuracy in calibration, human factors and environmental conditions will determine the overall uncertainty in the parameter determined from these measurements.

As a part of our commitment to our clients, we have worked out the uncertainty in the parameters reported by our laboratory. Although this does not form a part of our contract agreement, we present below our statistical estimate of uncertainty of various parameters based on our most recent evaluation (February, 2018).

Test / Parameter		Uncertainty*	Test / Parameter		Uncertainty*
Soil					
Water Content		± 0.09% of value	Free Swell Index, %		± 4.7% of value
Bulk & Dry Density		± 0.07 g/cc	Swell Pressure		± 0.008 kg/cm^2
Specific Gravity		± 0.025	Consolidation	Pressure	± 0.03 kg/cm^2
Liquid Limit		± 0.28 % of value		Void Ratio	±0.01
Plastic Limit		± 0.29 % of value	Density Index (relative density) of cohesionless soils		± 1.69 gm/cc
Shrinkage Limit		± 0.32 % of value			
Unconfined Compression	c	± 0.052 kg/cm^2	CD Direct Shear Test	ϕ	± 0.52 degrees
Triaxial Test (UU, CU & CD)	c	± 0.08 kg/cm^2	Soil Gradation		± 0.9% of particle size
	ϕ	± 0.02 degree			
Std. Proctor Compaction	MDD	± 0.01 g/cc	Coefficient of Permeability (Falling Head)		4.9 x 10^{-6} cm/s
	OMC	± 0.29 % of value			
Mod. Proctor Compaction	MDD	± 0.05 g/cc	Coefficient of Permeability (Constant Head)		2.7 x 10^{-5} cm/s
	OMC	± 0.29 % of value	Laboratory CBR		± 0.22 % of value
Rock					
Crushing Strength		± 0.9 kg/cm^2	Density		± 0.07 g/cc
Point Load Strength Index		± 0.016 kg/cm^2	Porosity		± 0.01
Water Absorption		± 0.09% of value	Tensile Strength of Rock by Indirect Test		± 0.54 % of value
Cerchar Abrasiveness Index Test		0.05			

* at 95 percent confidence level for coverage factor of 2

Uncertainty in Laboratory Measurements

Soil Profile (BH-2)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.900 m	Boring Method :	Shell & Auger
UTM Coordinates :	705156 E, 3154826 N	Ground Water Depth :	Not met	Casing Depth :	18.5 m
		Termination Depth :	50.28 m (RL 190.62 m)	Boring Start :	19-May-19
				Boring Finish :	21-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
0.00	0.50	DS1				Fill																
0.50	1.00	DS2					1.50															
1.50	1.95	SPT1	10	10		Stiff to hard brown sandy silt, low plastic (CL)																
2.25	2.55	UDS1				- with gravels, 2.0 to 3.0 m		12	20	57	11				1.79	1.67	7.4		UC		0.5	
3.00	3.45	SPT2	17	17		- stiff, 1.5 to 3.0 m																
4.50	4.95	SPT3	19	19		- very stiff, 3.0 to 7.5 m						28.8	18.3	10.5								
5.25	5.55	UDS2						0	27	58	15				1.90	1.69	12.5					
6.00	6.45	SPT4	24	24																		
7.50	7.95	SPT5	30	30								33.1	19.0	14.0								
8.25	8.55	UDS3				- with traces of gravel, 8.0 to 9.0 m		4	22	54	20				1.85	1.68	10.3		UU	1 ,2, 3	1.3	4.6
9.00	9.45	SPT6	54	54		- hard, 9.0 to 11.0 m												2.66				
10.50	10.95	SPT7	61	61								28.6	17.7	10.9								

[1] SPT is outside NABL scope.

Soil Profile (BH-2)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.900 m	Boring Method :	Shell & Auger
UTM Coordinates :	705156 E, 3154826 N	Ground Water Depth :	Not met	Casing Depth :	18.5 m
		Termination Depth :	50.28 m (RL 190.62 m)	Boring Start :	19-May-19
				Boring Finish :	21-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
11.25	11.55	UDS4				Hard brown sandy silt, low plastic (CL)		0	37	54	9				1.88	1.69	11.4					
12.00	12.45	SPT8	44	44																		
13.50	13.95	SPT9	43	43								32.0	16.5	15.4								
14.25	14.55	UDS5													1.86	1.70	9.8					
15.00	15.45	SPT10	38	38				0	23	64	13											
17.25	17.55	UDS6													1.86	1.64	13.4					
18.00	18.45	SPT11	36	36								27.5	18.3	9.3								
20.25	20.55	UDS7						0	36	51	13				1.87	1.66	12.5		UU	1 ,2, 3	1.6	5.1
21.00	21.45	SPT12	48	48																		
23.25	23.55	UDS8										28.9	13.7	15.2	1.88	1.72	9.1					
24.00	24.45	SPT13	52	52				0	27	59	14											
26.25	26.55	UDS9													1.95	1.71	14.2					

[1] SPT is outside NABL scope.

Soil Profile (BH-2)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.900 m	Boring Method :	Shell & Auger
UTM Coordinates :	705156 E, 3154826 N	Ground Water Depth :	Not met	Casing Depth :	18.5 m
		Termination Depth :	50.28 m (RL 190.62 m)	Boring Start :	19-May-19
				Boring Finish :	21-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
27.00	27.45	SPT14	55	55		Hard brown sandy silt, low plastic (CL)						32.7	18.9	13.7								
29.25	29.55	UDS10						0	28	60	12				1.95	1.69	15.4					
30.00	30.45	SPT15	60	60																		
32.25	32.55	UDS11										33.8	18.6	15.2	1.97	1.72	14.4					
33.00	33.45	SPT16	61	61				0	32	60	8											
35.25	35.55	UDS12													1.96	1.74	12.8		UU	3.4 ,5.1, 6.8	2.6	6.0
36.00	36.45	SPT17	62	62								31.1	17.1	14.0								
38.25	38.55	UDS13				- with gravels, 38.0 to 39.0 m		15	25	52	8				1.95	1.78	9.5					
39.00	39.45	SPT18	71	71																		
41.25	41.50	DS3										34.3	18.3	16.0								
42.00	42.45	SPT19	93	93				0	23	63	14											
44.25	44.50	DS4																				

[1] SPT is outside NABL scope.

Soil Profile (BH-2)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.900 m	Boring Method :	Shell & Auger
UTM Coordinates :	705156 E, 3154826 N	Ground Water Depth :	Not met	Casing Depth :	18.5 m
		Termination Depth :	50.28 m (RL 190.62 m)	Boring Start :	19-May-19
				Boring Finish :	21-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
45.00	45.45	SPT20	105	105		Hard brown sandy silt, low plastic (CL)						26.3	13.9	12.4								
47.25	47.68	SPT21	104/ 28cm																			
48.00	48.36	SPT22	103/ 21cm					0	22	61	17											
50.00	50.28	SPT23	100/ 13cm				50.28					34.6	15.9	18.7								

[1] SPT is outside NABL scope.

Soil Profile (BH-4)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705143 E, 3154816 N	Ground Water Depth :	Not met	Casing Depth :	5.0 m
		Termination Depth :	60.34 m (RL 180.16 m)	Boring Start :	22-May-19
				Boring Finish :	27-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																
0.50	1.00	DS2				- stiff, 0.0 to 6.0 m						27.9	16.0	11.9								
1.50	1.95	SPT1	8	8																		
2.25	2.55	UDS1						0	28	64	8				1.80	1.65	8.9					
3.00	3.45	SPT2	11	11								33.8	19.1	14.6								
4.50	4.95	SPT3	14	14																		
5.25	5.55	UDS2				- with gravels, 5.0 to 6.0 m		18	22	51	9				1.89	1.68	12.5		UU	1 ,2, 3	0.7	5.0
6.00	6.45	SPT4	24	24		- Very stiff, 6.0 to 9.0 m												2.65				
7.50	7.95	SPT5	29	29								30.8	19.8	11.0								
8.25	8.55	UDS3				- with traces of gravel, 8.0 to 9.0 m		3	22	59	16				1.88	1.70	10.7					
9.00	9.45	SPT6	36	36		- hard, 9.0 to 11.0 m																
10.50	10.95	SPT7	37	37								30.3	18.2	12.0								

[1] SPT is outside NABL scope.

Soil Profile (BH-4)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705143 E, 3154816 N	Ground Water Depth :	Not met	Casing Depth :	5.0 m
		Termination Depth :	60.34 m (RL 180.16 m)	Boring Start :	22-May-19
				Boring Finish :	27-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
11.25	11.55	UDS4				Very stiff to hard brown sandy silt, low plastic (CL)		22	26	44	8				1.82	1.64	11.3					
12.00	12.45	SPT8	34	34		- with gravels, 11.0 to 12.0 m																
13.50	13.95	SPT9	29	29		- hard, 12.0 to 13.5 m						34.0	16.5	17.5								
14.25	14.55	UDS5				- very stiff, 13.5 to 15.0 m									1.87	1.66	13.0		UU	1 ,2, 3	1.3	6.9
15.00	15.45	SPT10	37	37		- hard, 15.0 to 27.0 m		0	39	55	6											
17.25	17.55	UDS6										31.8	18.8	13.0	1.85	1.64	12.6					
18.00	18.45	SPT11	36	36																		
20.25	20.55	UDS7						0	35	55	10				1.86	1.66	12.0					
21.00	21.45	SPT12	56	56																		
23.25	23.55	UDS8										32.0	16.0	16.1	1.87	1.68	11.2					
24.00	24.45	SPT13	52	52				0	23	62	15											
26.25	26.55	UDS9													1.93	1.72	12.4		UU	2 ,3, 5	2.2	3.5

[1] SPT is outside NABL scope.

Soil Profile (BH-4)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705143 E, 3154816 N	Ground Water Depth :	Not met	Casing Depth :	5.0 m
		Termination Depth :	60.34 m (RL 180.16 m)	Boring Start :	22-May-19
				Boring Finish :	27-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
27.00	27.30	SPT14	100/ 15cm			Hard brown sandy silt, low plastic (CL)						33.4	13.7	19.6								
29.25	29.55	UDS10				- with gravels, 29.0 to 30.0 m		11	21	57	11				1.97	1.72	14.6					
30.00	30.45	SPT15	83	83																		
32.25	32.55	DS3										31.3	17.5	13.7								
33.00	33.45	SPT16	85	85																		
35.25	35.70	SPT17	79	79				0	26	56	18											
36.00	36.45	SPT18	71	71																		
38.25	38.70	SPT19	77	77								27.0	15.8	11.2								
39.00	39.45	SPT20	69	69																		
41.25	41.55	UDS11				- with gravels, 41.0 to 42.0 m		16	21	57	6				1.96	1.74	13.0					
42.00	42.45	SPT21	95	95								29.5	18.5	10.9								
44.25	44.43	UDS12													2.02	1.74	16.1					

[1] SPT is outside NABL scope.

Soil Profile (BH-4)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705143 E, 3154816 N	Ground Water Depth :	Not met	Casing Depth :	5.0 m
		Termination Depth :	60.34 m (RL 180.16 m)	Boring Start :	22-May-19
				Boring Finish :	27-May-19

Depth, m			SPT [1]				Grain Size Analysis				Atterberg Limits			Density and Moisture				Shear Tests			
From	To	Sample No.	Field Value, N_f	Corrected Value, N"	Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)	Specific Gravity	Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
45.00	45.44	SPT22	103/ 29cm	-		Hard brown sandy silt, low plastic (CL)															
46.50	46.85	SPT23	101/ 20cm	-				0	21	66	13										
48.00	48.38	SPT24	101/ 23cm	-																	
49.50	49.80	SPT25	100/ 15cm	-								34.6	20.2	14.4							
51.00	51.34	SPT26	102/ 19cm	-																	
52.50	52.85	SPT27	107/ 20cm	-		- with gravel, 52.5 to 54.0 m		7	25	55	13										
54.00	54.30	SPT28	101/ 15cm	-																	
55.50	55.82	SPT29	103/ 17cm	-								27.3	16.8	10.4							
57.00	57.35	SPT30	102/ 20cm	-			58.50														
58.50	58.83	SPT31	101/ 18cm	-		Very dense grey silty fine sand (SM)		0	52	39	9										
60.00	60.34	SPT32	105 /19cm	-			60.34														

[1] SPT is outside NABL scope.

Soil Profile (BH-6)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705014 E, 3154720 N	Ground Water Depth :	Not met	Casing Depth :	4.5 m
		Termination Depth :	46.8 m (RL 193.7 m)	Boring Start :	07-Jun-19
				Boring Finish :	11-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
0.00	0.50	DS1				Stiff to very hard brown sandy silt with gravels, low plastic (CL)						30.6	17.4	13.2								
1.50	1.95	SPT1	13	13		- stiff, 0.0 to 3.0 m																
2.25	2.55	UDS1						9	24	57	10				1.76	1.64	7.5		UU	1 ,2, 3	0.6	4.4
3.00	3.45	SPT2	22	22		- very stiff, 3.0 to 4.5 m						31.1	17.7	13.3								
4.50	4.95	SPT3	34	34		- hard, 4.5 to 12.0 m																
5.25	5.55	UDS2						17	18	56	9				1.90	1.70	11.8					
6.00	6.45	SPT4	35	35								32.1	20.1	12.0								
7.50	7.95	SPT5	39	39														2.66				
8.25	8.55	UDS3						7	19	50	24				1.91	1.69	13.2					
9.00	9.45	SPT6	41	41																		
10.50	10.95	SPT7	50	50								33.2	19.0	14.1								
11.25	11.55	UDS4						4	25	58	13				1.91	1.73	10.3		UU	1 ,2, 3	1.8	4.8

[1] SPT is outside NABL scope.

Soil Profile (BH-6)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705014 E, 3154720 N	Ground Water Depth :	Not met	Casing Depth :	4.5 m
		Termination Depth :	46.8 m (RL 193.7 m)	Boring Start :	07-Jun-19
				Boring Finish :	11-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N'				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
12.00	12.45	SPT8	39	39		Hard brown sandy silt, low plastic (CL)																
13.50	13.95	SPT9	45	45																		
14.25	14.55	UDS5				- with traces of gravel, 14.0 to 15.0 m		3	40	48	9	32.0	17.2	14.8	1.90	1.68	12.9					
15.00	15.45	SPT10	41	41			16.50															
16.50	16.95	SPT11	46	30		Dense to very dense grey silty sand (SM)																
17.25	17.55	UDS6				- with traces of gravel, 17.0 to 18.0 m		2	69	25	4				1.92	1.70	13.1		DS	1 ,2, 3	0.0	32.6
18.00	18.45	SPT12	51	31																		
19.50	19.95	SPT13	54	32																		
20.25	20.55	UDS7				- with gravel, 20.0 to 24.0 m		6	53	33	8				1.84	1.63	12.6					
21.00	21.45	SPT14	50	28																		
22.50	22.95	SPT15	51	27																		
23.25	23.55	UDS8						12	45	35	8				1.92	1.70	12.9		DS	1 ,2, 3	0.0	35.0

[1] SPT is outside NABL scope.

Soil Profile (BH-6)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705014 E, 3154720 N	Ground Water Depth :	Not met	Casing Depth :	4.5 m
		Termination Depth :	46.8 m (RL 193.7 m)	Boring Start :	07-Jun-19
				Boring Finish :	11-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
24.00	24.45	SPT16	65	33		Very dense grey silty fine sand (SM)																
25.50	25.95	SPT17	73	36		- with traces of gravel, 25.5 to 27.0 m	27.00	4	48	37	11											
27.00	27.45	SPT18	73	73		Hard brown sandy silt with traces of gravel, low plastic (CL)						32.5	17.1	15.4								
28.50	28.95	SPT19	80	80																		
30.00	30.45	SPT20	67	67				3	38	48	11											
31.50	31.95	SPT21	73	73																		
33.00	33.45	SPT22	83	83								31.7	18.3	13.5								
34.50	34.95	SPT23	87	87																		
36.00	36.45	SPT24	94	94				4	36	47	13											
37.04	37.49	SPT25	90	90								31.7	17.4	14.2								
39.00	39.45	SPT26	88	88																		
40.50	40.95	SPT27	90	90				3	36	39	22											

[1] SPT is outside NABL scope.

Soil Profile (BH-6)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705014 E, 3154720 N	Ground Water Depth :	Not met	Casing Depth :	4.5 m
		Termination Depth :	46.8 m (RL 193.7 m)	Boring Start :	07-Jun-19
				Boring Finish :	11-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
42.00	42.45	SPT28	82	82		Hard brown sandy silt, low plastic (CL)																
43.50	43.95	SPT29	92	92								33.2	20.1	13.1								
45.00	45.45	SPT30	99	99																		
46.50	46.80	SPT31	100/ 15cm	-		- with gravels, 46.5 to 46.8 m	46.80	6	28	56	10											

[1] SPT is outside NABL scope.

Soil Profile (BH-8)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705167 E, 3154673 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
		Termination Depth :	50.3 m (RL 190.2 m)	Boring Start :	28-May-19
				Boring Finish :	31-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
0.00	0.50	DS1				Hard brwon sandy silt, low plastic (CL)																
1.50	1.95	SPT1	48	48								29.2	20.3	9.0								
2.25	2.55	UDS1				- with gravels, 2.0 to 3.0 m		12	30	50	8				1.77	1.67	6.1		UU	1 ,2, 3	1.7	4.5
3.00	3.45	SPT2	36	36																		
4.50	4.95	SPT3	35	35								26.7	17.9	8.8								
5.25	5.55	UDS2													1.91	1.67	14.3					
6.00	6.45	SPT4	54	54				0	17	73	10											
7.50	7.95	SPT5	50	50																		
8.25	8.55	UDS3										29.5	18.8	10.7	1.92	1.73	10.8		UU	1 ,2, 3	1.9	6.8
9.00	9.45	SPT6	45	45														2.67				
10.50	10.95	SPT7	47	47		- with gravels, 10.5 to 11.0 m		17	28	39	16											
11.25	11.55	UDS4													1.89	1.68	12.6					

[1] SPT is outside NABL scope.

Soil Profile (BH-8)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705167 E, 3154673 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
		Termination Depth :	50.3 m (RL 190.2 m)	Boring Start :	28-May-19
				Boring Finish :	31-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
12.00	12.45	SPT8	47	47		Hard brwon sandy silt, low plastic (CL)						33.5	18.9	14.5								
13.50	13.95	SPT9	47	47																		
14.25	14.55	UDS5						0	35	56	9				1.78	1.62	9.8					
15.00	15.45	SPT10	49	49																		
16.50	16.95	SPT11	46	46			17.00					29.7	15.2	14.5								
17.25	17.55	UDS6				Dense to very dense brown silty fine sand (SM)									1.85	1.62	14.4		DS	1 ,2, 3	0.0	31.7
18.00	18.45	SPT12	44	27				0	66	28	6											
19.50	19.95	SPT13	50	29																		
20.25	20.55	UDS7													1.87	1.66	12.9					
21.00	21.45	SPT14	72	40																		
22.50	22.95	SPT15	75	40				0	66	28	6											
23.25	23.55	UDS8					24.00								1.89	1.72	10.2		DS	1 ,2, 3	0.0	33.3

[1] SPT is outside NABL scope.

Soil Profile (BH-8)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705167 E, 3154673 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
		Termination Depth :	50.3 m (RL 190.2 m)	Boring Start :	28-May-19
				Boring Finish :	31-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
24.00	24.45	SPT16	52	52		Hard brwon sandy silt, low plastic (CL)						28.8	15.9	12.9								
25.50	25.95	SPT17	63	63																		
26.25	26.55	UDS9																				
27.00	27.45	SPT18	89	89																		
28.50	25.95	SPT19	103	103								33.7	16.3	17.4								
30.00	30.43	SPT20	106/ 28cm	-																		
31.50	31.90	SPT21	100/ 25cm	-		- with gravels, 31.5 to 33.0 m		6	37	46	11											
33.00	33.42	SPT22	105/ 27cm	-																		
34.50	34.95	SPT23	95	95								30.2	17.1	13.2								
36.00	36.45	SPT24	80	80																		
37.50	37.95	SPT25	100	100				0	38	47	15											
39.00	39.45	SPT26	102	102								32.8	18.0	14.9								

[1] SPT is outside NABL scope.

Soil Profile (BH-8)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705167 E, 3154673 N	Ground Water Depth :	Not met	Casing Depth :	6.0 m
		Termination Depth :	50.3 m (RL 190.2 m)	Boring Start :	28-May-19
				Boring Finish :	31-May-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
40.50	40.95	SPT27	104	104		Hard brwon sandy silt, low plastic (CL)																
42.00	42.40	SPT28	101/ 25cm	-																		
43.50	43.91	SPT29	103/ 24cm	-		- with gravels, 43.5 to 45.0 m		6	34	50	10											
45.00	45.39	SPT30	104/ 24cm	-								32.6	18.3	14.3								
46.50	46.87	SPT31	101/ 22cm	-																		
48.00	48.35	SPT32	102/ 20cm	-				0	34	55	11											
50.00	50.30	SPT33	101/ 15cm	-			50.30					32.8	19.6	13.2								

[1] SPT is outside NABL scope.

Soil Profile (BH-9)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705101 E, 3154655 N	Ground Water Depth :	Not met	Casing Depth :	7.5 m
		Termination Depth :	60.35 m (RL 180.15 m)	Boring Start :	01-Jun-19
				Boring Finish :	06-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
0.00	0.50	DS1				Stiff brown clayey silt, medium plastic (CI)		0	29	57	14											
1.50	1.95	SPT1	12	12			2.00					37.3	20.1	17.1								
2.25	2.55	UDS1				Very stiff to hard brown sandy silt with gravels, low plastic (CL)		10	31	47	12				1.75	1.61	8.5					
3.00	3.45	SPT2	15	15																		
4.50	4.95	SPT3	20	20								29.3	17.1	12.2								
5.25	5.55	UDS2						6	30	51	13				1.91	1.70	12.1		UU	1 ,2, 3	1.0	5.1
6.00	6.45	SPT4	28	28														2.68				
7.50	7.95	SPT5	33	33								25.9	18.6	7.3								
8.25	8.55	UDS3						10	32	45	13				1.88	1.69	11.2					
9.00	9.45	SPT6	40	40																		
10.50	10.95	SPT7	39	39								29.8	17.3	12.5								
11.25	11.55	UDS4						4	31	56	9				1.89	1.69	11.7		UU	1 ,2, 3	1.8	5.0

[1] SPT is outside NABL scope.

Soil Profile (BH-9)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705101 E, 3154655 N	Ground Water Depth :	Not met	Casing Depth :	7.5 m
		Termination Depth :	60.35 m (RL 180.15 m)	Boring Start :	01-Jun-19
				Boring Finish :	06-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
12.00	12.45	SPT8	50	50		Hard brown sandy silt, low plastic (CL)																
13.50	13.95	SPT9	52	52								32.7	16.9	15.8								
14.25	14.55	UDS5						0	31	57	12				1.90	1.70	11.7					
15.00	15.45	SPT10	46	46																		
16.50	16.95	SPT11	47	47								34.6	16.7	17.9								
17.25	17.55	UDS6													1.91	1.69	13.2					
18.00	18.45	SPT12	46	28		Dense to very dense grey silty fine sand (SM)	18.00	2	60	31	7											
19.50	19.95	SPT13	48	28		- with traces of gravel, 18.0 to 19.5 m																
20.25	20.55	UDS7				- dense, 18.0 to 21.0 m		26	42	26	6				1.87	1.69	10.5		DS	1 ,2, 3	0.0	33.1
21.00	21.45	SPT14	105	59		- intermixed with gravels, 20.0 to 21.0 m																
22.50	22.90	SPT15	102/ 25cm	-																		
24.00	24.38	SPT16	101/ 23cm	-																		

[1] SPT is outside NABL scope.

Soil Profile (BH-9)

ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705101 E, 3154655 N	Ground Water Depth :	Not met	Casing Depth :	7.5 m
		Termination Depth :	60.35 m (RL 180.15 m)	Boring Start :	01-Jun-19
				Boring Finish :	06-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
25.50	25.95	SPT17	105	52		Very dense brown silty fine sand (SM)		0	65	28	7											
27.00	27.45	SPT18	92	43			28.50															
28.50	28.95	SPT19	92	92		Hard brown sandy silt, low plastic (CL)																
30.00	30.45	SPT20	71	71								29.2	15.4	13.8								
31.50	31.95	SPT21	78	78																		
33.00	33.45	SPT22	88	88		- with gravels, 33.0 to 35.5 m		22	25	41	12											
34.50	34.95	SPT23	79	79																		
36.00	36.45	SPT24	60	60								31.7	21.4	10.3								
37.50	37.95	SPT25	78	78																		
39.00	39.45	SPT26	96	96		- with traces of gravel, 39.0 to 40.5 m		3	18	63	16											
40.50	40.95	SPT27	104	104																		
42.00	43.39	SPT28	104/ 24cm									33.2	15.8	17.4								

[1] SPT is outside NABL scope.

Soil Profile (BH-9)

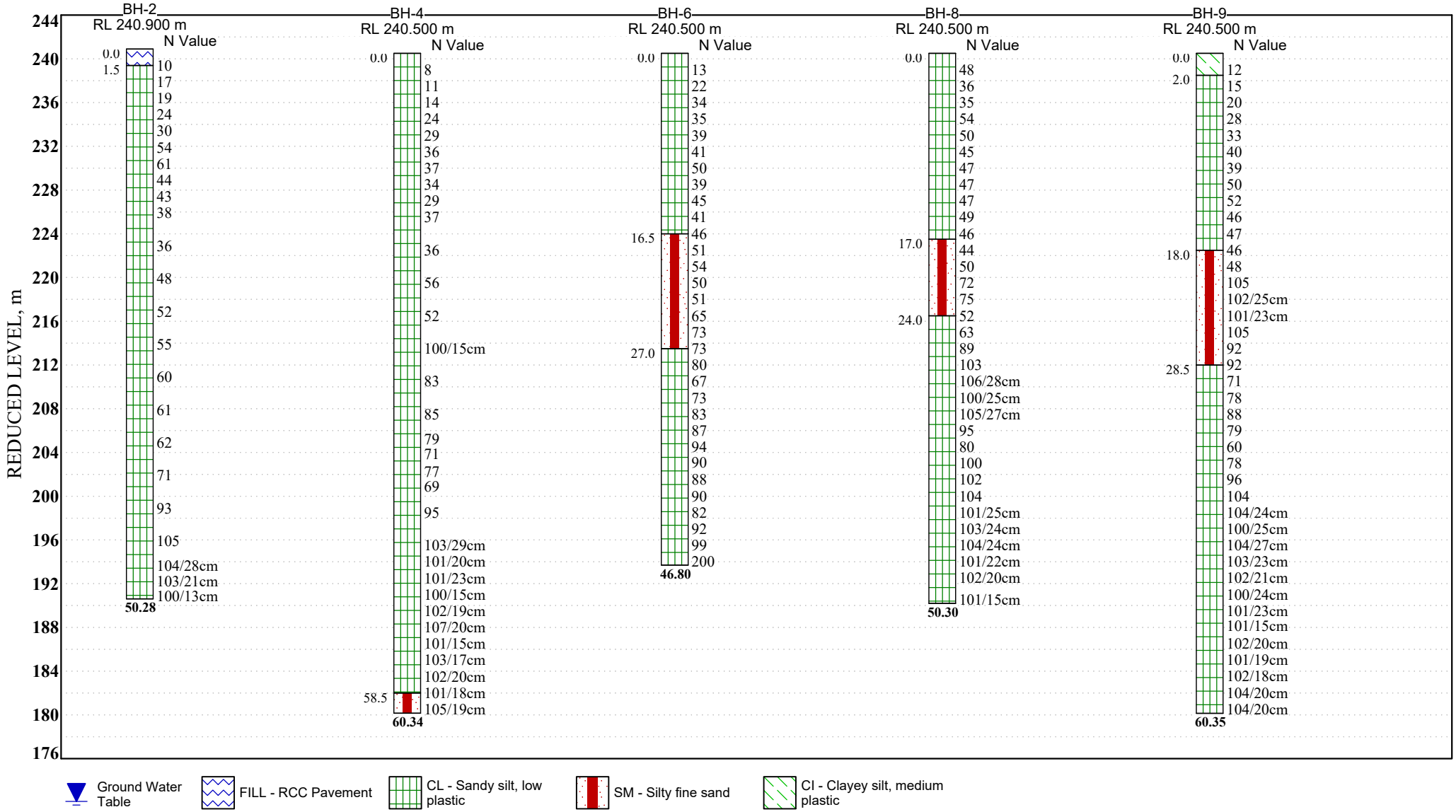
ISO/IEC 17025:2005 Certified Laboratory (NABL) Certificate No. T-1741

Location :	Refer Plate 1	Surface Elevation :	RL 240.500 m	Boring Method :	Shell & Auger
UTM Coordinates :	705101 E, 3154655 N	Ground Water Depth :	Not met	Casing Depth :	7.5 m
		Termination Depth :	60.35 m (RL 180.15 m)	Boring Start :	01-Jun-19
				Boring Finish :	06-Jun-19

Depth, m		Sample No.	SPT [1]		Symbol	SOIL DESCRIPTION	Depth of Strata, (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests			
From	To		Field Value, N_f	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm^3)	Dry Density (gms/cm^3)	Moisture Content (%)		Type of Test	Confining Pressures, (kg/cm^2)	Cohesion Intercept, 'c' (kg/cm^2)	Angle of Internal Friction, ϕ (degrees)
43.50	43.90	SPT29	100/ 25cm	-		Hard brown sandy silt with gravels, low plastic (CL)																
45.00	45.42	SPT30	104/ 27cm	-				10	30	40	20											
46.50	46.88	SPT31	103/ 23cm	-																		
48.00	48.36	SPT32	102/ 21cm	-								32.9	15.2	17.6								
49.50	46.89	SPT33	100/ 24cm	-																		
51.00	51.38	SPT34	101/ 23cm	-				6	40	42	12											
52.00	52.80	SPT35	101/ 15cm	-																		
54.00	54.35	SPT36	102/ 20cm	-								34.9	17.1	17.8								
55.50	55.84	SPT37	101/ 19cm	-																		
57.00	57.33	SPT38	102/ 18cm	-				8	33	48	11											
58.50	58.85	SPT39	104/ 20cm	-																		
60.00	60.35	SPT40	104/ 20cm	-			60.35					34.4	16.7	17.7								

[1] SPT is outside NABL scope.

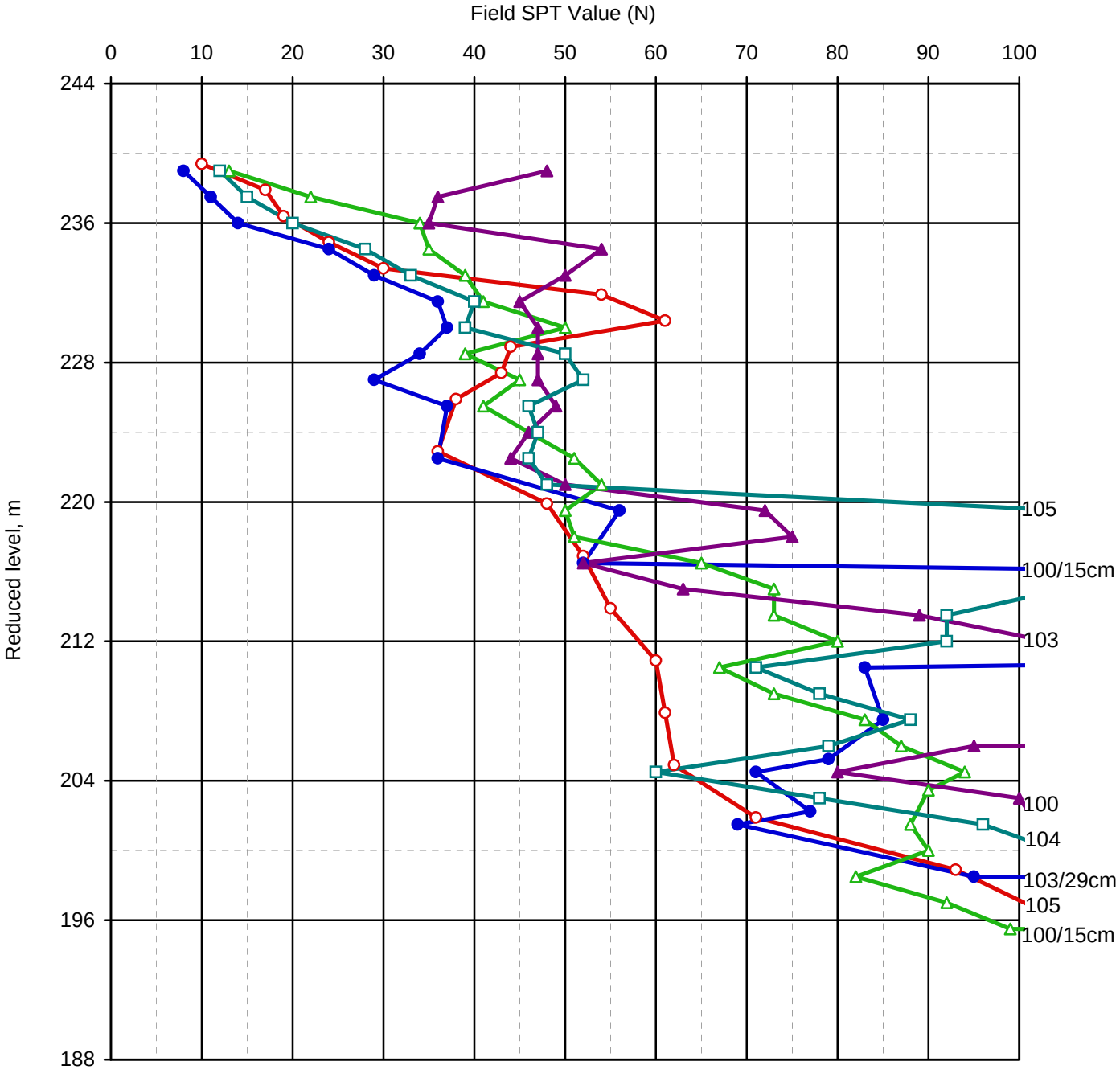
Summary of Borehole Profiles



Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-2	240.900	Refer Plate 1
	BH-4	240.500	
	BH-6	240.500	
	BH-8	240.500	
	BH-9	240.500	

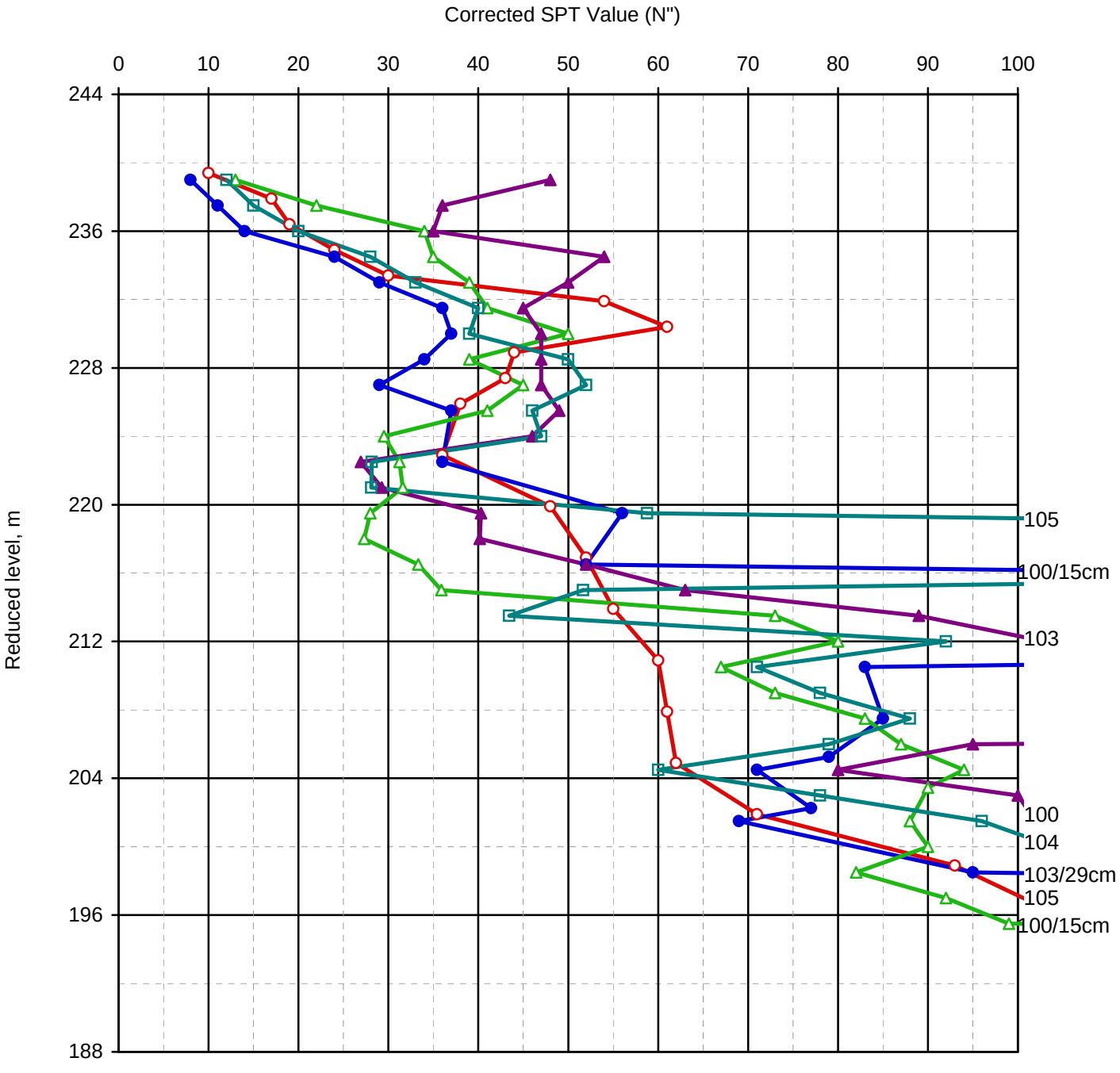


Field SPT Values vs. Reduced level

Standard Penetration Test

IS : 2131-1981, RA-2007

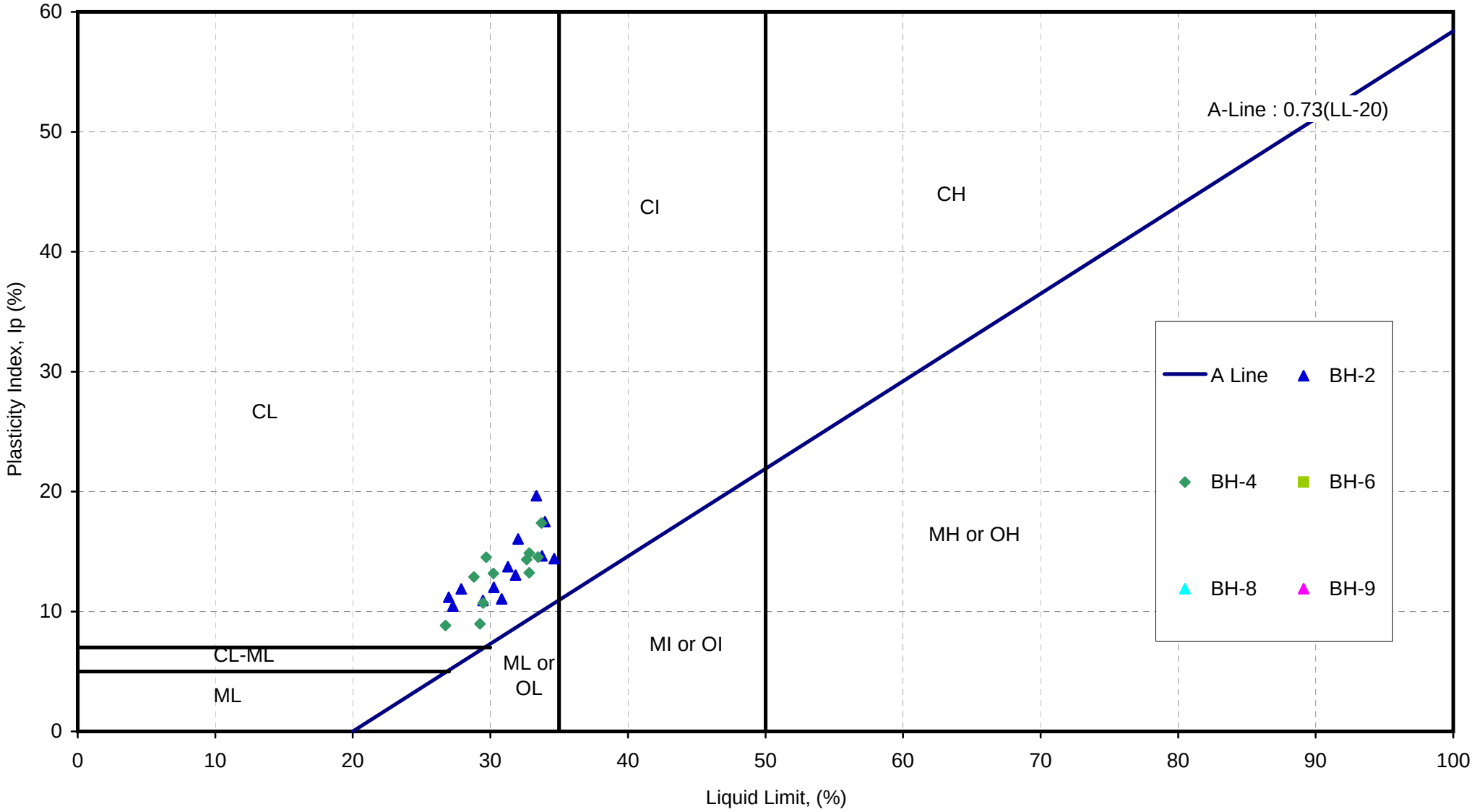
Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-2	240.900	Refer Plate 1
	BH-4	240.500	
	BH-6	240.500	
	BH-8	240.500	
	BH-9	240.500	



Corrected SPT Values vs. Reduced level

Atterberg Test

IS : 2720 (Part-5)-1985, RA-2010

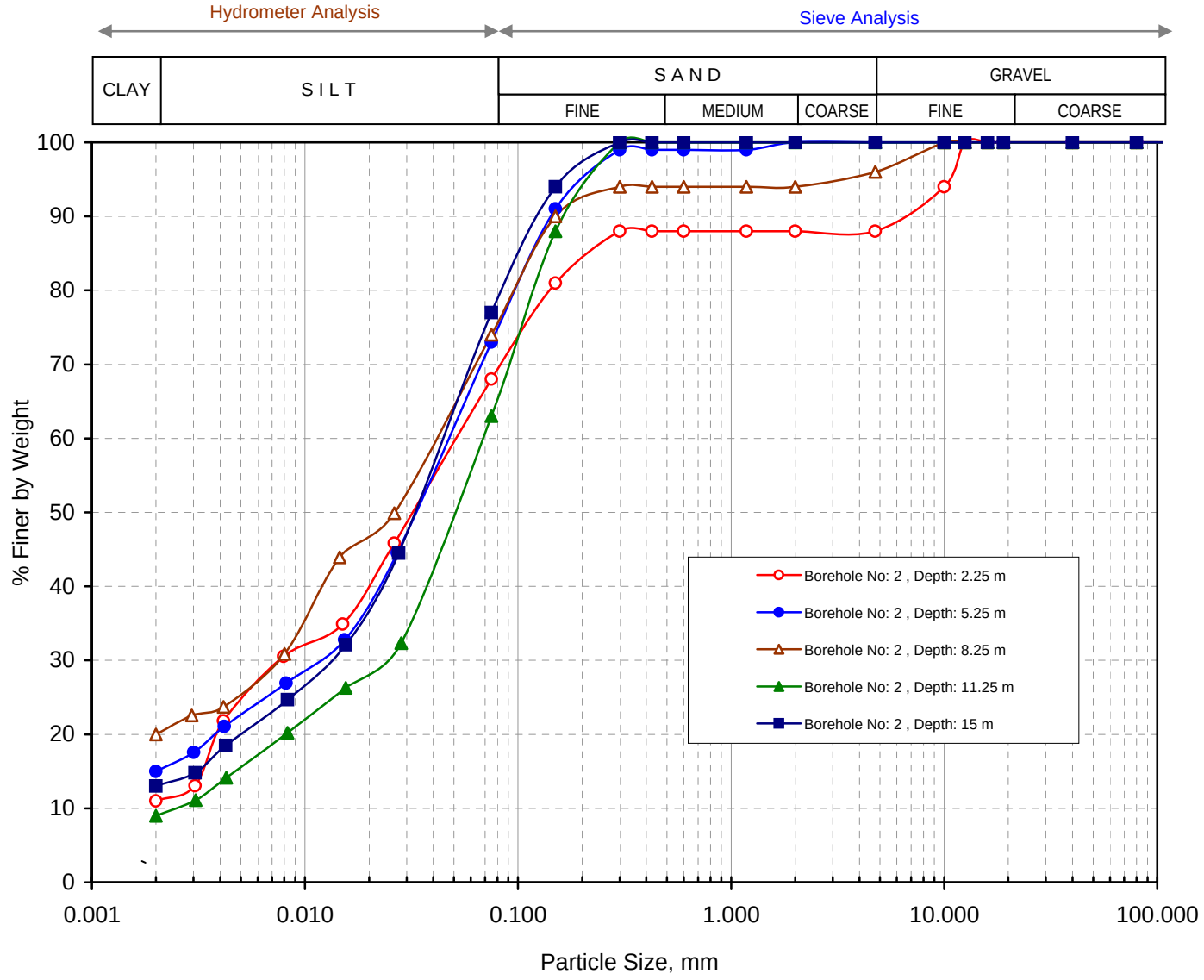


Plasticity Chart

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-2	2.25	Sandy silt with gravels (CL)	12	20	57	11	0.057	0.008			
BH-2	5.25	Sandy silt (CL)	0	27	58	15	0.053	0.012			
BH-2	8.25	Sandy silt with traces of gravel (CL)	4	22	54	20	0.047	0.008			
BH-2	11.25	Sandy silt (CL)	0	37	54	9	0.070	0.023	0.003	23.3	2.52
BH-2	15.00	Sandy silt (CL)	0	23	64	13	0.050	0.013			



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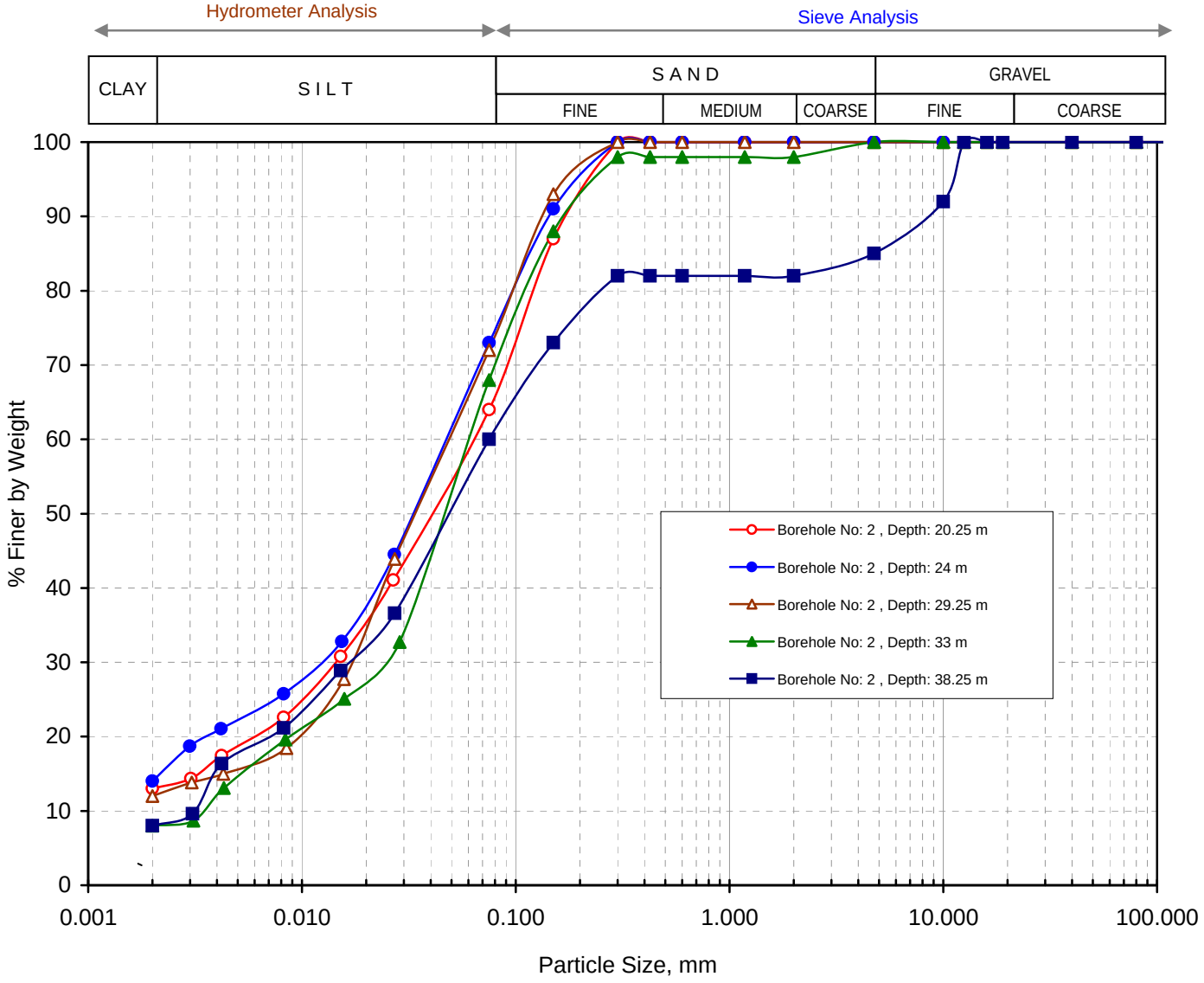
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-2	20.25	Sandy silt (CL)	0	36	51	13	0.067	0.015			
BH-2	24.00	Sandy silt (CL)	0	27	59	14	0.053	0.013			
BH-2	29.25	Sandy silt (CL)	0	28	60	12	0.055	0.017			
BH-2	33.00	Sandy silt (CL)	0	32	60	8	0.064	0.024	0.003	21.3	3.00
BH-2	38.25	Sandy silt with gravels (CL)	15	25	52	8	0.075	0.017	0.003	25.0	1.28



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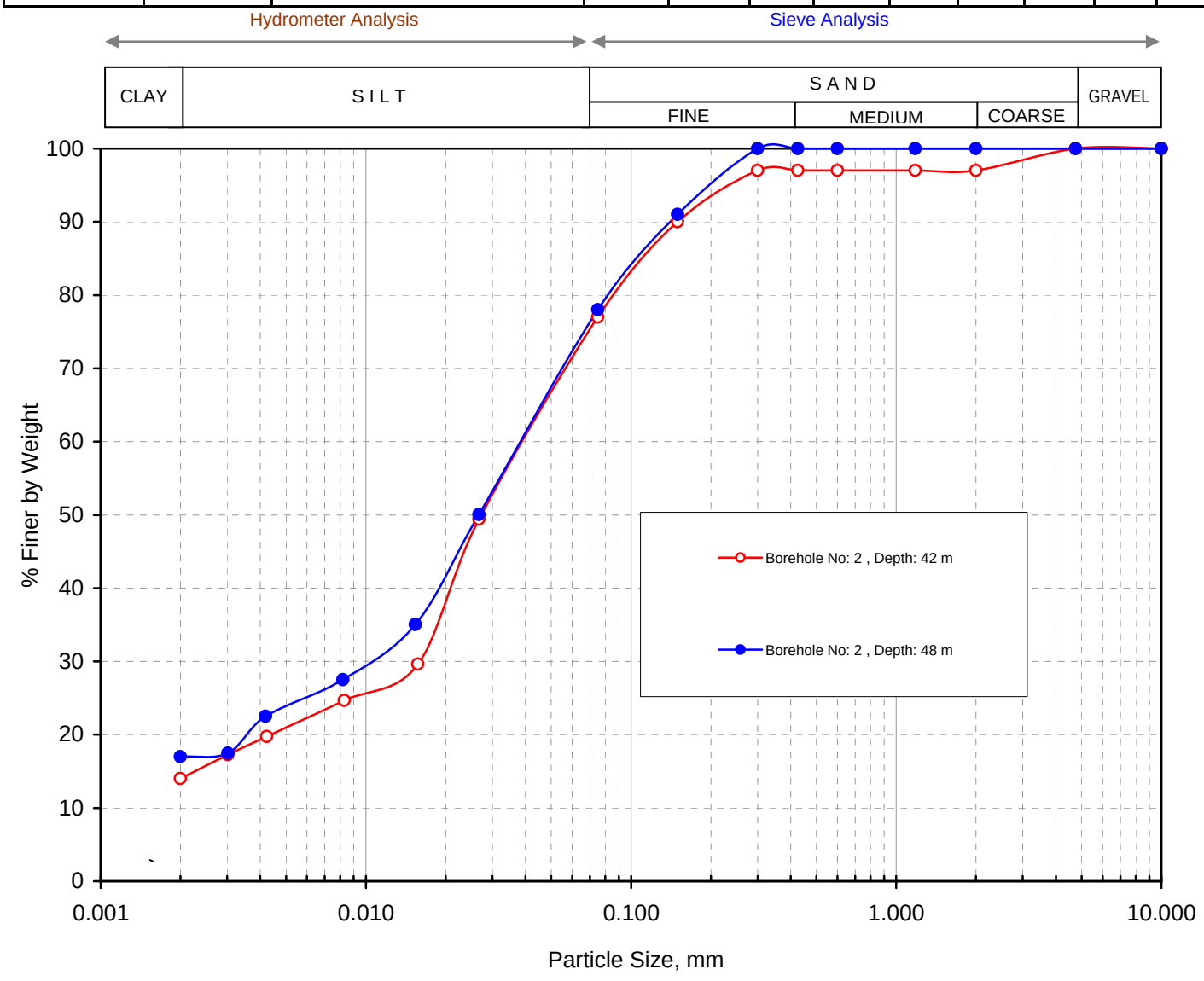
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-2	42.00	Sandy silt (CL)	0	23	63	14	0.045	0.016			
BH-2	48.00	Sandy silt (CL)	0	22	61	17	0.044	0.011			



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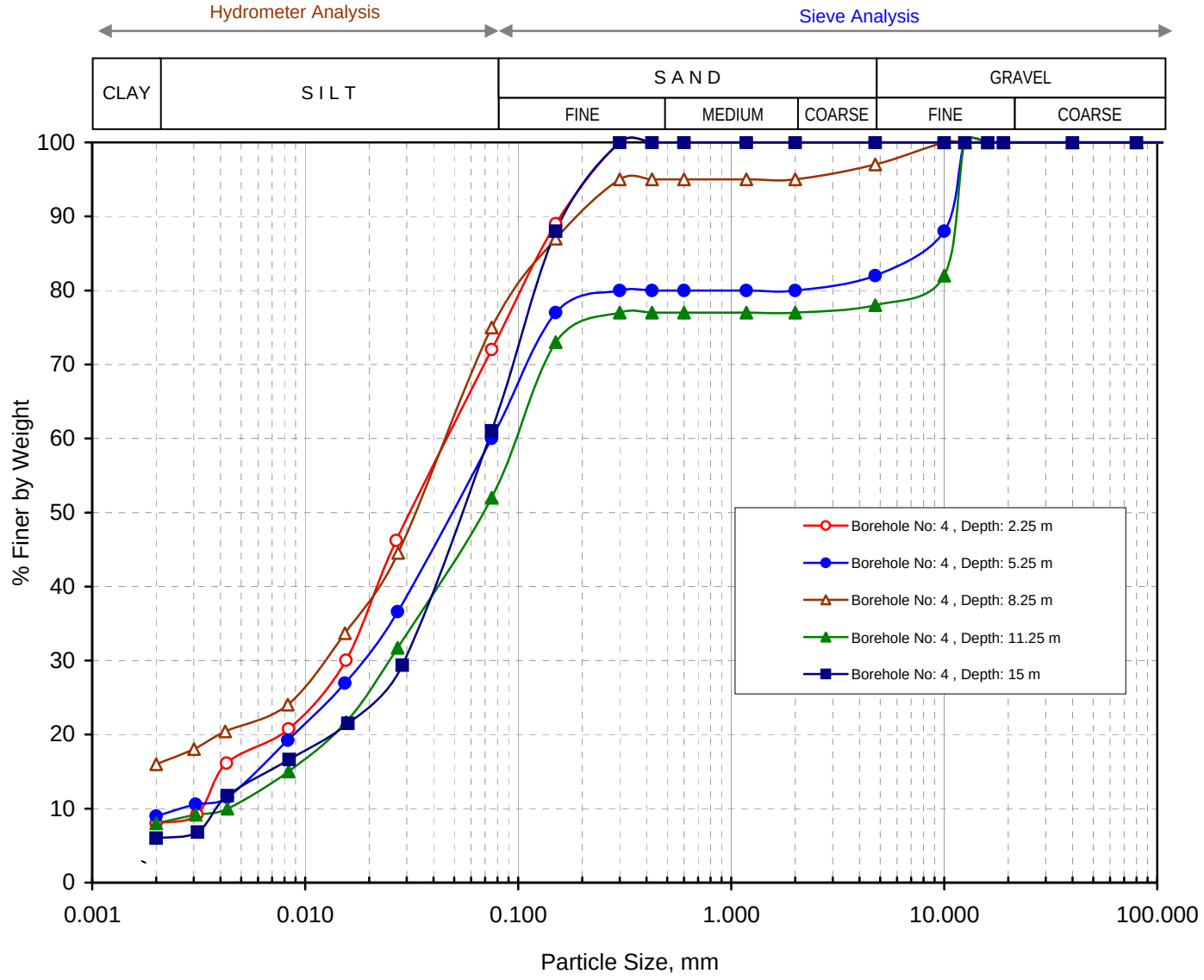
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-4	2.25	Sandy silt (CL)	0	28	64	8	0.053	0.016	0.003	17.7	1.61
BH-4	5.25	Sandy silt with gravels (CL)	18	22	51	9	0.075	0.019	0.003	25.0	1.60
BH-4	8.25	Sandy silt with traces of gravel (CL)	3	22	59	16	0.052	0.013			
BH-4	11.25	Sandy silt with gravels (CL)	22	26	44	8	0.104	0.025	0.004	26.0	1.50
BH-4	15.00	Sandy silt (CL)	0	39	55	6	0.074	0.030	0.004	18.5	3.04



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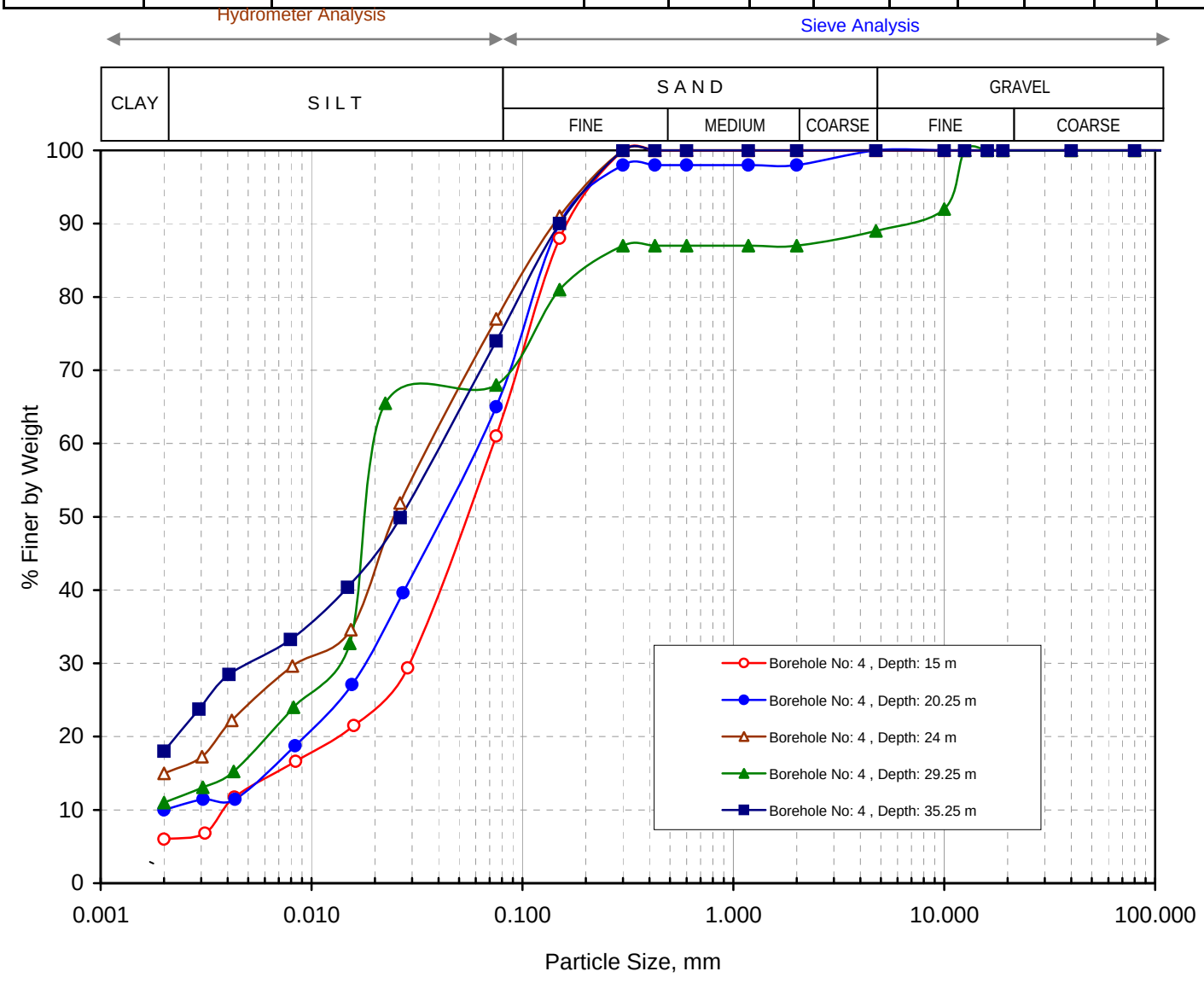
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-4	15.00	Sandy silt (CL)	0	39	55	6	0.074	0.030	0.004	18.5	3.04
BH-4	20.25	Sandy silt (CL)	0	35	55	10	0.066	0.018	0.002	33.0	2.45
BH-4	24.00	Sandy silt (CL)	0	23	62	15	0.042	0.009			
BH-4	29.25	Sandy silt with gravels (CL)	11	21	57	11	0.021	0.013			
BH-4	35.25	Sandy silt (CL)	0	26	56	18	0.047	0.005			



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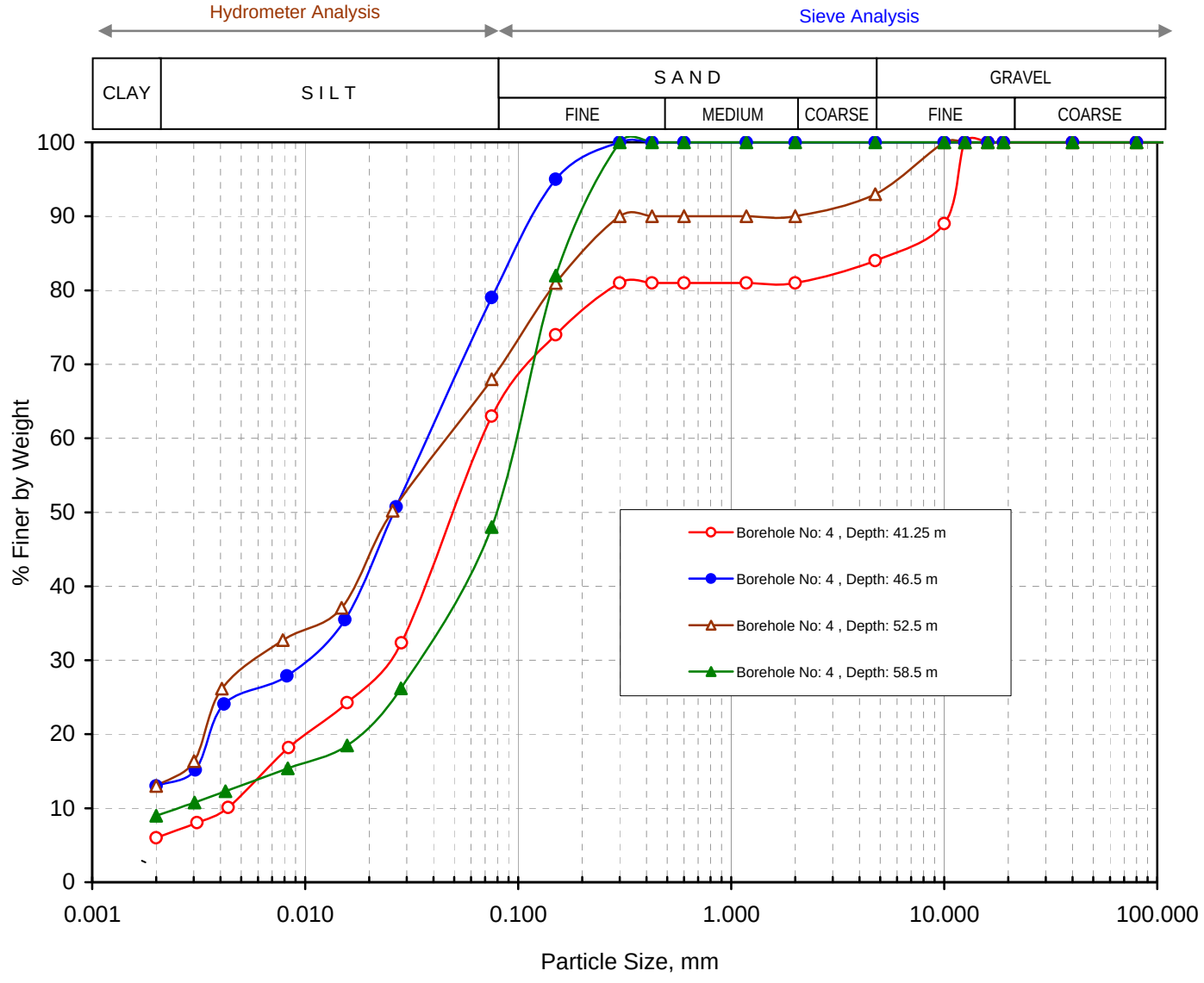
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-4	41.25	Sandy silt with gravels (CL)	16	21	57	6	0.070	0.025	0.004	17.5	2.23
BH-4	46.50	Sandy silt (CL)	0	21	66	13	0.043	0.010			
BH-4	52.50	Sandy silt with gravels (CL)	7	25	55	13	0.053	0.006			
BH-4	58.50	Silty fine sand (SM)	0	52	39	9	0.101	0.036	0.003	33.7	4.28



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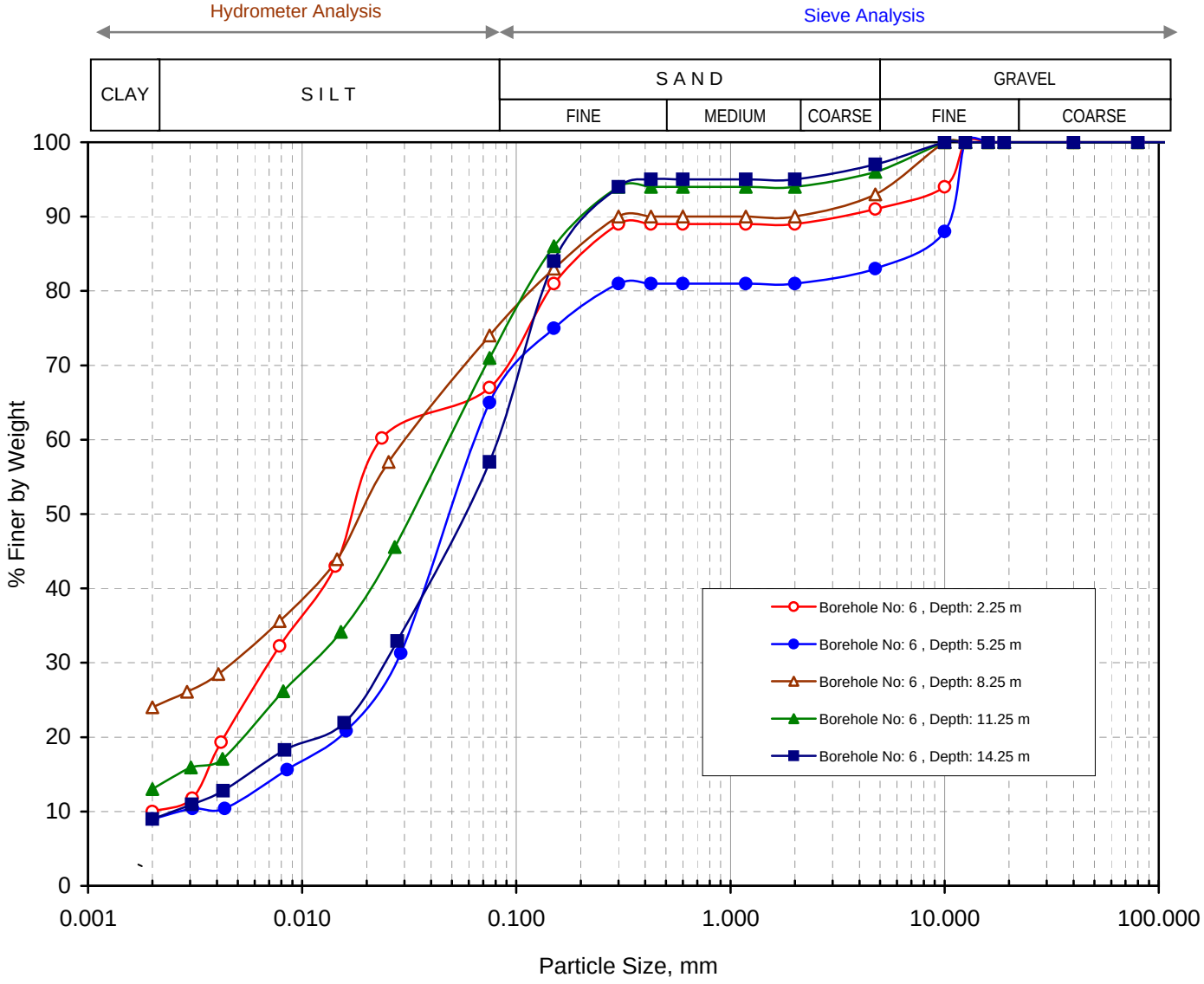
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-6	2.25	Sandy silt with gravels (CL)	9	24	57	10	0.023	0.007	0.002	11.5	1.07
BH-6	5.25	Sandy silt with gravels (CL)	17	18	56	9	0.068	0.027	0.003	22.7	3.57
BH-6	8.25	Sandy silt with gravels (CL)	7	19	50	24	0.034	0.005			
BH-6	11.25	Sandy silt with gravels (CL)	4	25	58	13	0.054	0.012			
BH-6	14.25	Sandy silt with traces of gravel (CL)	3	40	48	9	0.083	0.025	0.003	27.7	2.51



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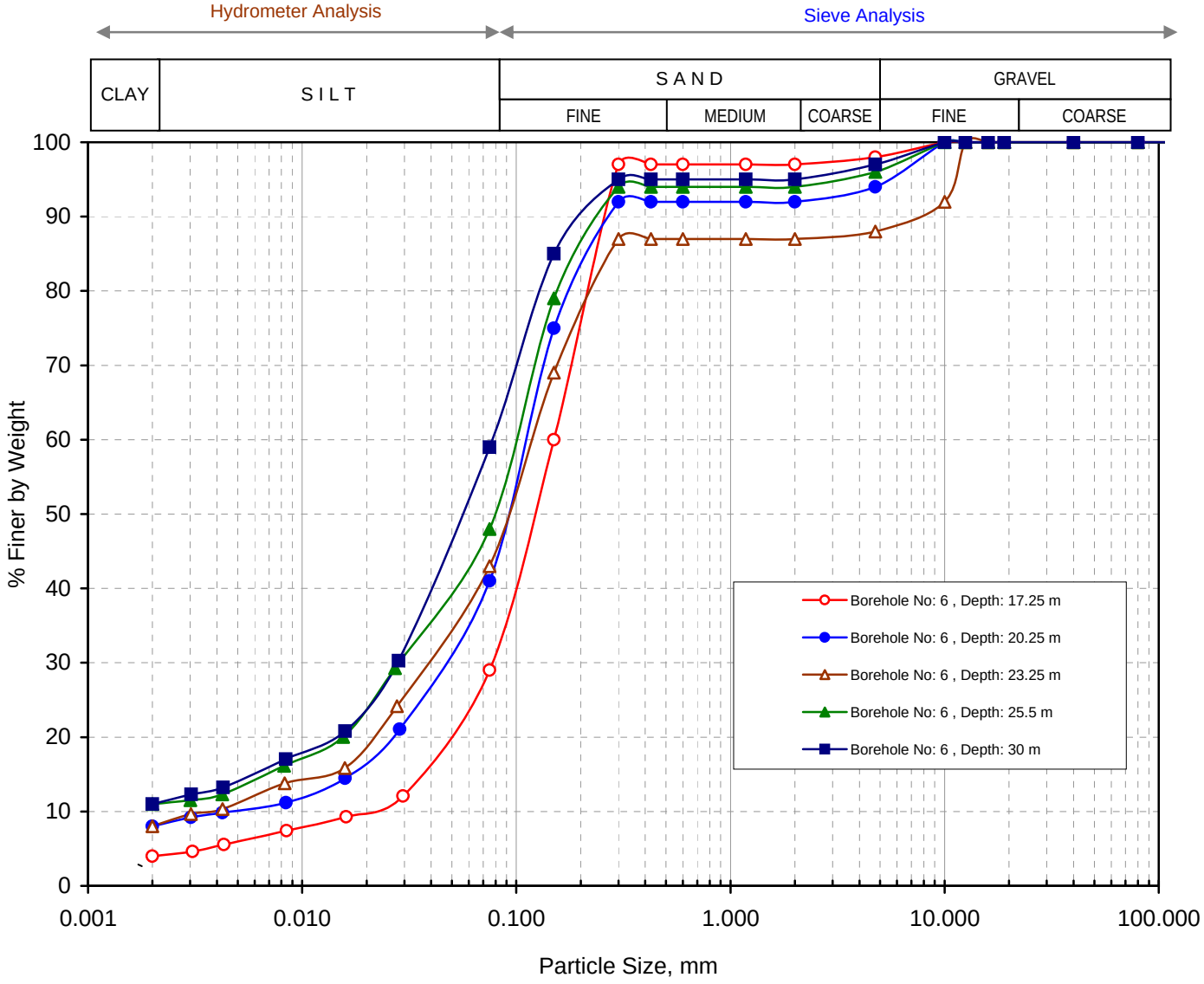
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-6	17.25	Silty sand with traces of gravel (SM)	2	69	25	4	0.150	0.077	0.019	7.9	2.08
BH-6	20.25	Silty sand with gravels (SM)	6	53	33	8	0.117	0.049	0.005	23.4	4.10
BH-6	23.25	Silty sand with gravels (SM)	12	45	35	8	0.124	0.042	0.004	31.0	3.56
BH-6	25.50	Silty fine sand with traces of gravel (SM)	4	48	37	11	0.104	0.029			
BH-6	30.00	Sandy silt with traces of gravel (CL)	3	38	48	11	0.078	0.028			



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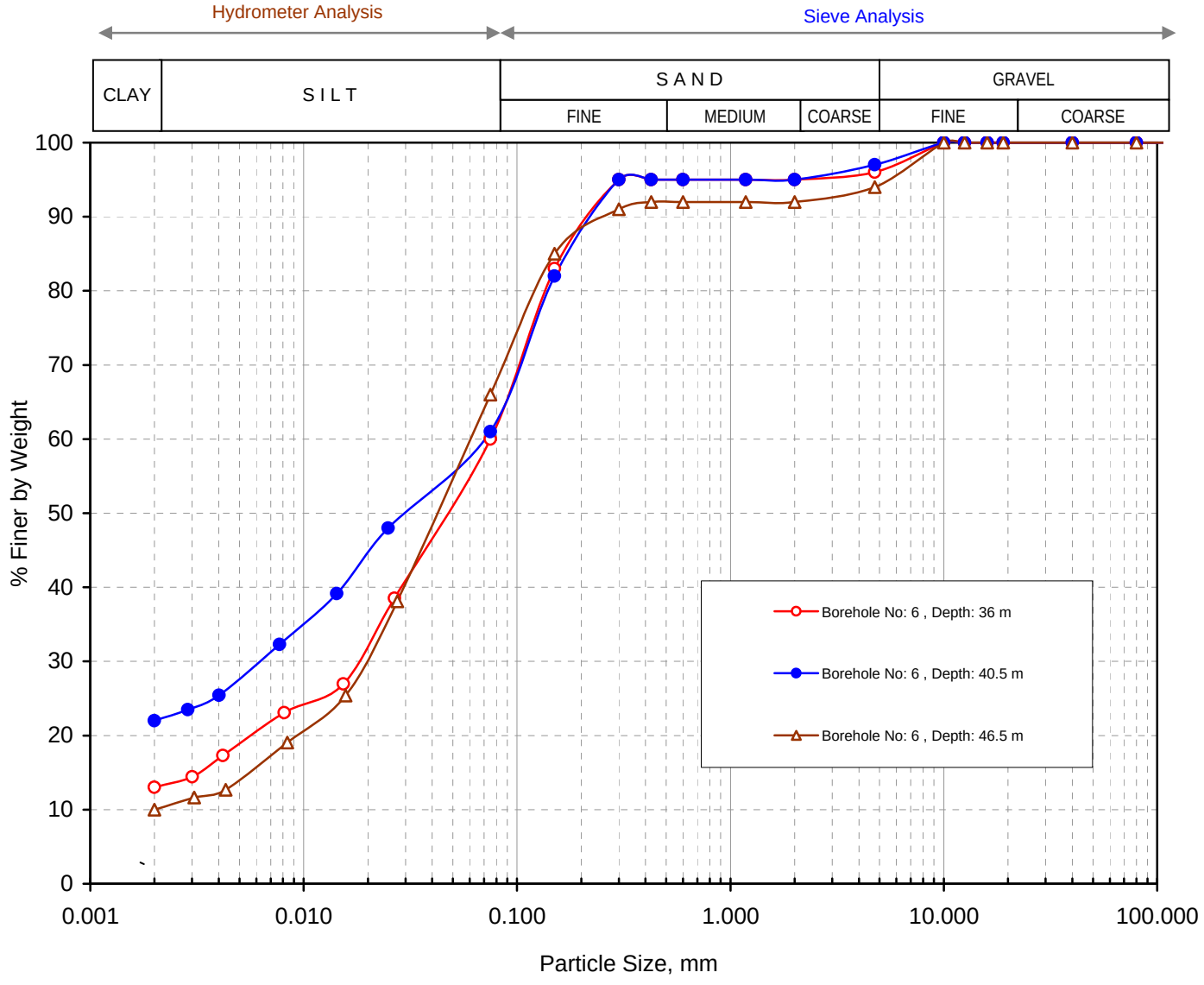
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-6	36.00	Sandy silt with traces of gravel (CL)	4	36	47	13	0.075	0.018			
BH-6	40.50	Sandy silt with traces of gravel (CL)	3	36	39	22	0.071	0.006			
BH-6	46.50	Sandy silt with gravels (CL)	6	28	56	10	0.065	0.020	0.002	32.5	3.08



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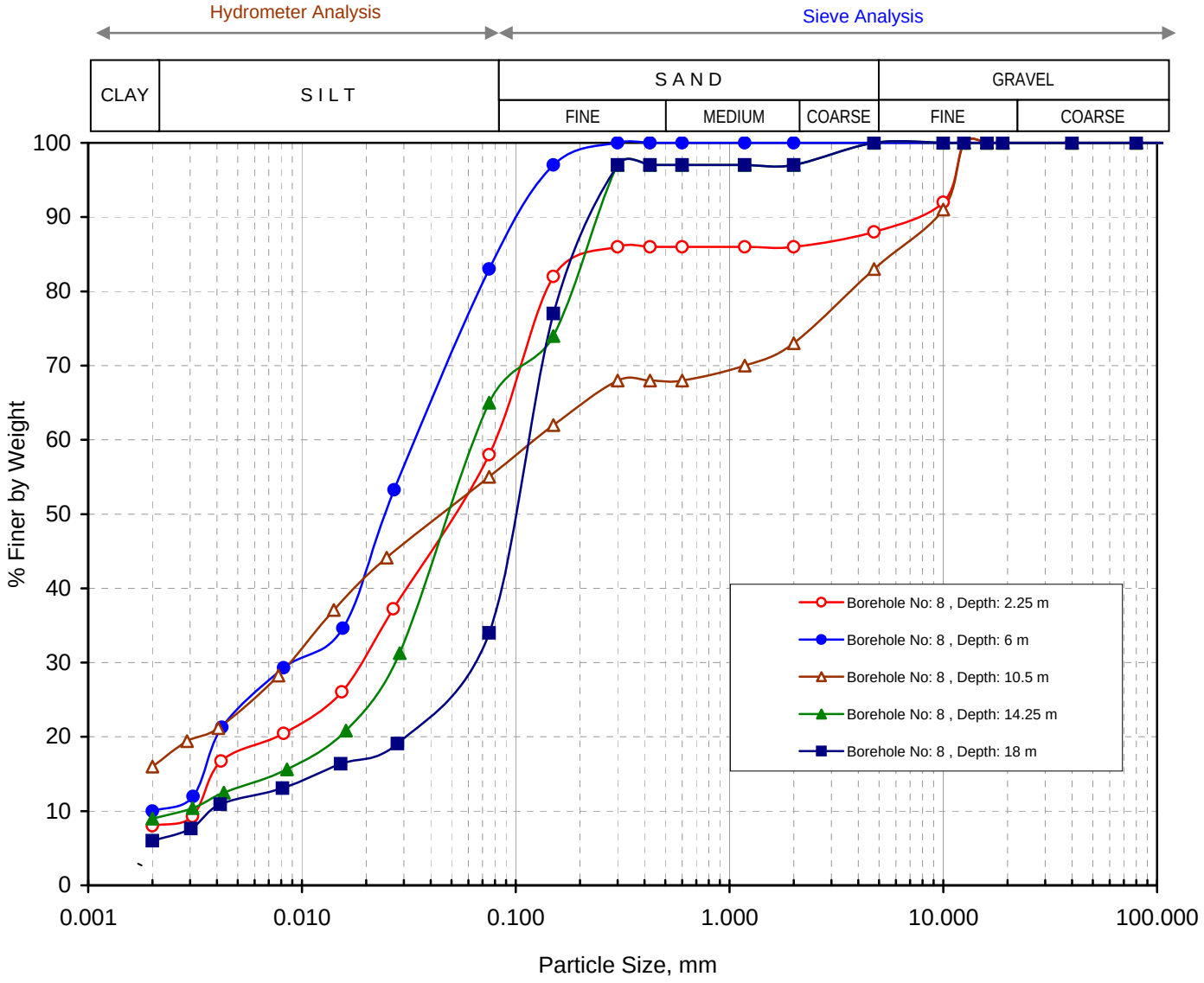
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-8	2.25	Sandy silt with gravels (CL)	12	30	50	8	0.081	0.019	0.003	27.0	1.49
BH-8	6.00	Sandy silt (CL)	0	17	73	10	0.038	0.009	0.002	19.0	1.07
BH-8	10.50	Sandy silt with gravels (CL)	17	28	39	16	0.129	0.009			
BH-8	14.25	Sandy silt (CL)	0	35	56	9	0.068	0.027	0.003	22.7	3.57
BH-8	18.00	Silty fine sand (SM)	0	66	28	6	0.120	0.062	0.004	30.0	8.01



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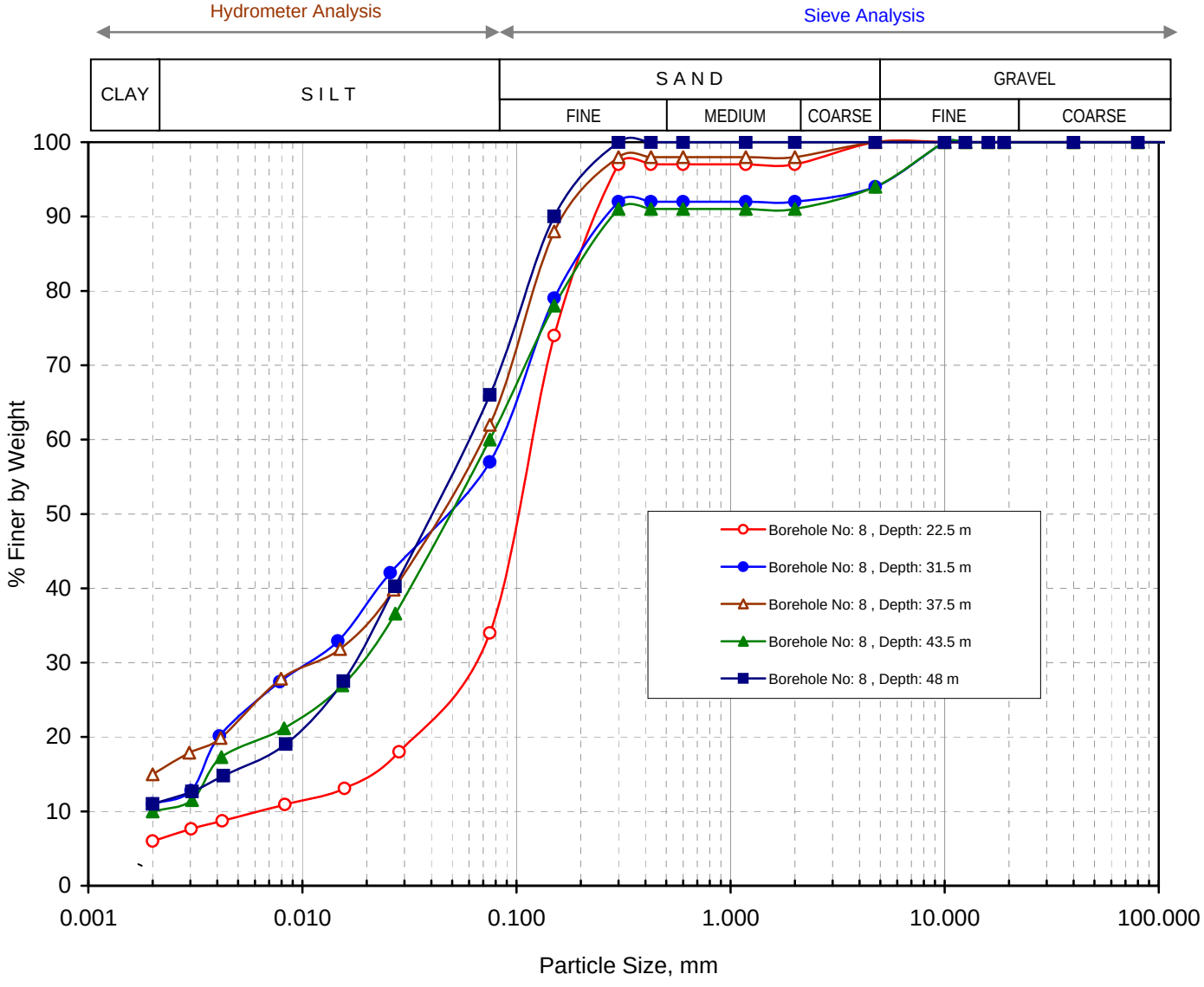
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-8	22.50	Silty fine sand (SM)	0	66	28	6	0.124	0.063	0.007	17.7	4.57
BH-8	31.50	Sandy silt with gravels (CL)	6	37	46	11	0.085	0.011			
BH-8	37.50	Sandy silt (CL)	0	38	47	15	0.071	0.012			
BH-8	43.50	Sandy silt with gravels (CL)	6	34	50	10	0.075	0.019	0.002	37.5	2.41
BH-8	48.00	Sandy silt (CL)	0	34	55	11	0.064	0.018			



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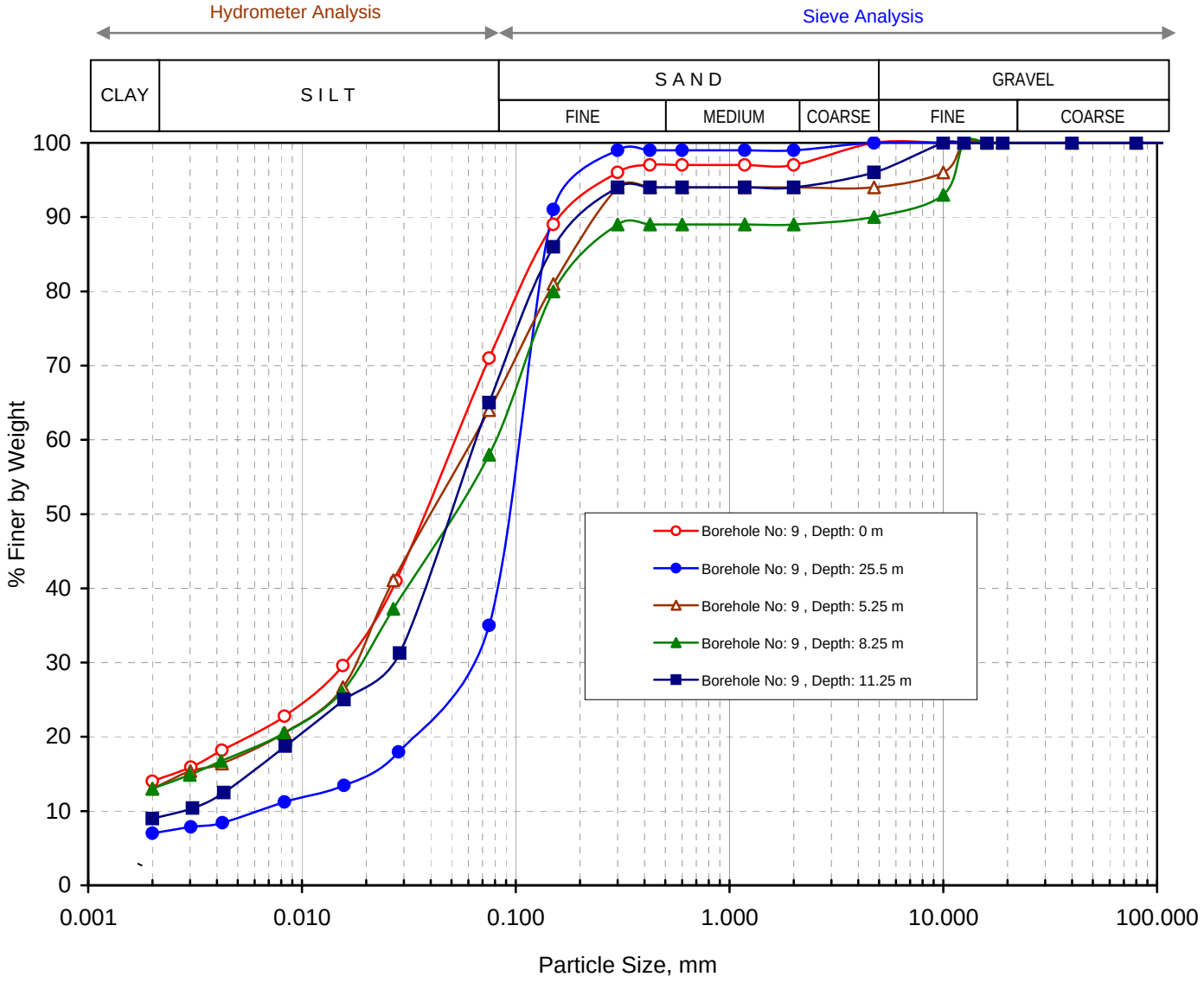
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-9	0.00	Clayey silt (CI)	0	29	57	14	0.058	0.016			
BH-9	25.50	Silty fine sand (SM)	0	65	28	7	0.108	0.061	0.007	15.4	4.92
BH-9	5.25	Sandy silt with gravels (CL)	6	30	51	13	0.067	0.018			
BH-9	8.25	Sandy silt with gravels (CL)	10	32	45	13	0.082	0.019			
BH-9	11.25	Sandy silt with gravels (CL)	4	31	56	9	0.068	0.026	0.003	22.7	3.31



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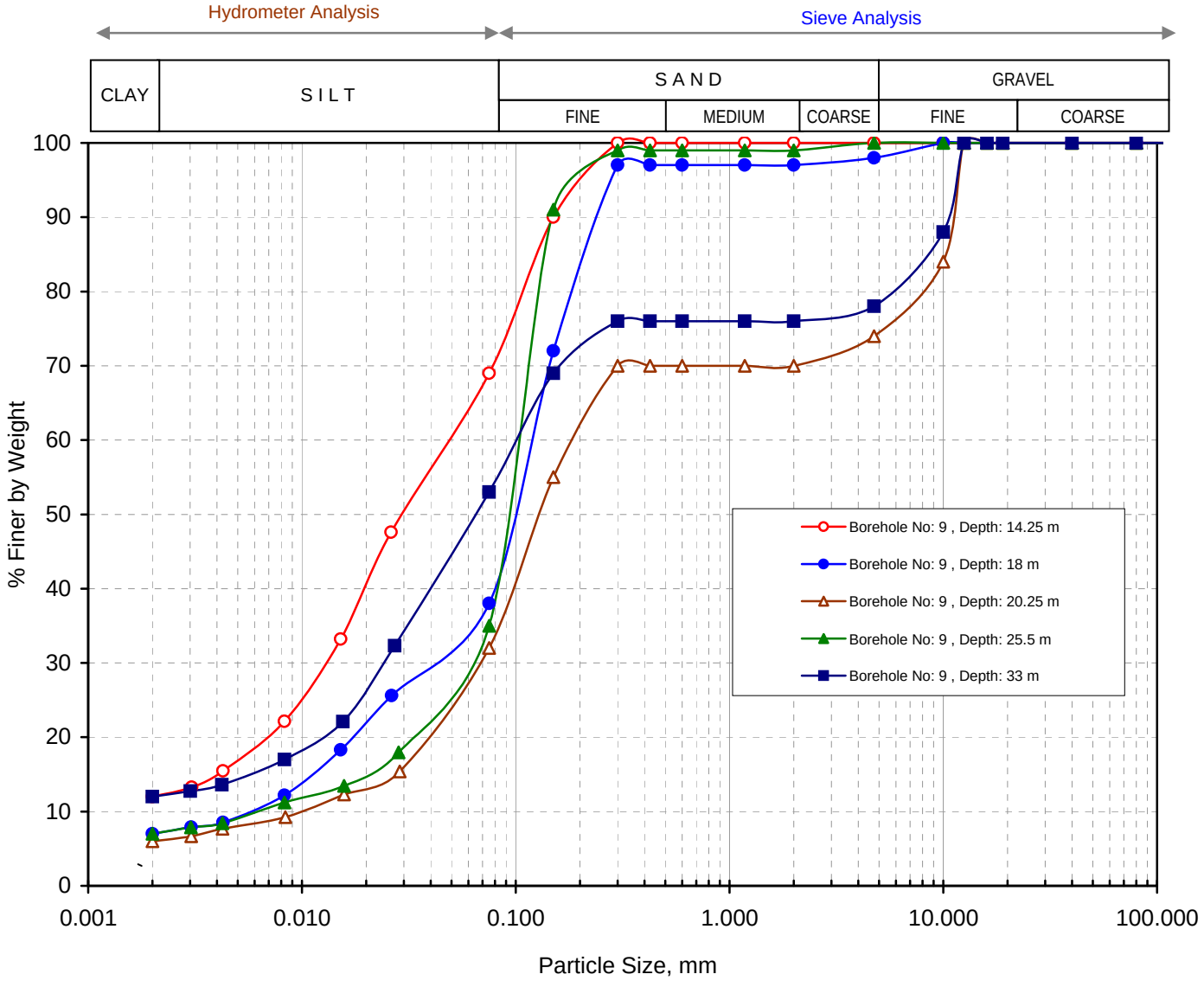
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-9	14.25	Sandy silt (CL)	0	31	57	12	0.054	0.013			
BH-9	18.00	Silty fine sand with traces of gravel (SM)	2	60	31	7	0.124	0.044	0.006	20.7	2.60
BH-9	20.25	Silty fine sand intermixed with gravels (SM)	26	42	26	6	0.200	0.069	0.010	20.0	2.38
BH-9	25.50	Silty fine sand (SM)	0	65	28	7	0.108	0.061	0.007	15.4	4.92
BH-9	33.00	Sandy silt with gravels (CL)	22	25	41	12	0.108	0.024			



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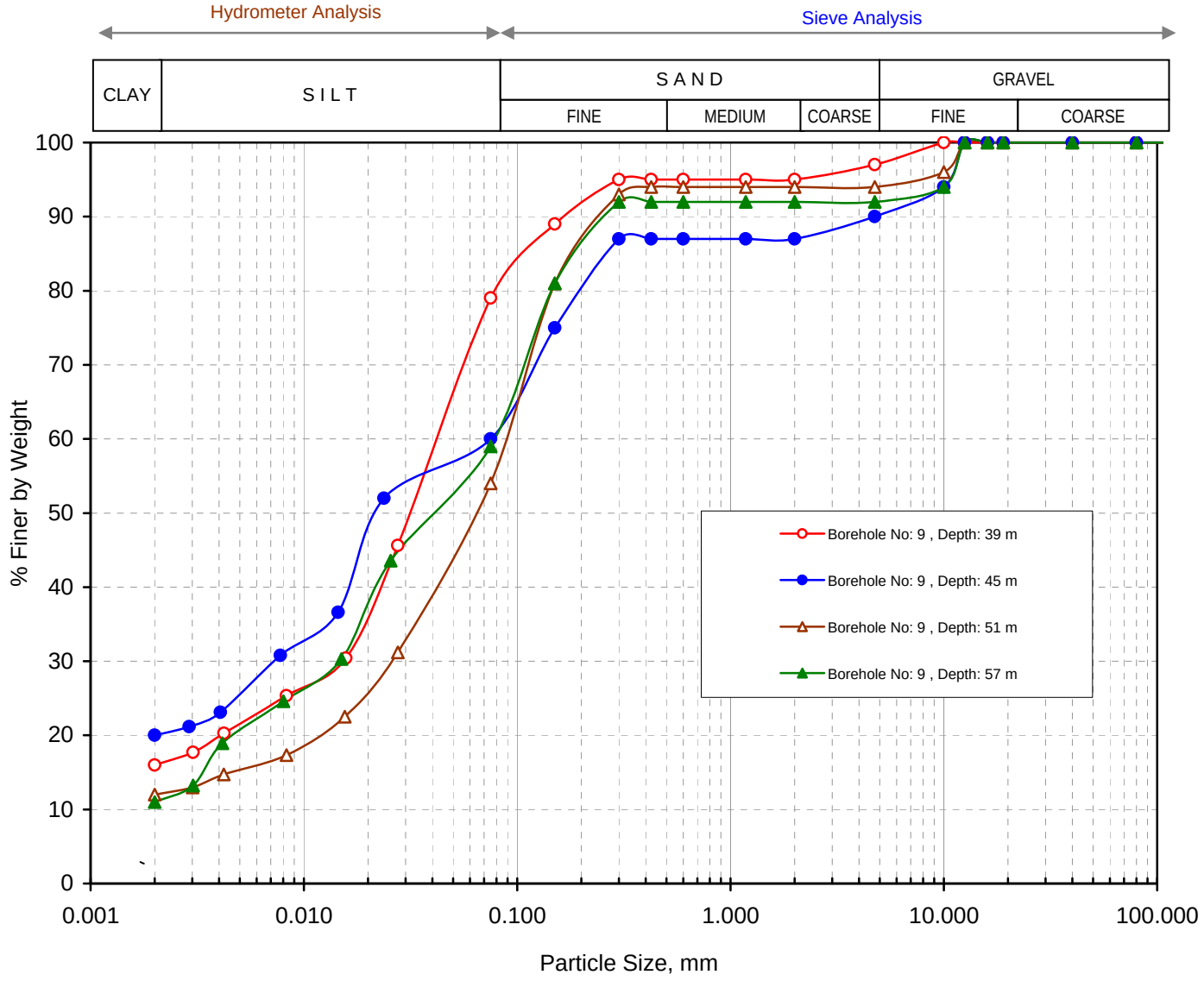
Grain Size Distribution Curve

Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D_{60}	D_{30}	D_{10}	C_u	C_c
BH-9	39.00	Sandy silt with traces of gravel (CL)	3	18	63	16	0.048	0.015			
BH-9	45.00	Sandy silt with gravels (CL)	10	30	40	20	0.075	0.007			
BH-9	51.00	Sandy silt with gravels (CL)	6	40	42	12	0.092	0.026			
BH-9	57.00	Sandy silt with gravels (CL)	8	33	48	11	0.078	0.015			



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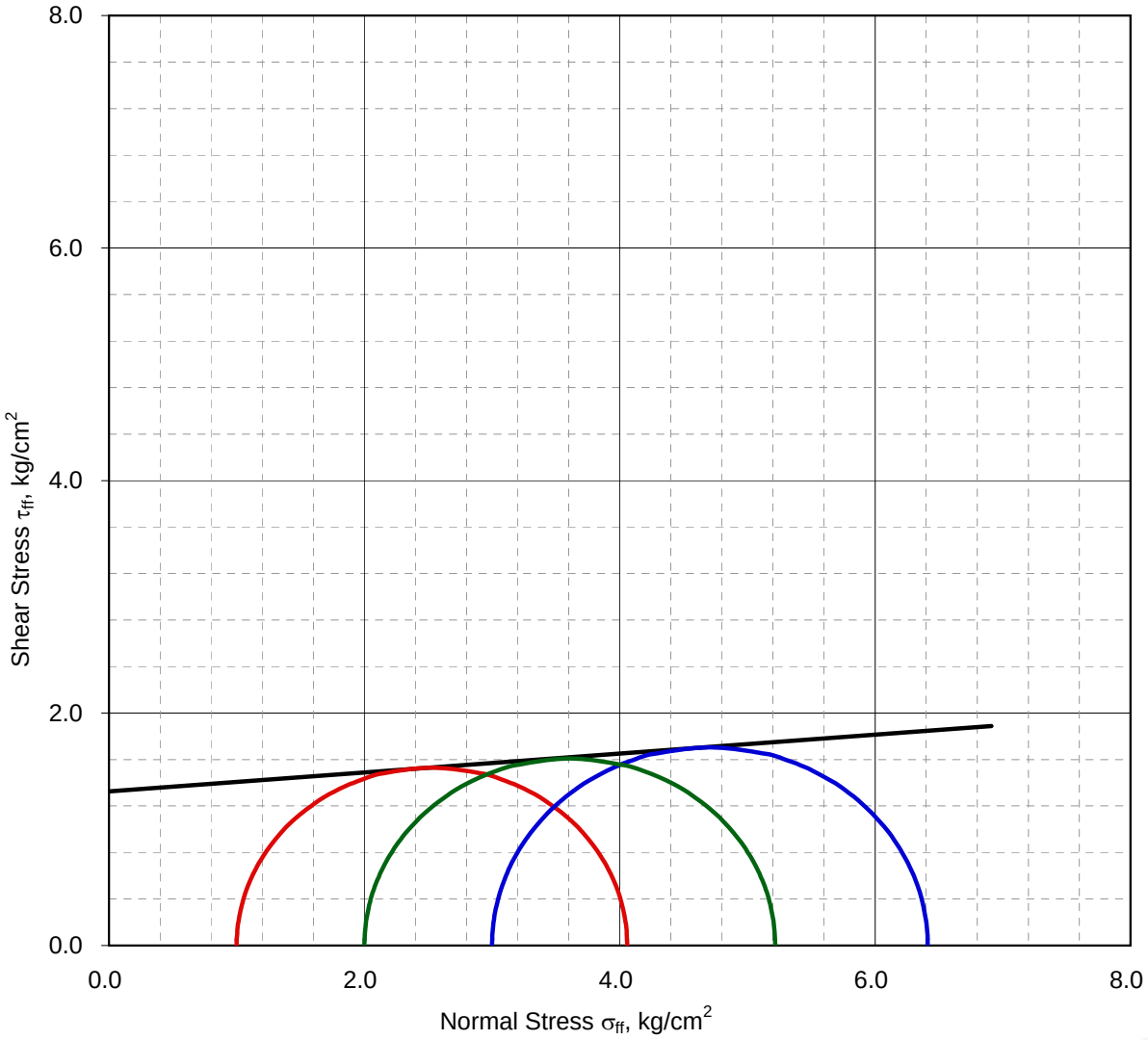
Grain Size Distribution Curve

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-2		Sample Depth: 8.25 m	
	Sample No.: UDS-3		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.84	1.85	1.85
	Dry Density (g/cc):	1.67	1.67	1.67
	Moisture Content (%):	10.8	10.7	10.8
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	3.06	3.22	3.41
	Failure Strain, ε_f (%):	23.7	23.7	23.7
	Cohesion Intercept, c:	**1.30**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**4.6**	**degrees**	



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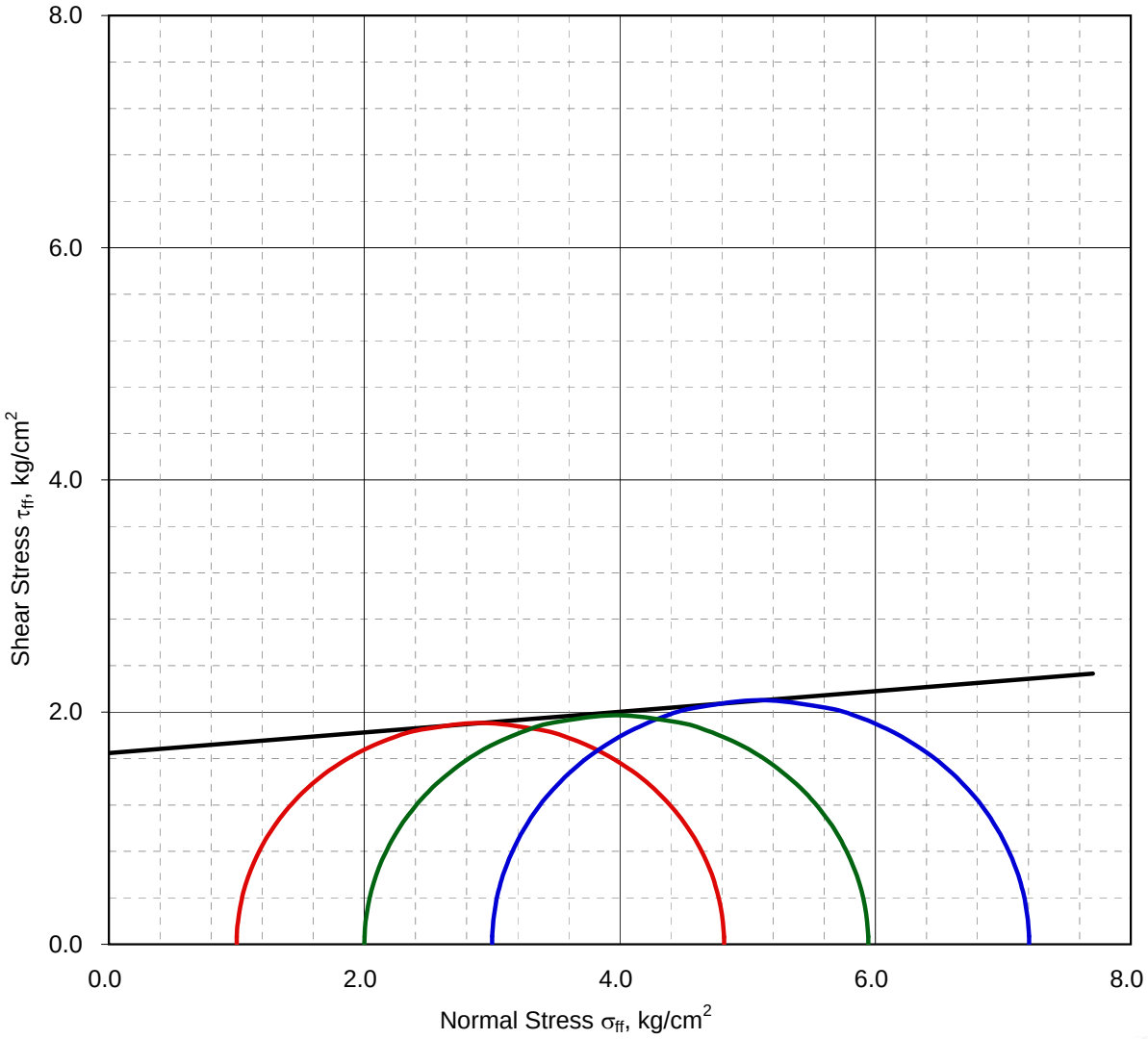
Mohr-Coulomb Failure Envelope

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-2		Sample Depth: 20.25 m	
	Sample No.: UDS-7		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.85	1.84	1.85
	Dry Density (g/cc):	1.65	1.65	1.66
	Moisture Content (%):	12.0	11.8	11.8
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	3.82	3.95	4.20
	Failure Strain, ε_f (%):	23.7	23.7	23.7
	Cohesion Intercept, c:	**1.60**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**5.1**	**degrees**	



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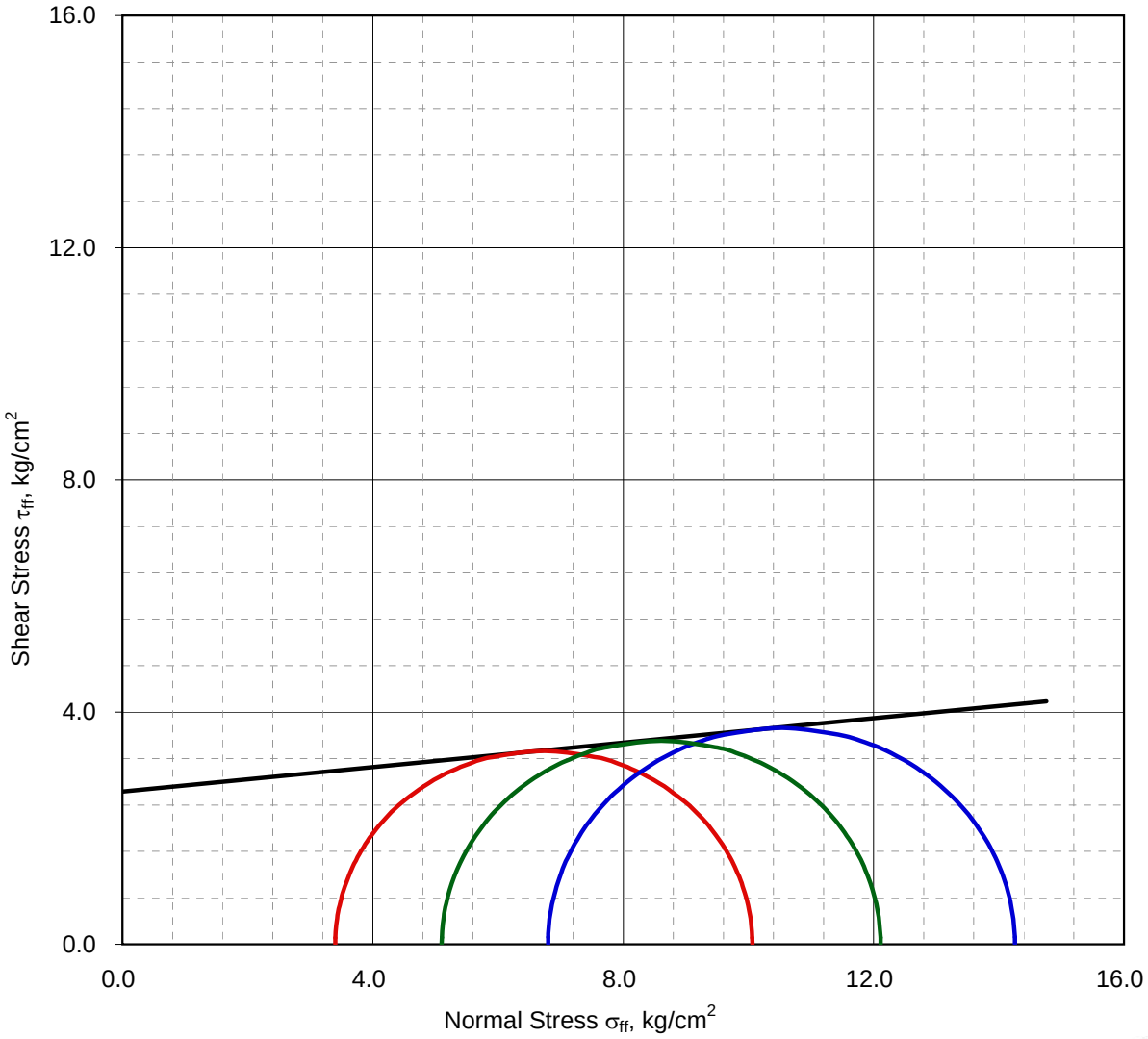
Mohr-Coulomb Failure Envelope

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-2		Sample Depth: 35.25 m	
	Sample No.: UDS-12		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	3.4	5.1	6.8
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.94	1.95	1.94
	Dry Density (g/cc):	1.74	1.74	1.74
	Moisture Content (%):	11.5	11.7	11.4
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	6.66	7.01	7.46
	Failure Strain, ε_f (%):	23.7	23.7	18.4
	Cohesion Intercept, c:	**2.60**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**6.0**	**degrees**	



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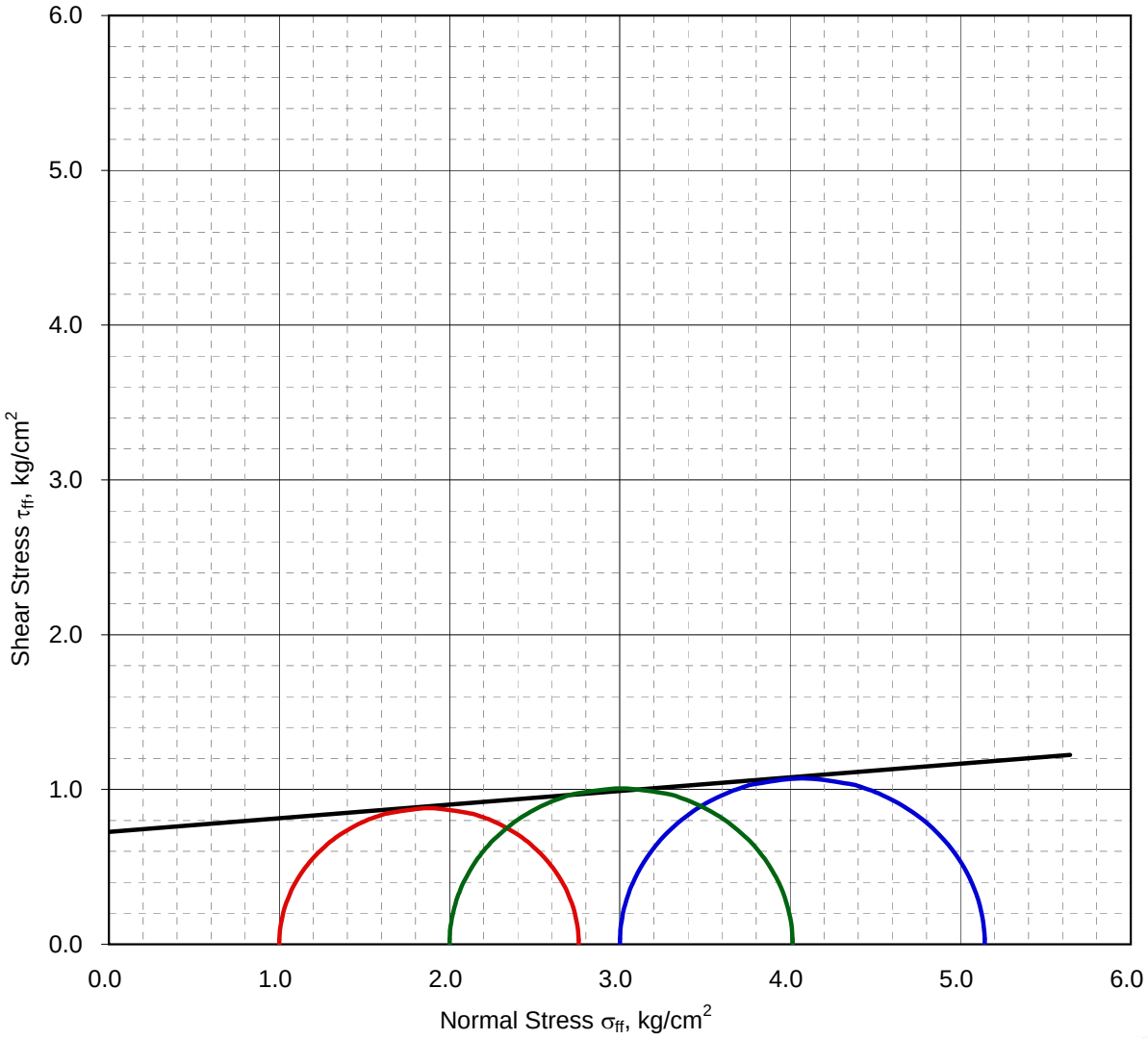
Mohr-Coulomb Failure Envelope

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-4		Sample Depth: 5.25 m	
	Sample No.: UDS-2		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.87	1.88	1.87
	Dry Density (g/cc):	1.68	1.68	1.68
	Moisture Content (%):	11.5	12.0	10.9
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	1.76	2.01	2.14
	Failure Strain, ε_f (%):	23.7	23.7	23.7
	Cohesion Intercept, c:	**0.70**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**5.0**	**degrees**	



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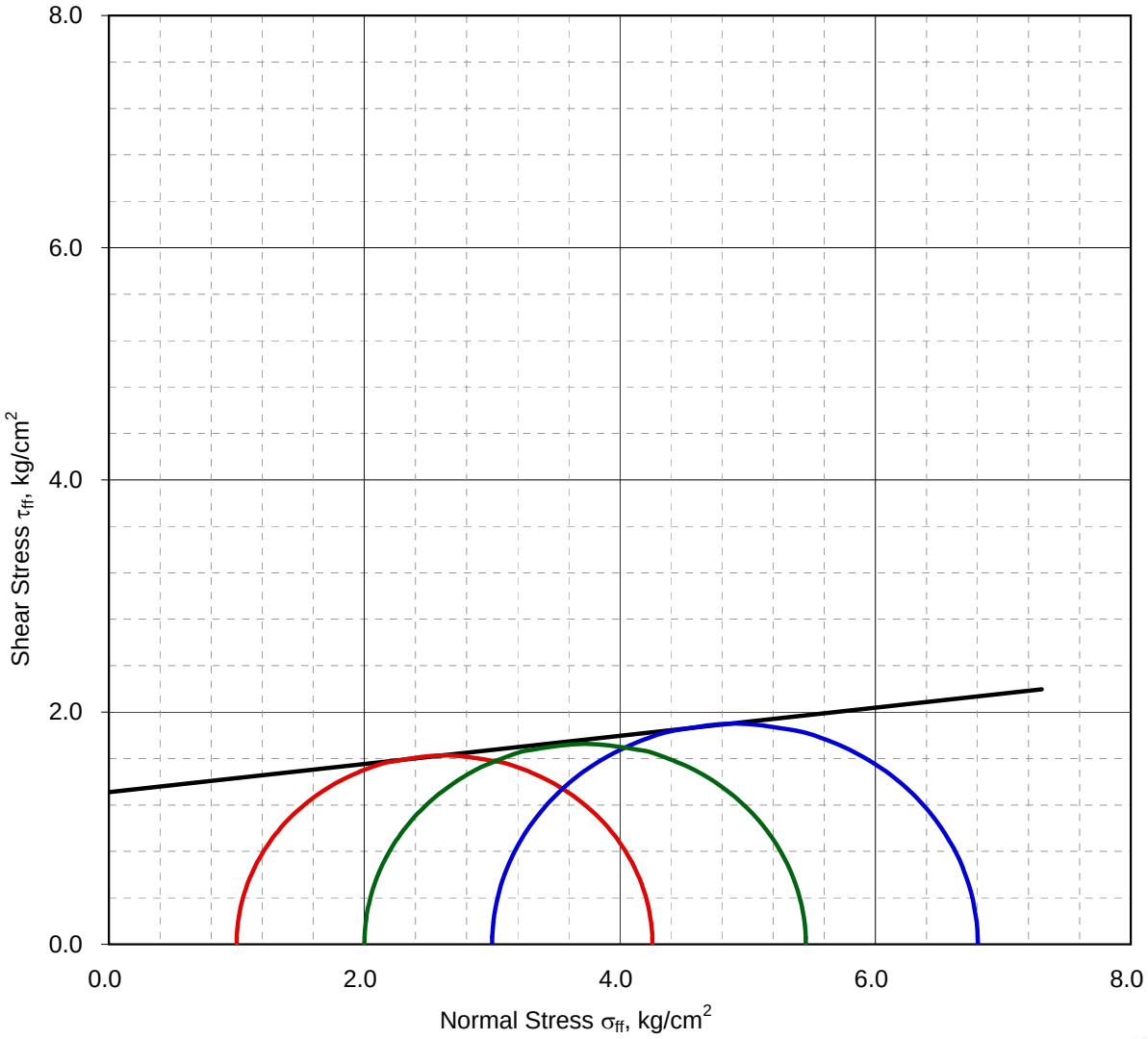
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-4		Sample Depth: 14.25 m	
	Sample No.: UDS-5		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.87	1.87	1.87
	Dry Density (g/cc):	1.66	1.66	1.66
	Moisture Content (%):	13.2	13.0	13.1
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	3.26	3.46	3.80
	Failure Strain, ε_f (%):	21.1	21.1	21.1
	Cohesion Intercept, c:	**1.30**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**6.9**	**degrees**	



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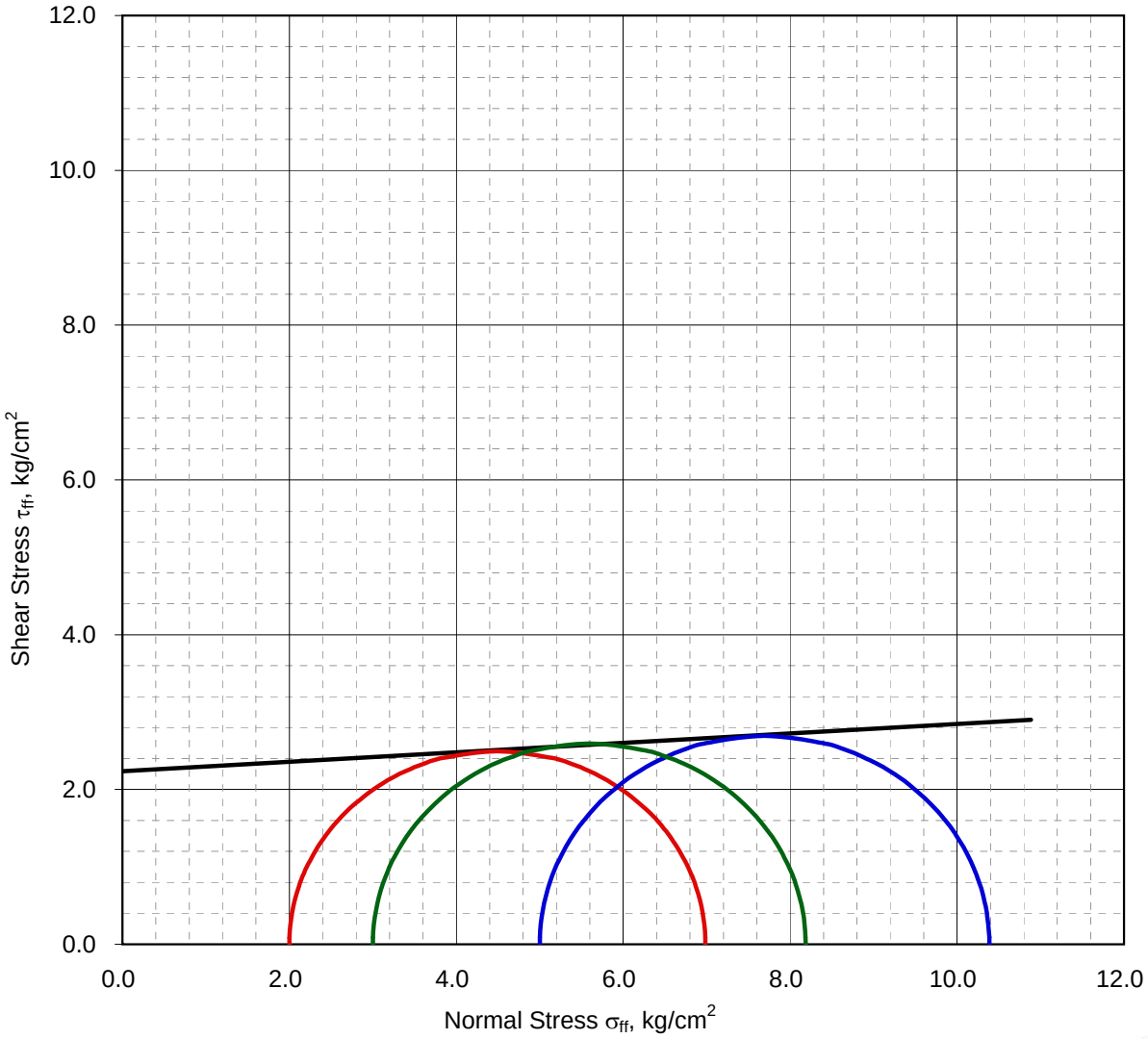
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-4	Sample Depth: 26.25 m		
	Sample No.: UDS-9	Sample Description: Sandy silt		
	Confining Pressure, σ_0 (kg/cm^2):	2.0	3.0	5.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.92	1.92	1.92
	Dry Density (g/cc):	1.72	1.72	1.72
	Moisture Content (%):	11.4	11.1	11.3
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	4.99	5.19	5.39
	Failure Strain, ε_f (%):	13.2	13.2	13.2
	Cohesion Intercept, c:	**2.20**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**3.5**	**degrees**	



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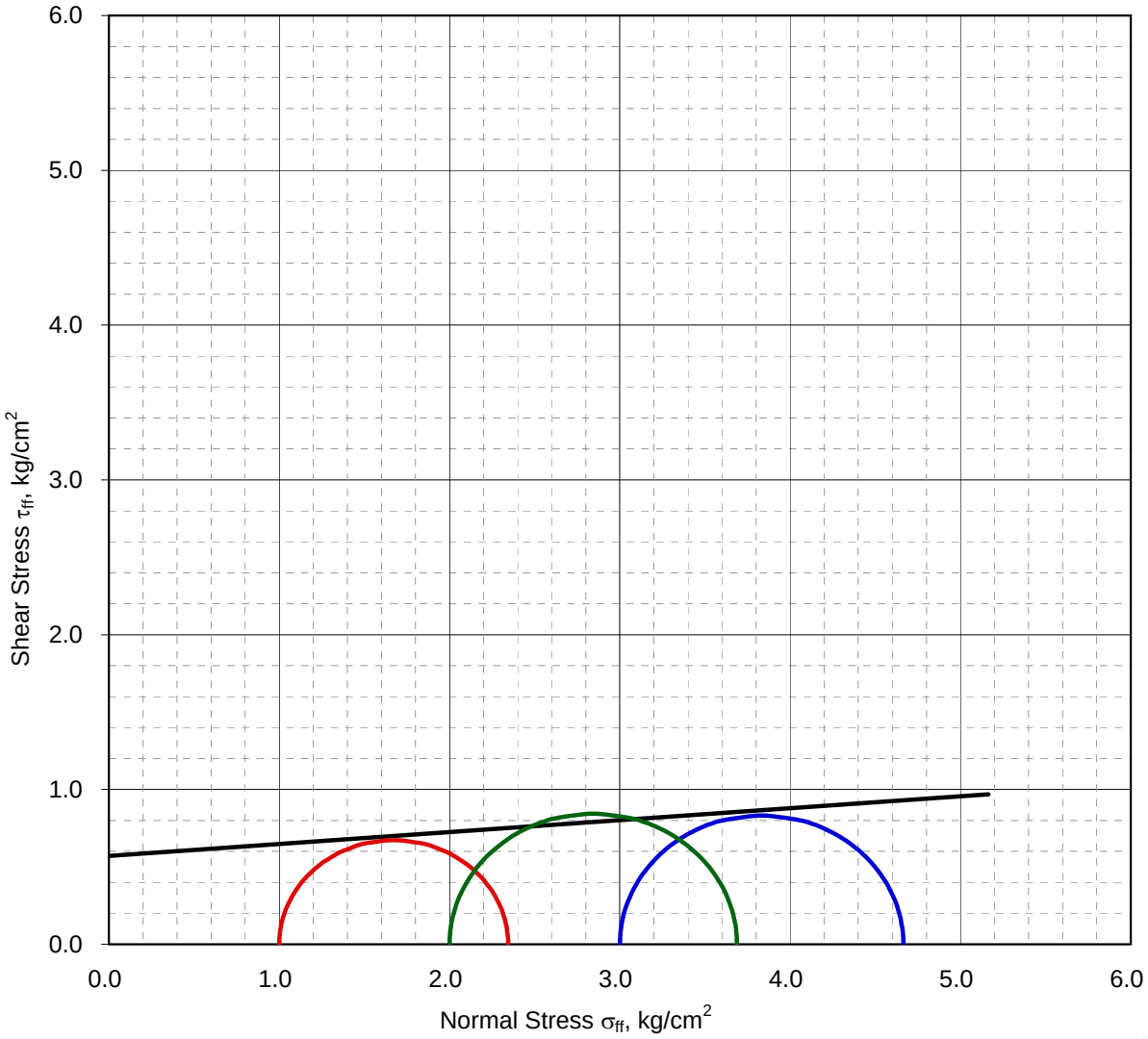
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-6		Sample Depth: 2.25 m	
	Sample No.: UDS-1		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.75	1.75	1.75
	Dry Density (g/cc):	1.64	1.63	1.63
	Moisture Content (%):	7.3	7.3	7.8
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	1.34	1.69	1.66
	Failure Strain, ε_f (%):	0.7	0.7	0.7
	Cohesion Intercept, c:	**0.60**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**4.4**	**degrees**	



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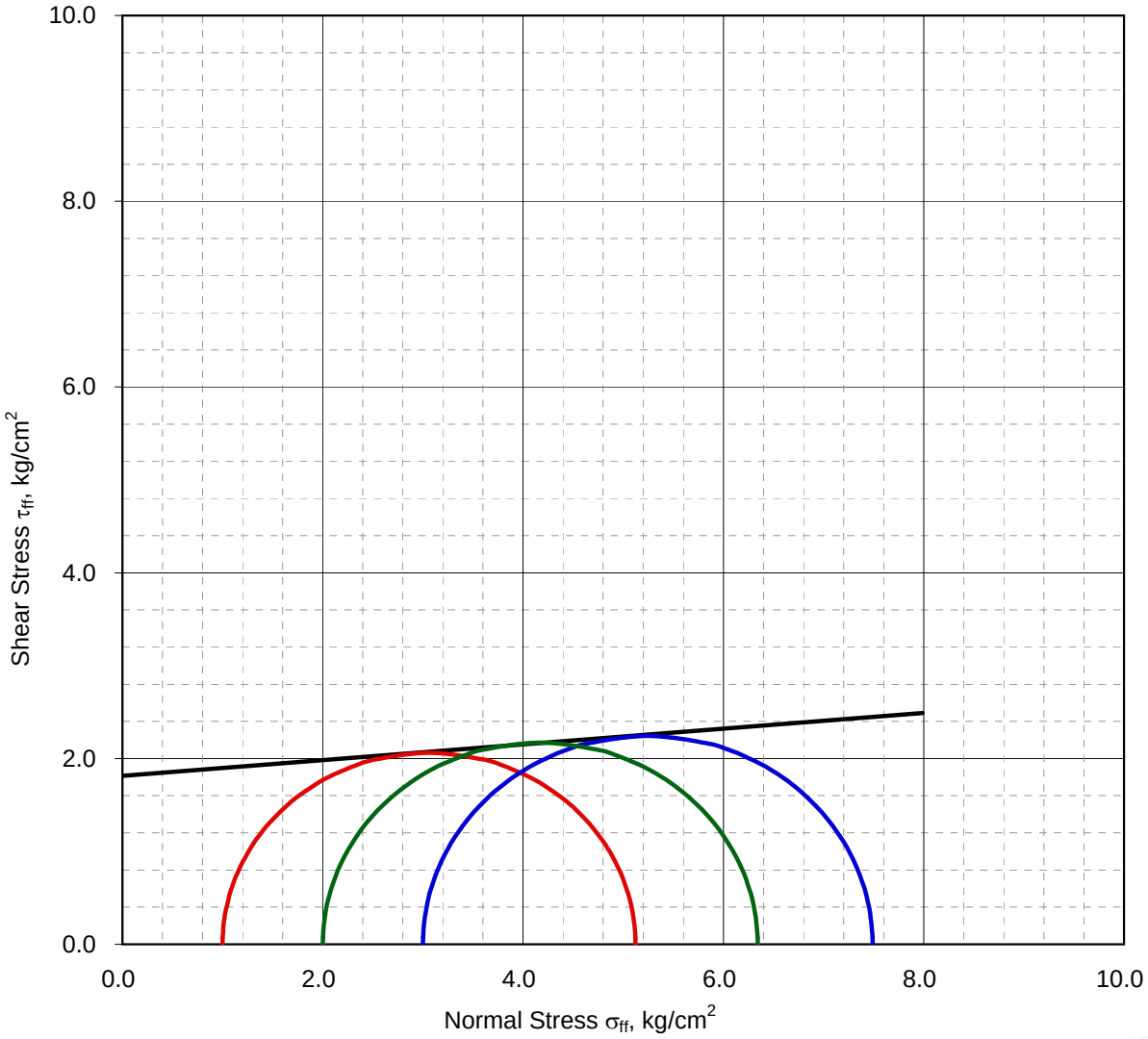
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-6		Sample Depth: 11.25 m	
	Sample No.: UDS-4		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.91	1.90	1.90
	Dry Density (g/cc):	1.72	1.71	1.71
	Moisture Content (%):	11.3	11.5	11.5
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	4.12	4.34	4.49
	Failure Strain, ε_f (%):	13.2	13.2	13.2
	Cohesion Intercept, c:	**1.80**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**4.8**	**degrees**	



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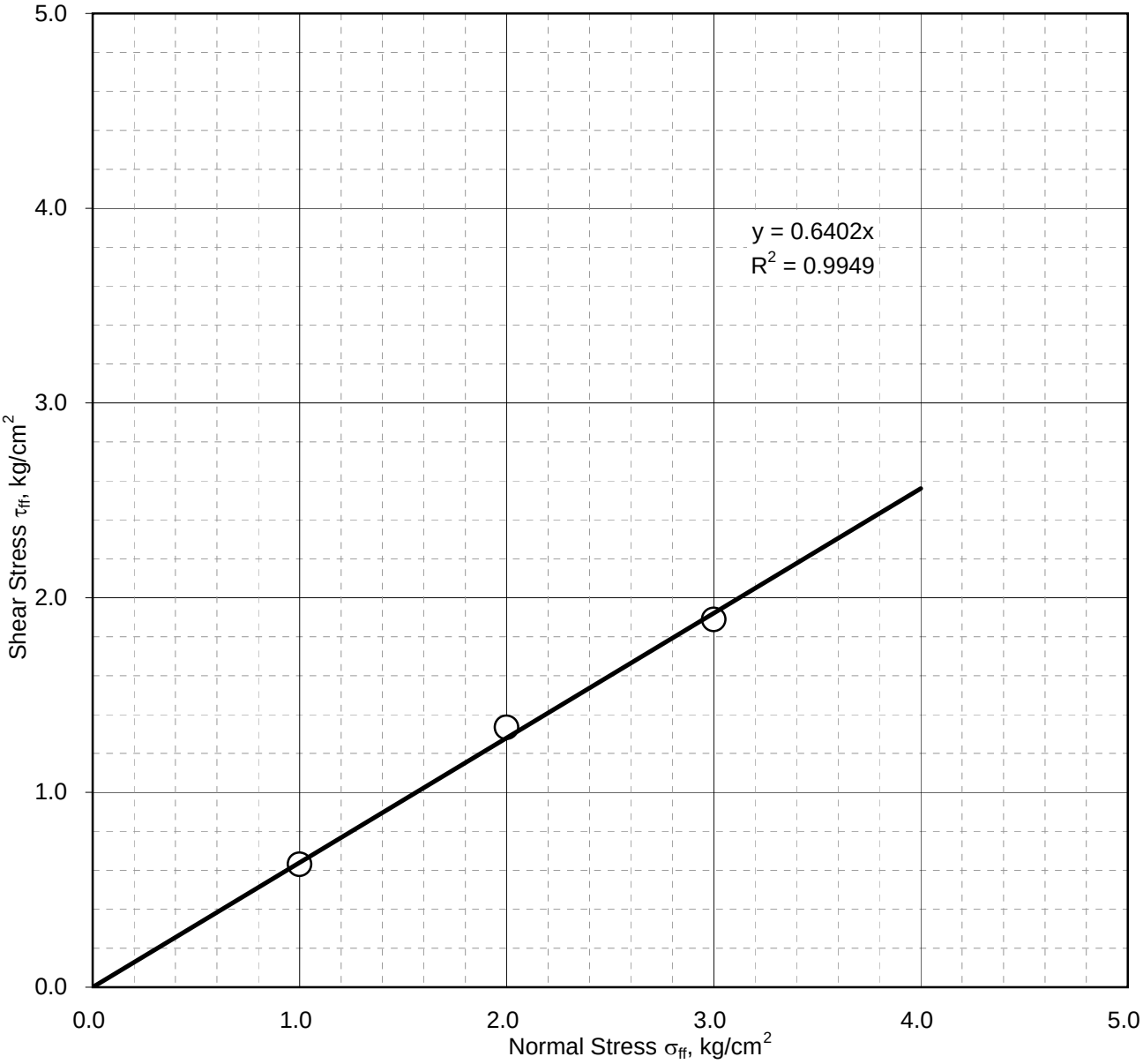
Mohr-Coulomb Failure Envelope

Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-6	Sample Depth: 17.25 m	
	Sample No.: UDS-6	Sample Description: Silty sand	
Test Results	Dry Density of Soil (g/cm^3):	1.70	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, c :	**0.00**	**kg/cm^2**
	Angle of Internal Friction, ϕ :	**32.6**	**degrees**



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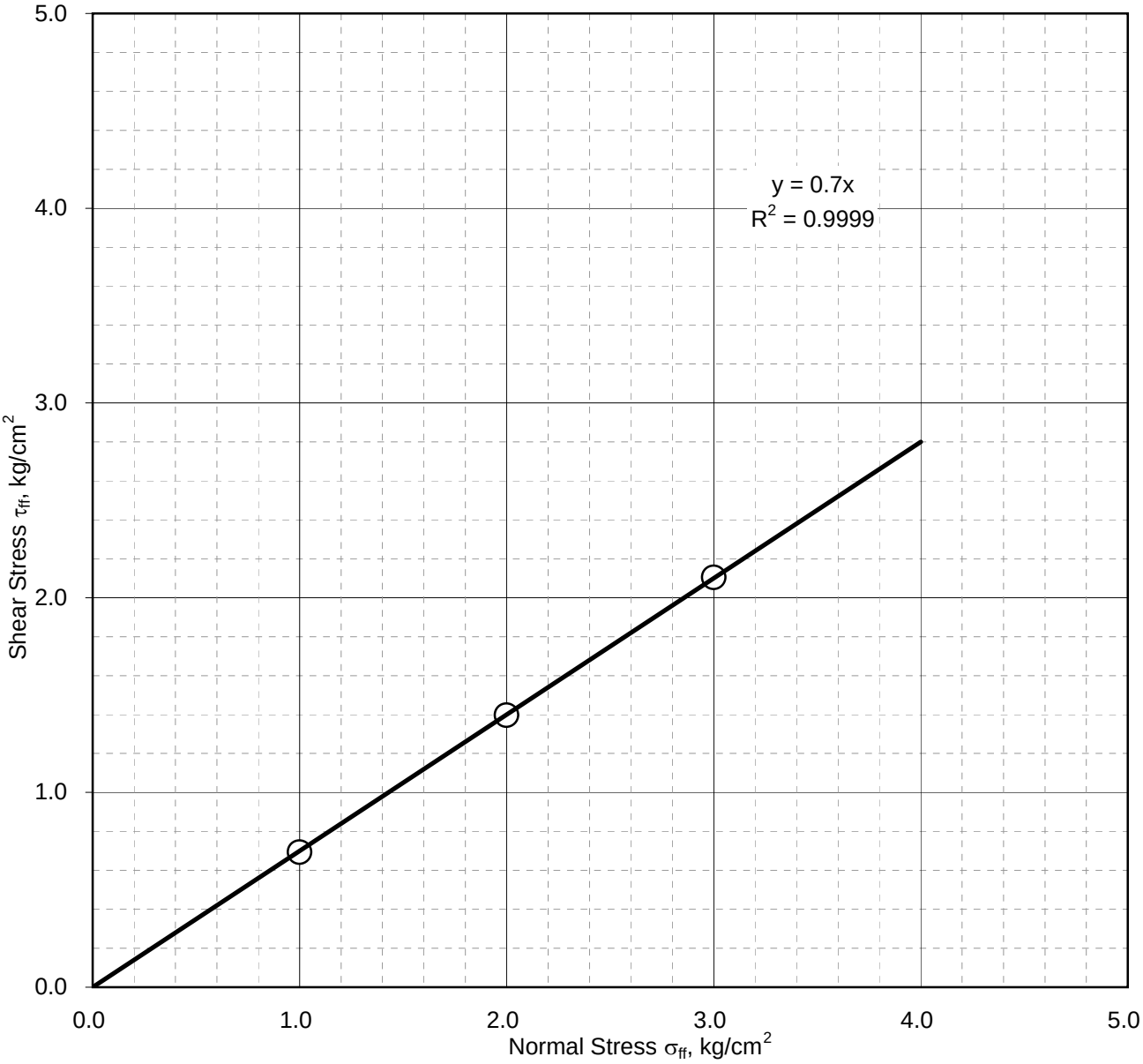
Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-6	Sample Depth: 23.25 m	
	Sample No.: UDS-8	Sample Description: Silty sand	
Test Results	Dry Density of Soil (g/cm^3):	1.70	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, c :	**0.00**	**kg/cm^2**
	Angle of Internal Friction, ϕ :	**35.0**	**degrees**



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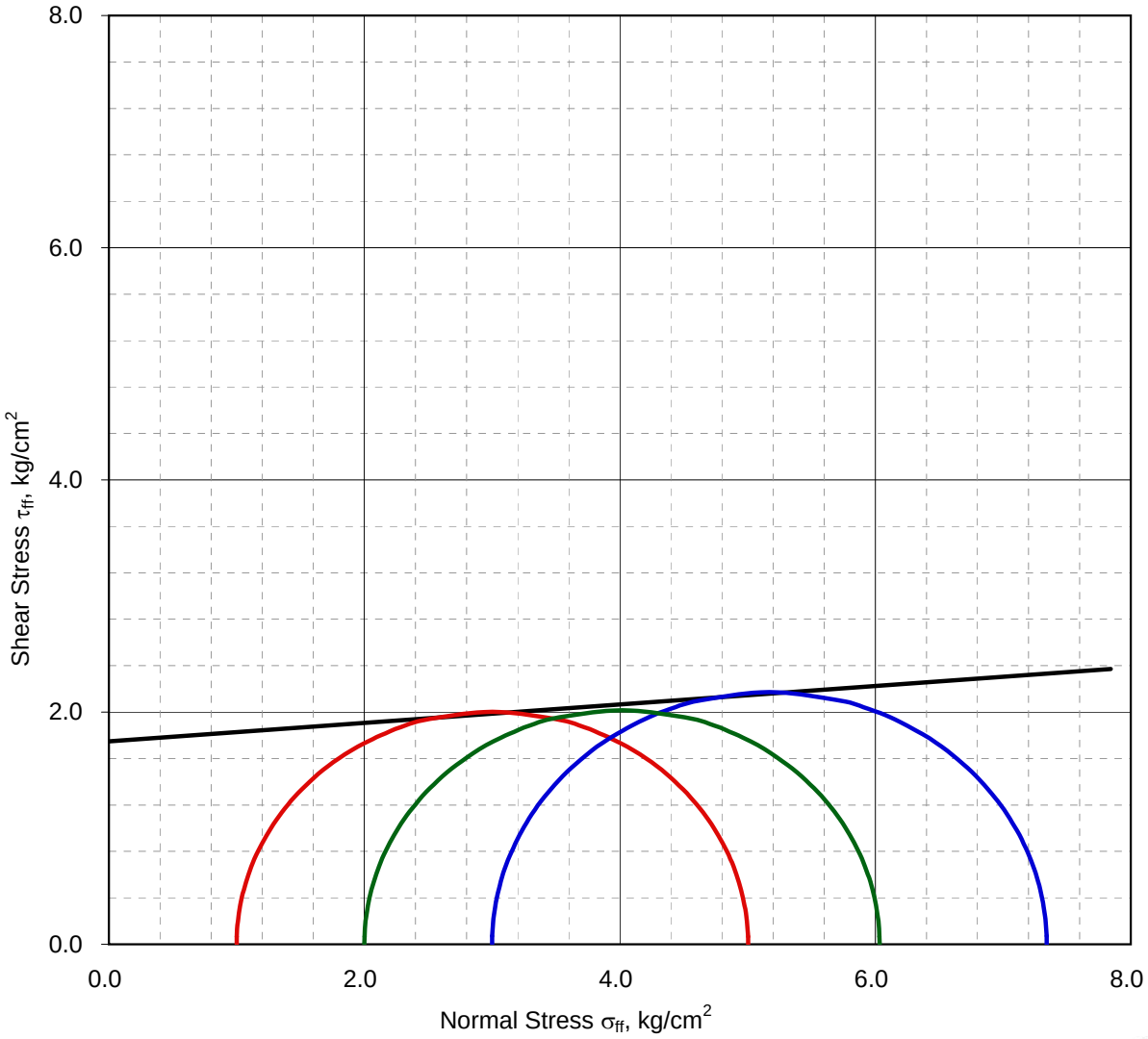
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-8		Sample Depth: 2.25 m	
	Sample No.: UDS-1		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.76	1.76	1.76
	Dry Density (g/cc):	1.66	1.66	1.65
	Moisture Content (%):	6.2	6.4	6.7
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	4.00	4.03	4.34
	Failure Strain, ε_f (%):	13.2	13.2	13.2
	Cohesion Intercept, c:	**1.70**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**4.5**	**degrees**	



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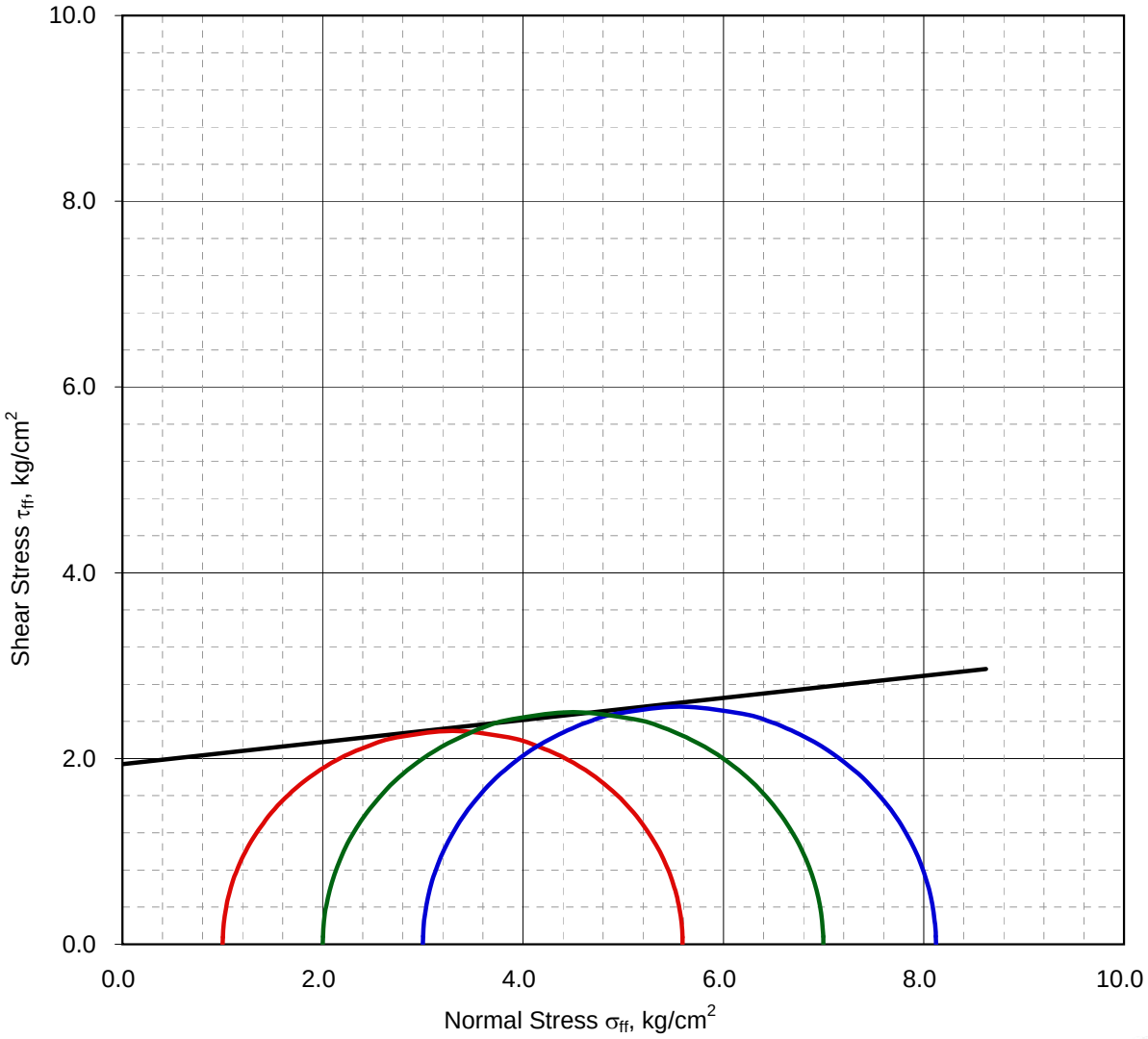
Mohr-Coulomb Failure Envelope

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-8		Sample Depth: 8.25 m	
	Sample No.: UDS-3		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.91	1.91	1.91
	Dry Density (g/cc):	1.74	1.74	1.73
	Moisture Content (%):	9.6	9.3	10.0
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	4.59	5.00	5.12
	Failure Strain, ε_f (%):	23.7	23.7	23.7
	Cohesion Intercept, c:	**1.90**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**6.8**	**degrees**	



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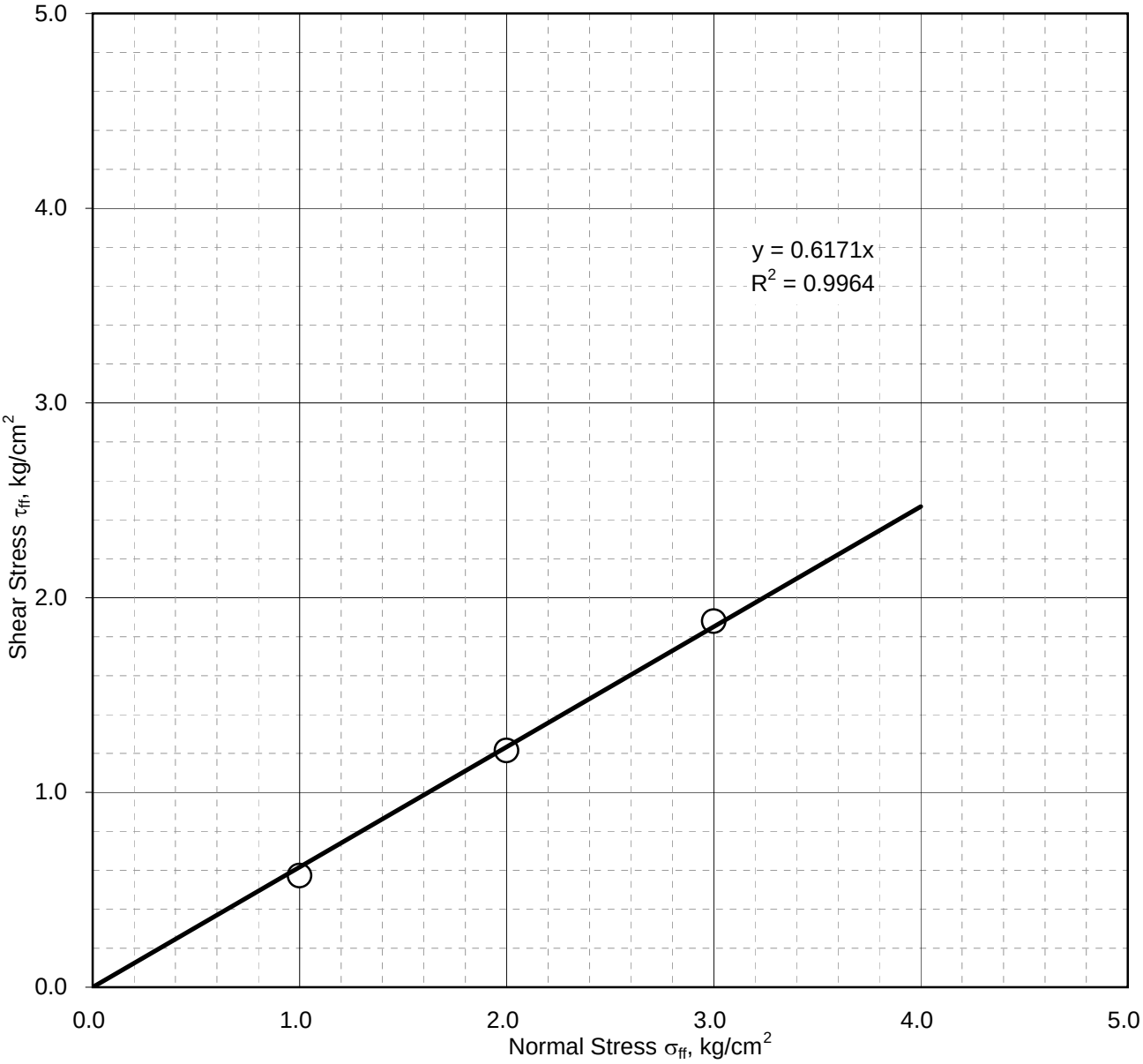
Mohr-Coulomb Failure Envelope

Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-8	Sample Depth: 17.25 m	
	Sample No.: UDS-6	Sample Description: Silty fine sand	
Test Results	Dry Density of Soil (g/cm^3):	1.62	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, c :	**0.00**	**kg/cm^2**
	Angle of Internal Friction, ϕ :	**31.7**	**degrees**



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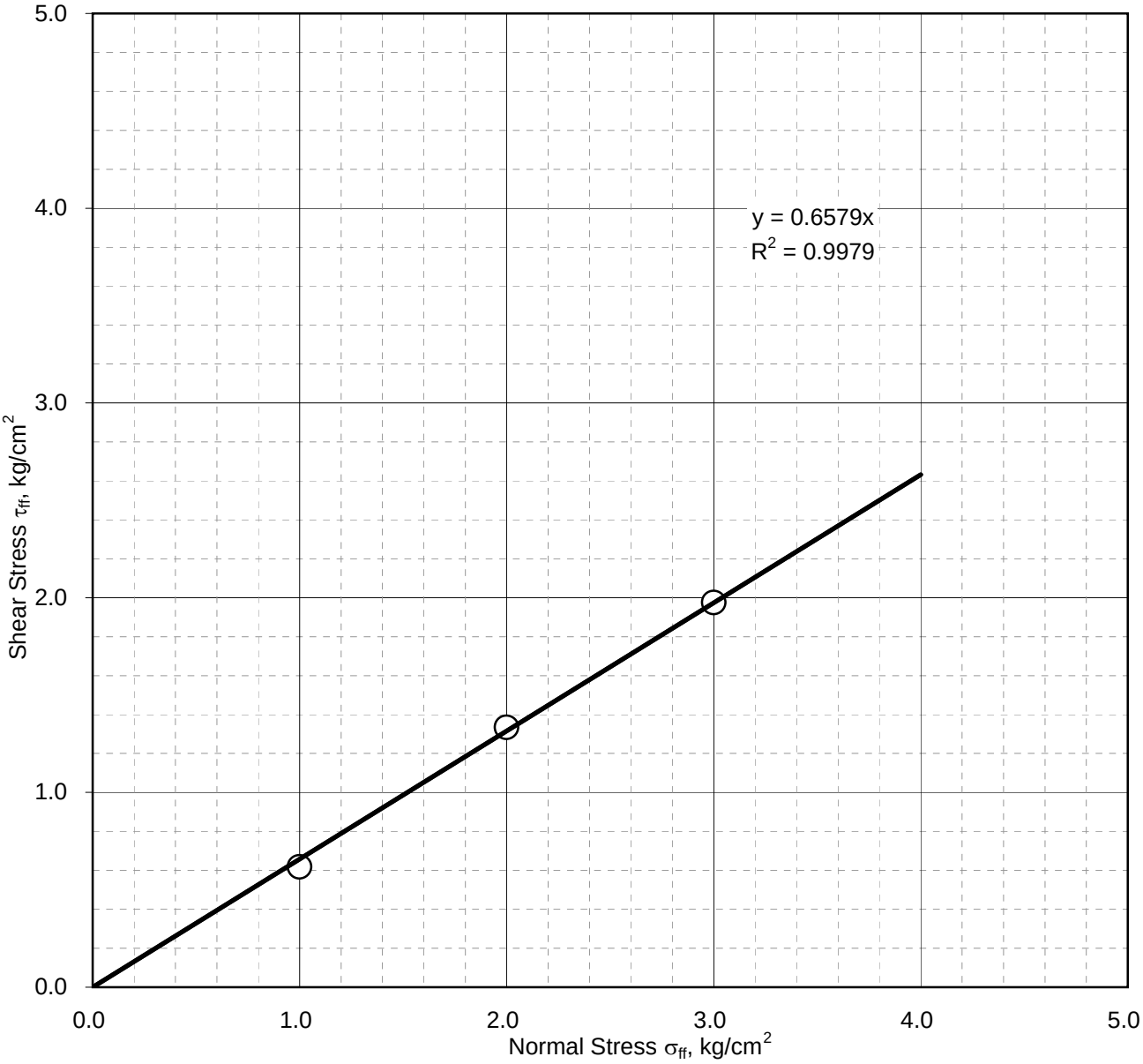
Mohr-Coulomb Failure Envelope

Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-8	Sample Depth: 23.25 m	
	Sample No.: UDS-8	Sample Description: Silty fine sand	
Test Results	Dry Density of Soil (g/cm^3):	1.72	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, c :	**0.00**	**kg/cm^2**
	Angle of Internal Friction, ϕ :	**33.3**	**degrees**



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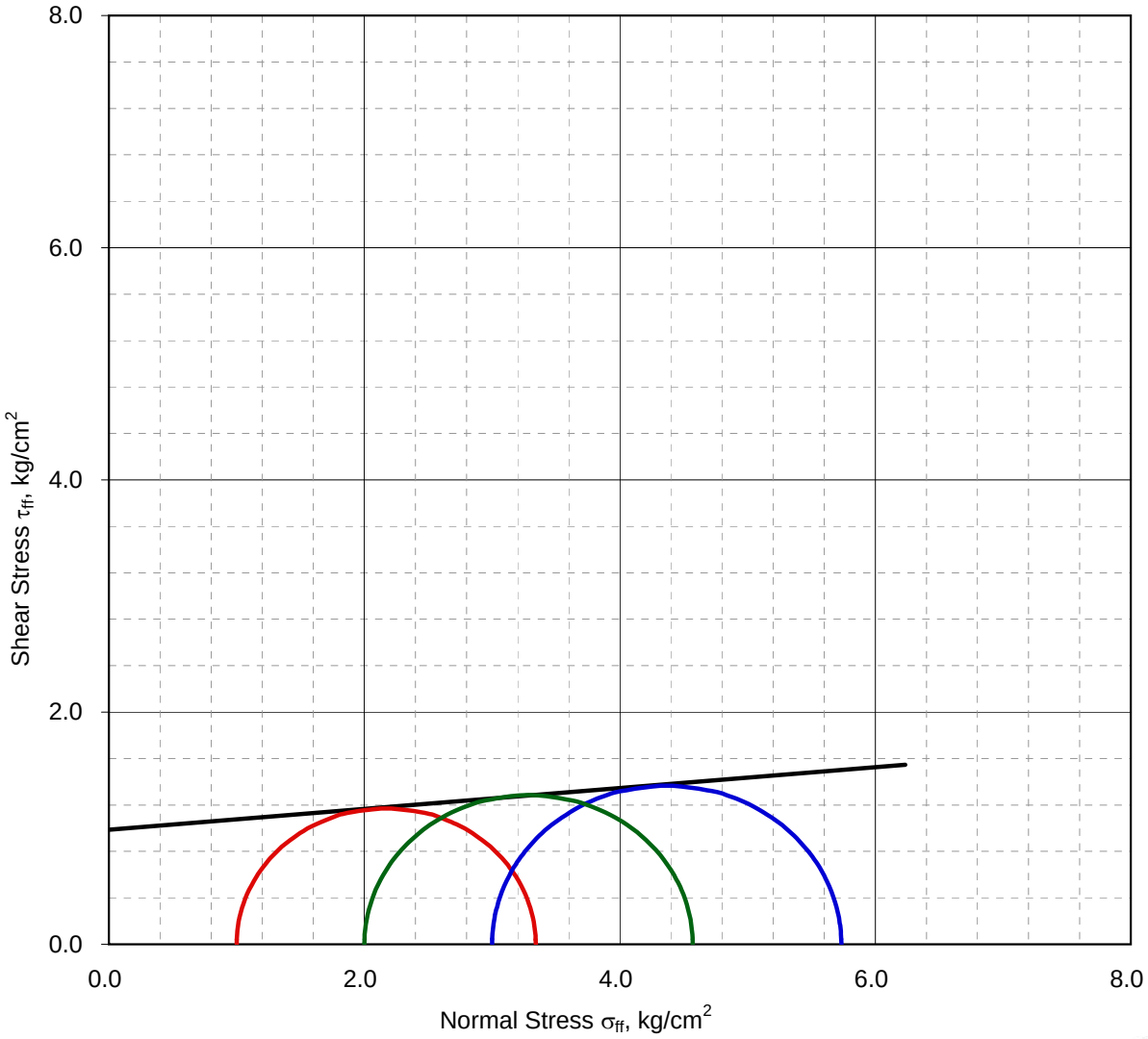
Mohr-Coulomb Failure Envelope

Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-9		Sample Depth: 5.25 m	
	Sample No.: UDS-2		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.91	1.90	1.91
	Dry Density (g/cc):	1.71	1.71	1.71
	Moisture Content (%):	11.9	11.1	11.5
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	2.34	2.57	2.73
	Failure Strain, ε_f (%):	2.6	2.6	2.6
	Cohesion Intercept, c:	**1.00**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**5.1**	**degrees**	



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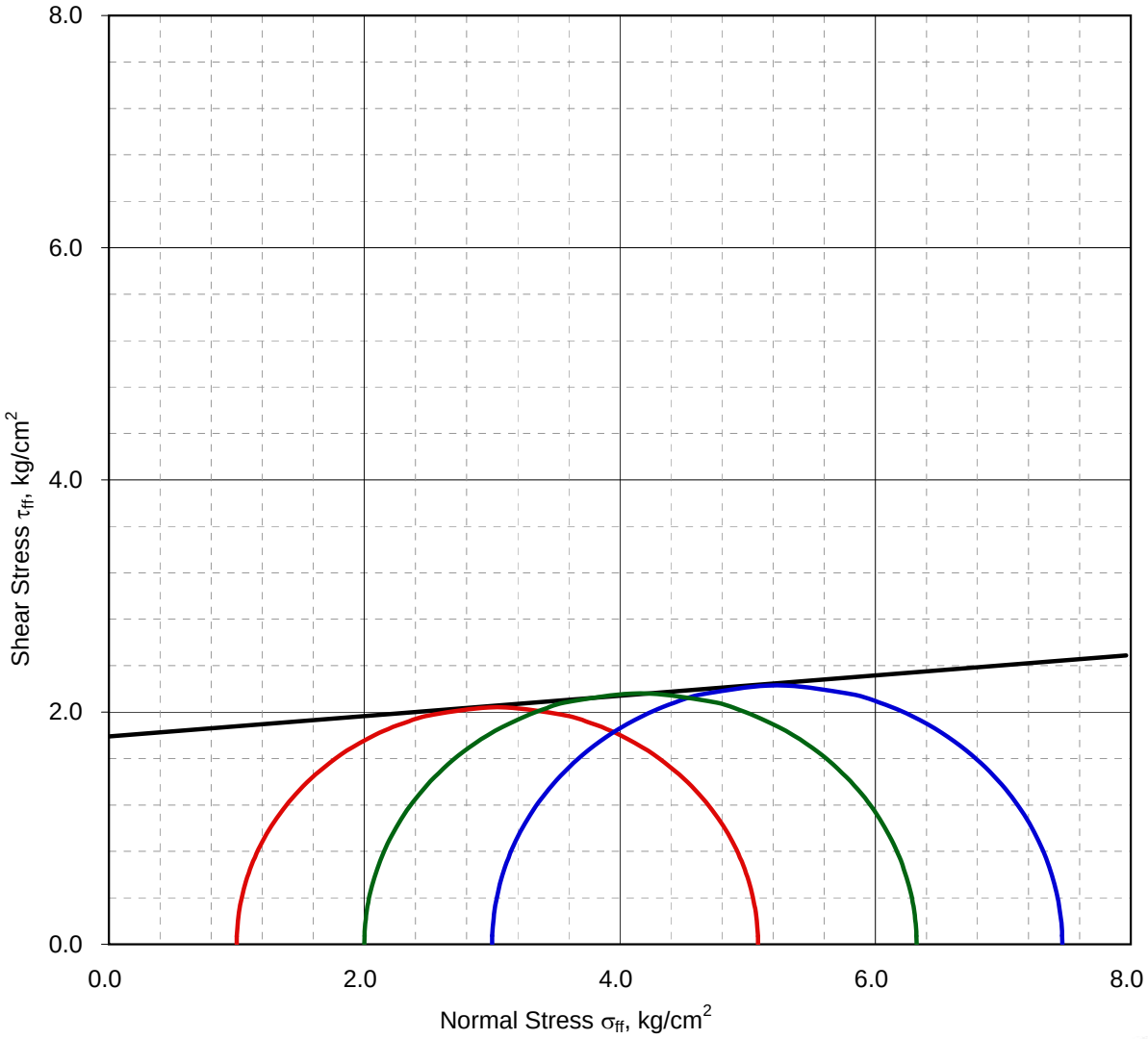
Unconsolidated Undrained Triaxial Test

IS : 2720 (Part-11)-1993, RA-2007

Sample Details	Borehole No.: BH-9		Sample Depth: 11.25 m	
	Sample No.: UDS-4		Sample Description: Sandy silt	
	Confining Pressure, σ_0 (kg/cm^2):	1.0	2.0	3.0
	Initial diameter (cm):	3.8	3.8	3.8
	Initial Length (cm):	7.6	7.6	7.6
	Bulk Density (g/cc):	1.88	1.89	1.88
	Dry Density (g/cc):	1.70	1.70	1.70
	Moisture Content (%):	10.8	10.9	10.7
Test Results	Peak Deviator Stress, $(\sigma_3-\sigma_1)_f$ (kg/cm^2):	4.08	4.32	4.46
	Failure Strain, ε_f (%):	13.2	13.2	13.2
	Cohesion Intercept, c:	**1.80**	**kg/cm^2**	
	Angle of Internal Friction, ϕ:	**5.0**	**degrees**	



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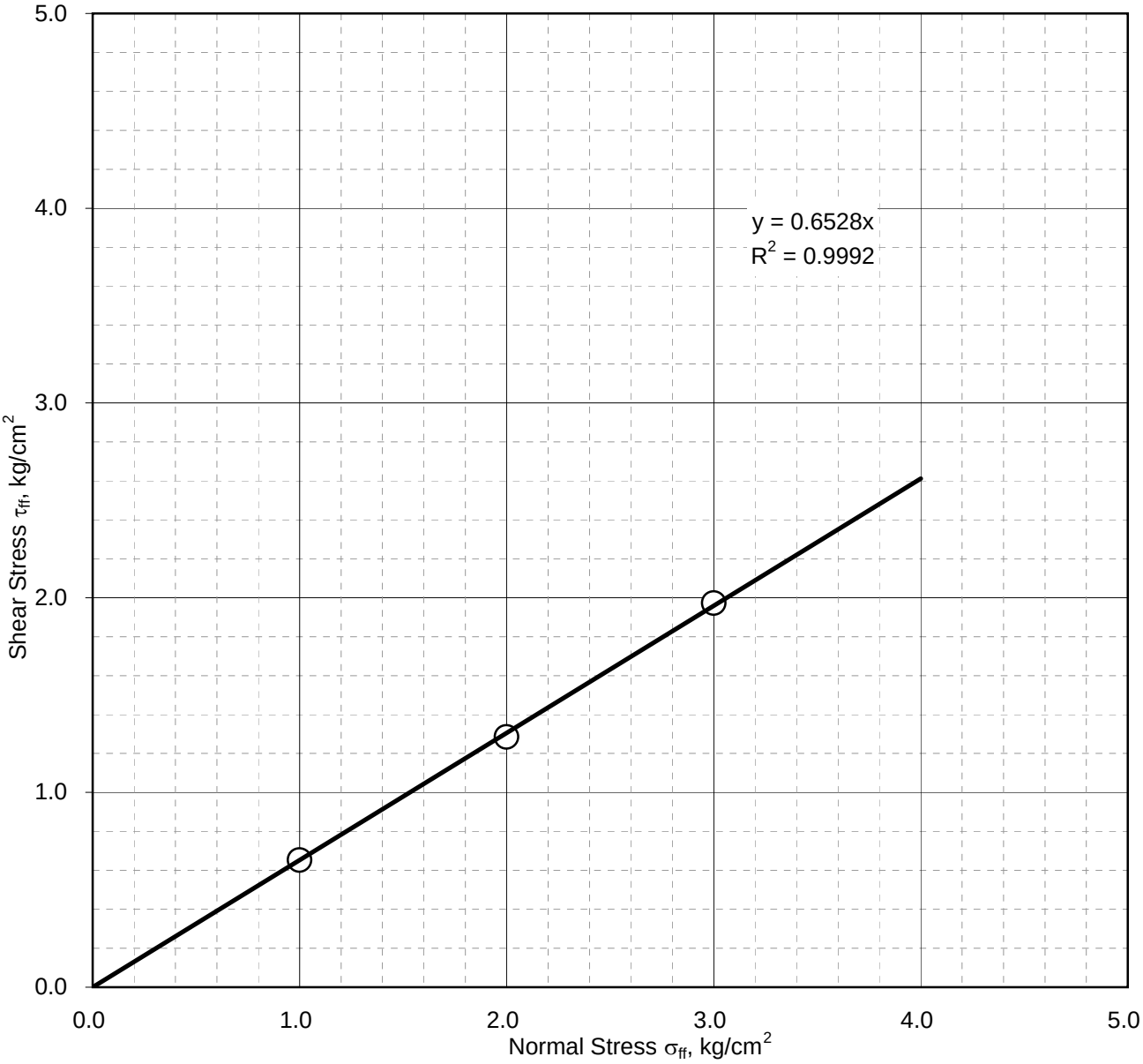
Mohr-Coulomb Failure Envelope

Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-9	Sample Depth: 20.25 m	
	Sample No.: UDS-7	Sample Description: Silty fine sand	
Test Results	Dry Density of Soil (g/cm^3):	1.69	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, c :	**0.00**	**kg/cm^2**
	Angle of Internal Friction, ϕ :	**33.1**	**degrees**



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Mohr-Coulomb Failure Envelope

TEST RESULTS

Soil-Water Extract Test Results				
Borehole No.	Depth, (m)	Sulphate Content (SO_3), %	Chloride Content (Cl), %	pH Value
BH-2	1.50	0.08	0.11	8.2
BH-4	1.50	0.09	0.01	7.8
BH-6	1.50	0.08	0.01	7.8
BH-8	1.50	0.08	0.01	7.9
BH-9	1.50	0.11	0.02	7.6

IS : 456-2000, SPECIFICATIONS

Requirements for Concrete Exposed to Sulphate Attack as per IS : 456-2000, Clauses 8.2.2.4 and 9.1.2, Table 4, Page-19

Class	Concentration of Sulphates, expressed as SO_3 In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

Classification of Chloride Conditions in Groundwater*

Classification	Chloride Limits	
	Tropical Climate	Temperate Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

*Source : Institution of Civil Engineers, London (1979)

Chemical Test Results

APPENDIX-A

TYPICAL CALCULATIONS

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

Block-2&3

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity c = cohesion intercept
q = overburden pressure B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 10.00 T/m^2 ϕ = 4.0 degrees GENERAL SHEAR FAILURE
c' = 6.67 T/m^2 ϕ = 2.7 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 6.19 N_q = 1.43 N_g = 0.34
Local Shear Failure : N_c' = 5.81 N_q' = 1.27 N_g' = 0.21

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	2.0	
2.0	10.0	1.80
10.0	16.0	1.90
16.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = Not Met

R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60

Depth factor to be considered ? Y

For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 2.0 m

FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
3.0	**3.0**	*Square*	**7.5**	0.60	1.30	1.20	0.80	1.39	1.00	1.00				47.0		**47.0**	56.9
6.0	**6.0**	*Square*	**7.5**	0.60	1.30	1.20	0.80	1.20	1.00	1.00				40.9		**40.9**	50.8

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

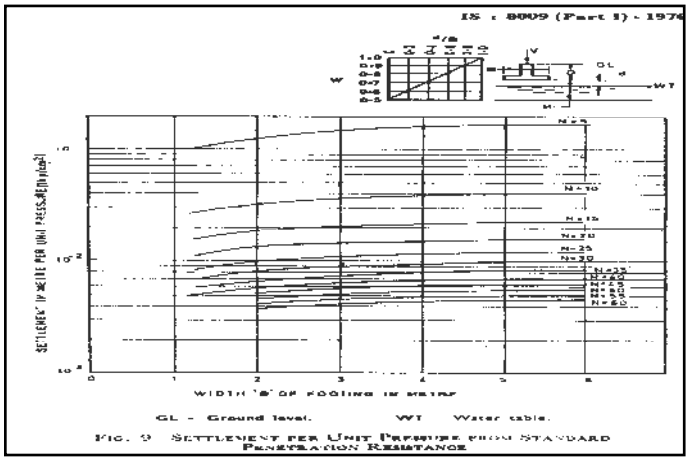


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Not Met

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 2.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
3.0	3.0	7.5	Square	23.0	**29.0**	11.9	0.60	0.63	1.0	36.3
6.0	6.0	7.5	Square	23.0	**29.0**	13.1	0.60	0.74	0.8	37.5

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m		Soil Classification	Modulus of Elasticity,T/m^2
	From	To		
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 2.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
3.0	3.0	7.5	**29.0**	1.00	0.63	1.00	10.00	0.503	2647	**17.6**
6.0	6.0	7.5	**29.0**	0.80	0.74	1.00	10.00	0.503	3548	**24.6**

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity
c = cohesion intercept
q = overburden pressure
B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor
FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 16.00 T/m^2 ϕ = 5.0 degrees GENERAL SHEAR FAILURE
c' = 10.67 T/m^2 ϕ = 3.3 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 6.49 N_q = 1.57 N_g = 0.45
Local Shear Failure : N_c' = 5.99 N_q' = 1.35 N_g' = 0.27

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	11.0	
11.0	16.0	1.90
16.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = 30.0 m

R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60

Depth factor to be considered ? Y

For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 11.0 m

FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
6.0	**6.0**	*Square*	**14.0**	0.60	1.30	1.20	0.80	1.11	1.00	1.00				61.9		**61.9**	67.6

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

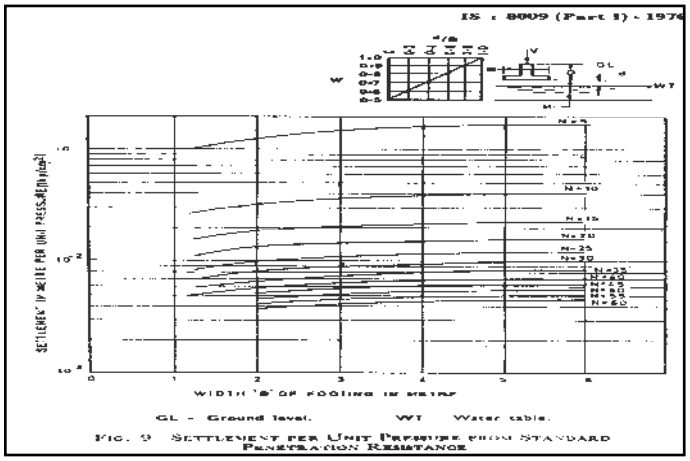


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Noit Met ?Enter WT Depth correctly

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 11.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
6.0	6.0	14.0	Square	32.0	**44.0**	9.0	0.60	0.85	0.8	45.0

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m From	Depth,m To	Soil Classification	Modulus of Elasticity,T/m^2
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 11.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
6.0	6.0	14.0	**44.0**	0.80	0.85	1.00	10.00	0.503	4213	**36.0**

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity
c = cohesion intercept
q = overburden pressure
B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor
FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 16.00 T/m^2 ϕ = 5.0 degrees GENERAL SHEAR FAILURE
c' = 10.67 T/m^2 ϕ = 3.3 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 6.49 N_q = 1.57 N_g = 0.45
Local Shear Failure : N_c' = 5.99 N_q' = 1.35 N_g' = 0.27

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	8.0	
8.0	10.0	1.80
10.0	16.0	1.90
16.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = Not Met

R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60

Depth factor to be considered ? Y

For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 8.0 m

FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
3.0	**3.0**	*Square*	**10.0**	0.60	1.30	1.20	0.80	1.15	1.00	1.00				63.1		**63.1**	66.7
6.0	**6.0**	*Square*	**10.0**	0.60	1.30	1.20	0.80	1.07	1.00	1.00				59.4		**59.4**	63.0

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

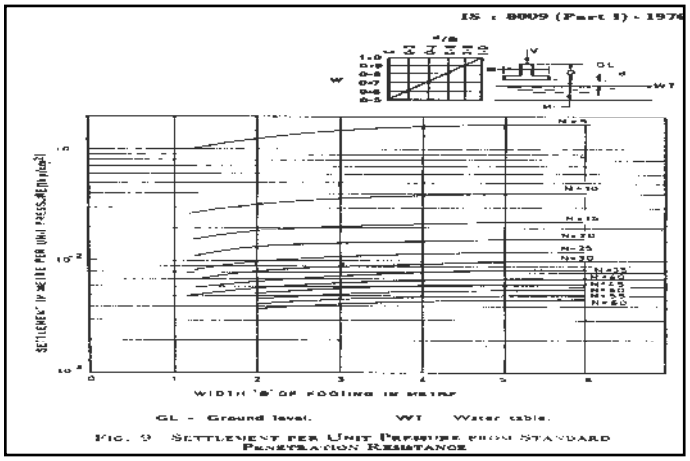


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Not Met

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 8.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
3.0	3.0	10.0	Square	26.0	**36.0**	10.4	0.60	0.80	1.0	49.8
6.0	6.0	10.0	Square	26.0	**36.0**	11.4	0.60	0.91	0.8	49.7

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m		Soil Classification	Modulus of Elasticity,T/m^2
	From	To		
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 8.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
3.0	3.0	10.0	**36.0**	1.00	0.80	1.00	10.00	0.503	2980	**24.5**
6.0	6.0	10.0	**36.0**	0.80	0.91	1.00	10.00	0.503	3840	**34.5**

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity
c = cohesion intercept
q = overburden pressure
B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor
FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 16.00 T/m^2 ϕ = 5.0 degrees GENERAL SHEAR FAILURE
c' = 10.67 T/m^2 ϕ = 3.3 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 6.49 N_q = 1.57 N_g = 0.45
Local Shear Failure : N_c' = 5.99 N_q' = 1.35 N_g' = 0.27

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	10.0	
10.0	16.0	1.90
16.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = Not Met
R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60
Depth factor to be considered ? Y
For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 10.0 m
FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
3.0	**3.0**	*Square*	**12.0**	0.60	1.30	1.20	0.80	1.15	1.00	1.00				63.2		**63.2**	67.0
6.0	**6.0**	*Square*	**12.0**	0.60	1.30	1.20	0.80	1.07	1.00	1.00				59.5		**59.5**	63.3

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

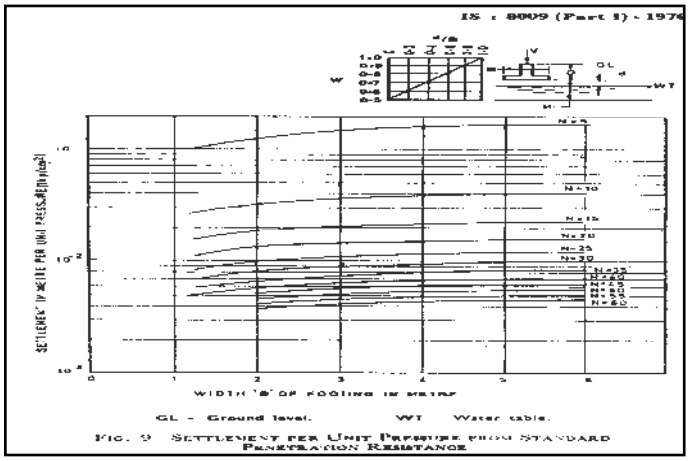


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Not Met

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 10.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
3.0	3.0	12.0	Square	30.0	**40.0**	8.8	0.60	0.80	1.0	47.1
6.0	6.0	12.0	Square	30.0	**40.0**	9.7	0.60	0.91	0.8	47.1

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m		Soil Classification	Modulus of Elasticity,T/m^2
	From	To		
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 10.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
3.0	3.0	12.0	**40.0**	1.00	0.80	1.00	10.00	0.503	3153	**25.7**
6.0	6.0	12.0	**40.0**	0.80	0.91	1.00	10.00	0.503	4027	**36.6**

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity c = cohesion intercept
q = overburden pressure B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 16.00 T/m^2 ϕ = 5.0 degrees GENERAL SHEAR FAILURE
c' = 10.67 T/m^2 ϕ = 3.3 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 6.49 N_q = 1.57 N_g = 0.45
Local Shear Failure : N_c' = 5.99 N_q' = 1.35 N_g' = 0.27

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	11.0	
11.0	16.0	1.90
16.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = 30.0 m

R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60

Depth factor to be considered ? Y

For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 11.0 m

FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
3.0	**3.0**	*Square*	**14.0**	0.60	1.30	1.20	0.80	1.22	1.00	1.00				67.6		**67.6**	73.3
6.0	**6.0**	*Square*	**14.0**	0.60	1.30	1.20	0.80	1.11	1.00	1.00				61.9		**61.9**	67.6

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

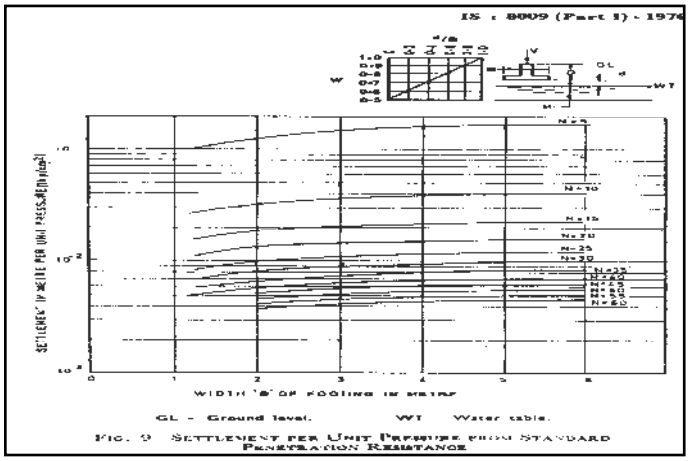


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Noit Met ?Enter WT Depth correctly

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 11.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
3.0	3.0	14.0	Square	32.0	**44.0**	8.2	0.60	0.73	1.0	44.1
6.0	6.0	14.0	Square	32.0	**44.0**	9.0	0.60	0.85	0.8	45.0

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m From	Depth,m To	Soil Classification	Modulus of Elasticity,T/m^2
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 11.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
3.0	3.0	14.0	**44.0**	1.00	0.73	1.00	10.00	0.503	3427	**23.7**
6.0	6.0	14.0	**44.0**	0.80	0.85	1.00	10.00	0.503	4213	**36.0**

Bearing Capacity Analysis for Shallow Foundations

Analysis as per IS 6403-1981

Block-4

The bearing capacity equation is as follows :

$$q_{net\ safe} = (1/FS)\{cNcz_cd_c+q(N_q-1)z_qd_q+0.5BgN_gz_gd_gR_w\}$$

where:

$q_{net\ safe}$ = safe net bearing capacity; c = cohesion intercept
q = overburden pressure; B = Foundation width
γ = Bulk density of soil below founding level
R_w = Water table correction factor; FS = Factor of safety
N_c, N_q, N_g = bearing capacity factors, which are a function of f
d_c, d_q, d_g = Depth factors
z_c, z_q, z_g = Shape factors

Soil parameters :

c = 0.00 T/m^2 ϕ = 33.0 degrees GENERAL SHEAR FAILURE
c' = 0.00 T/m^2 ϕ = 23.4 degrees LOCAL SHEAR FAILURE

General Shear Failure : N_c = 38.64 N_q = 26.09 N_g = 35.19
Local Shear Failure : N_c' = 18.56 N_q' = 9.03 N_g' = 8.69

Bulk Density Profile

Depth, m From	Depth, m To	γ T/m^3
0.0	10.0	
10.0	16.0	
16.0	24.0	
24.0	28.0	1.95
28.0	60.0	2.00

Factor of safety = 2.5 as per IS 1904-1986

Design Water Table depth = Not Met
R_w factor: Constant value(**V**) for worst condition or calculate(**C**) based on WT Depth ? : V Rw = 0.60
Depth factor to be considered ? Y
For computation of Depth Factor, depth below GL to be ignored to account for loose soils,poorly compacted backfill above foundation, scour etc. = 24.0 m
FAILURE CRITERIA : **GENERAL SHEAR FAILURE**

Foundation Dimensions B, m	Foundation Dimensions L, m	FOUN-DATION SHAPE	Depth,m	R_w	Shape Factors z_c	Shape Factors z_q	Shape Factors z_g	Depth factors (GSF) d_c	Depth factors (GSF) d_q	Depth factors (GSF) d_g	Depth factors (LSF) d_c'	Depth factors (LSF) $d_{q'}$	Depth factors (LSF) d_g'	$q_{net\ safe}$, T/m^2 GSF	$q_{net\ safe}$, T/m^2 LSF	Safe Net Bearing Capacity T/m^2	Gross Bearing Capacity (Safe) T/m^2
6.0	**6.0**	*Square*	**27.5**	0.60	1.30	1.20	0.80	1.22	1.11	1.11				135.8		**135.8**	142.6

Settlement Analysis for Shallow Foundation Based on N-Values

Analysis as per IS:8009(Part 1)-1976 , Clause 9.1.4

Block-4

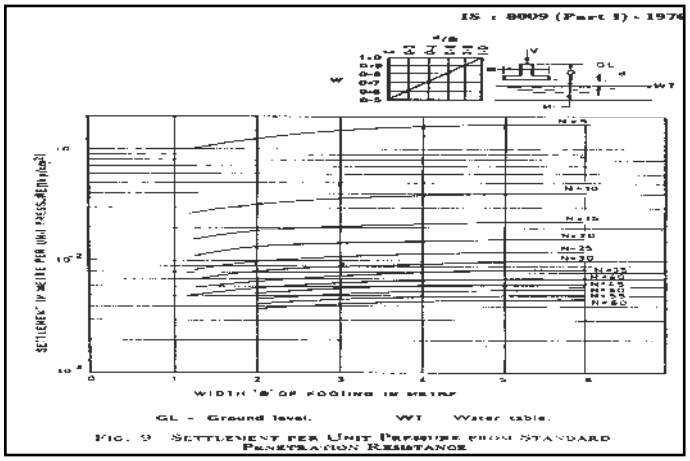


FIG. 9 SETTLEMENT PER UNIT PRESSURE FROM STANDARD PENETRATION RESISTANCE

Design Water Table Depth : Not Met

R_w factor : Calculate (**C**) based on water table depth or Fixed Value(**V**) for worst condition : V Rw factor for design : 0.6

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour, etc. 24.0 m

Foundation Width,m	Foundation Length,m	Foundation Depth,m	Shape	Design N-Value	Design Net Bearing Pressure, T/m^2	Settlement @ $1kg/cm^2$ (as read off from graph), mm	R_w	Fox's Depth Factor, d_f	Rigidity Factor, d_r	Computed Settlement, mm
6.0	6.0	27.5	Square	50.0	**75.0**	5.6	0.60	0.82	0.8	45.7

Settlement Analysis for Shallow Foundations
Elastic Settlement Computed From Theory of Elasticity

Analysis as per IS : 8009 Part 1 - 1976, Clause 9.2

Block-4

Total settlement computed as equal to elastic/immediate settlement.
No consolidation settlement - analysis valid for granular soils,weathered rocks,
hard clays & cohesive soils above water table

ELASTIC / IMMEDIATE SETTLEMENT

$$S_i = \frac{q\ B'\ (1 - \mu^2)\ I}{E}\ d_f\ d_r$$

Reference : *Foundation Analysis & Design by J.E.Bowles* fifth edition (1996)

where B = Foundation width B' = B/2 L' = L/2 μ = Poisson's Ratio

q = Applied Bearing Pressure E = Modulus of Elasticity

d_f = Fox's Depth factor d_r = Rigidity factor

I = Influence factor at corner of rectangular loaded area(B' x L'),
computed from theory of elasticity using Steinbrenner's factors

Settlement at centre of footing of size B x L = 4 x Settlement at corner of area B' x L'

Poisson's Ratio : 0.40

Is Rigid Layer met ? Y Rigid Layer at 50.00 m depth

Layer No.	Depth,m		Soil Classification	Modulus of Elasticity,T/m^2
	From	To		
1	0.0	10.0	Sandy silt	1500
2	10.0	16.0	Sandy silt	2200
3	16.0	28.0	Silty Fine Sand	3500
4	28.0	60.0	Sandy silt	5000

Fox's Depth Factor to be considered ? Y

Depth to be ignored in Depth Factor Computation for loose soils, poorly compacted backfill, scour etc. = 24.0 m

Foundation Width (B), m	Foundation Length (L), m	Embedment Depth (D), m	Applied Bearing Press. T/m^2	Rigidity Factor, d_r	Fox's Depth Factor	M = L'/B'	N = H/B'	Influence Factor	E(weighted ave.) T/m^2	Elastic Settlement mm
6.0	6.0	27.5	**75.0**	0.80	0.82	1.00	7.50	0.484	4967	**48.6**

APPENDIX-B

SITE PHOTOGRAPHS

Borehole No.-2

Site Photographs

Borehole No.-4

Site Photographs

Borehole No.-6

Site Photographs

ANNEXURE – 7

Site Plan and Landscape Plan

1031

707

1	2	3	4	5	6	7	8	9	10
TYPE	FLOOR	AREA IN SQ.M/ ONE FLOOR	NO. OF FLOORS	TOTAL FAR/ ALL FLOOR	PROPOSED FAR/ ALL TOWER	TOTAL BUILT-UP OF ONE FLOOR	TOTAL BUILT-UP OF ALL FLOOR	TOTAL BUILT-UP AREA OF ALL TOWER	TOTAL GROUND COVERAGE OF ALL TOWER
RETAIL/ NEIGHBORHOOD SHOPPING	LOWER GROUND FLOOR	35377.329	1	35377.329	170346.557	44371.857	44371.857	216114.542	51217.106
RETAIL/ NEIGHBORHOOD SHOPPING	UPPER GROUND FLOOR	41166.515	1	41166.515		51217.106	51217.106		
RETAIL 22108.647 / NEIGHBORHOOD SHOPPING 8109.000	1ST FLOOR	30217.647	1	30217.647		40347.450	40347.450		
RETAIL	2ND FLOOR	34109.843	1	34109.843		44173.181	44173.181		
	3RD FLOOR	26022.260	1	26022.260		32420.886	32420.886		
	4TH FLOOR (GYM,F&B & AUDITORIUM)	3452.963	1	3452.963		3684.083	3684.083		
OFFICE BLOCK-DT-5	4TH FLOOR	1456.706	1	1456.706	20618.711	1582.266	1582.266	70906.994	
BLOCK-DT-6		5582.975	1	5582.975		6067.092	6067.092		
BLOCK-DT-7		3635.649	1	3635.649		3819.769	3819.769		
BLOCK-DT-8		3844.530	1	3844.530		3978.471	3978.471		
BLOCK-DT-9		2589.717	1	2589.717		2744.557	2744.557		
HOTEL		3209.134	1	3209.134		3301.114	3301.114		
OFFICE BLOCK-DT-5	5TH & 6TH FLOOR	1421.488	2	2842.976	22579.136	2997.816	5996.632		
BLOCK-DT-6		3165.560	2	6331.120		6474.050	12948.100		
BLOCK-DT-7		1436.650	2	2873.300		4078.335	8156.670		
BLOCK-DT-8		2230.660	2	4461.320		4254.336	8508.672		
BLOCK-DT-9		1910.660	2	3821.320		3940.359	7880.718		
HOTEL		1124.550	2	2249.100		2327.064	4654.128		
BASEMENT-1(BOH HOTEL)	-	1259.805	1	1259.805	1259.805	1259.805	1259.805		
BASEMENT-1	-	-	-	-	-	-	66287.947	66287.947	-
BASEMENT-2							67782.565	67782.565	
BASEMENT-3							67421.672	67421.672	
BASEMENT-4							67523.405	67523.405	
BASEMENT-5							68176.822	68176.822	
STAIRCASES ON SURFACE									
MUMTY AREA							2686.289	2686.289	
TOTAL					214814.209			627089.256	51217.106

LAND FOR FAR AND GROUND COVERAGE CALCULAITONS (As per Zoning Sheet)				32.36	acres
				130,956.066	sqm.
~~TOD FAR @ 3.50 ON NET LAND AREA~~	(M) =			458,346.231	sqm.
TOTAL FAR ON NET LAND AREA	(M) =			458,346.231	
FAR CONSUMED (OC Granted in building 2 & 3 and Basemnt floors)	(A) =			109,355.360	sqm.
SANCTION UNDER PROCESS (In building 2 & 3 BASEMENT) + GUARD ROOM	(B) =		984.110 + 38.664	1,022.774	sqm.
SANCTION UNDER PROCESS (In building 4)	(C) =			131,940.297	sqm.
PROPOSED FAR (In building 5,6,7,8 & 9)	(D) =			214,814.209	sqm.
BALANCE FAR	(I) =	(M - A - C - D)		1,213.591	sqm.
PERMISSIBLE GROUND COVERAGE @ 60%				78,573.640	sqm.
REQUIRED ECS @ 50 FOR PERMISSIBLE FAR				9,167	ECS
50% EARLIER APPROVED 150 FAR USED FOR NEIGHBORHOOD SHOPPING	=	150% OF 130956.066	=	196,434.099	SQM.
		50% OF 196434.099	=	98,217.049	SQM.
REQUIRED AREA FOR NEIGHBORHOOD SHOPPING			=	98,217.049	SQM.
PROPOSED AREA FOR NEIGHBORHOOD SHOPPING	=	35377.329 + 41166.515 + 8109.000 =		84,652.844	SQM.

AREA STATEMENT

	BUILDINGS	PROPOSED/REVISED SUBMISSION FAR COMMERCIAL	PROPOSED/REVISED SUBMISSION GROUND COVERAGE (sqm)	ECS REQUIRED	ECS PROPOSED	OCCUPATION GRANTED (AS BUILT) FAR	OCCUPATION GRANTED (AS BUILT) GROUND COVERAGE (sqm)	OCCUPATION GRANTED (AS BUILT) ECS
OCCUPATION GRANTED	BUILDING 2					54597.380	6963.93	494
	BUILDING 3					54597.380	6963.93	497
SANCTION UNDER PROCESS	BASEMENT FLOOR - 1 & 2 (BUILDING 2&3)	984.110				160.600	0	-
	SURFACE							126
	BUILDING - 4	131940.297	9,792.042	2,639	2,693			
	GUARD ROOM	38.664	38.664					
PROPOSED FAR (In building 5,6,7,8 & 9)		214814.209	51217.106	4,296	6,606			
	TOTAL	347,777.280	61,009.148	6,935	9,299	109,355.360	13,927.860	1,117

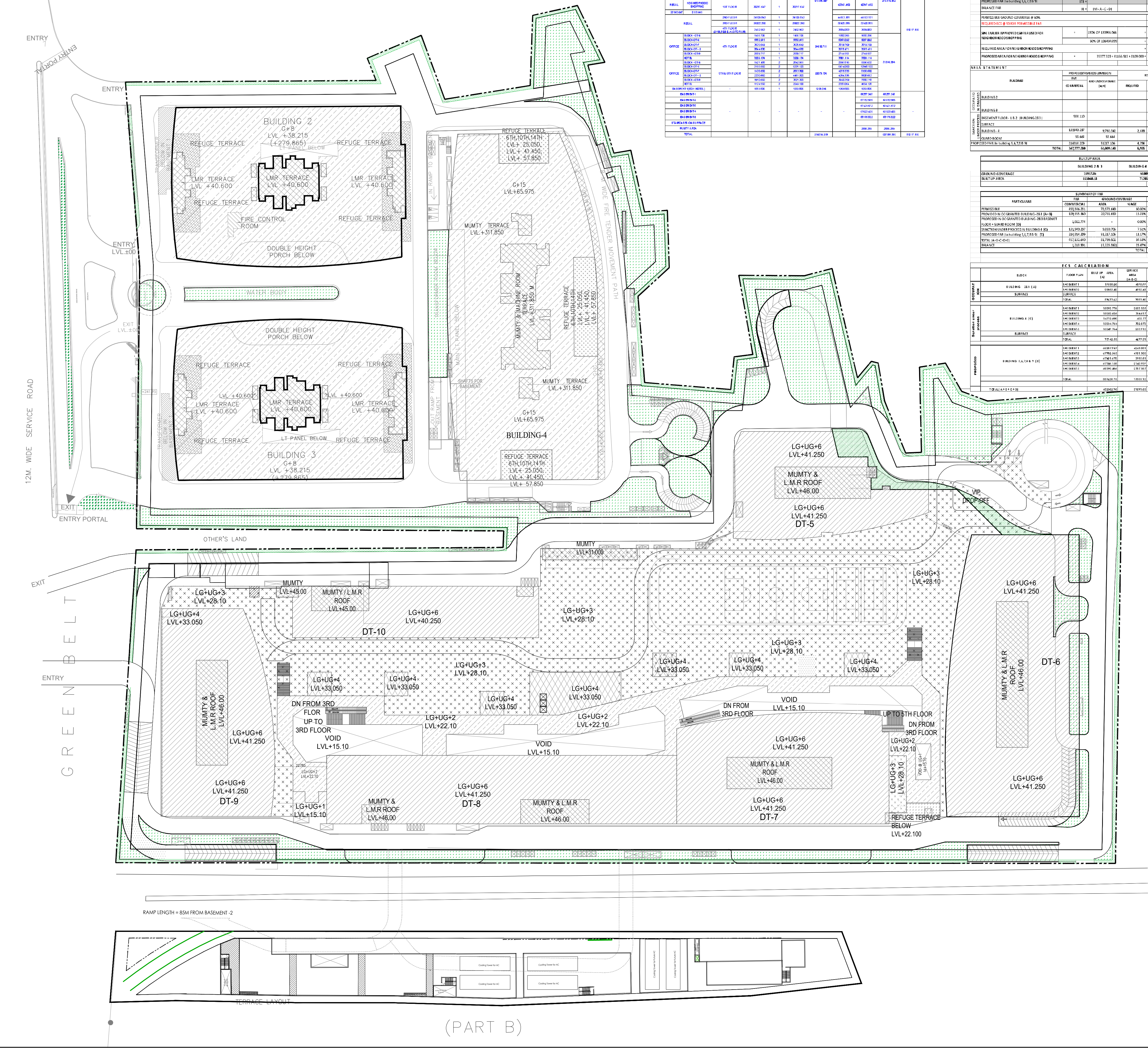
BUILTUP AREA	BUILDING 2 & 3	BUILDING 4 & PHASE II	TOTAL
GROUND GOVERAGE	13927.86	61009.14	74937.00
BUILTUP AREA	163040.18	712033.74	875074.00

SUMMARY OF FAR

PARTICULARS	FAR COMMERCIAL	GROUND COVERAGE AREA	GROUND COVERAGE %AGE	ECS REQUIRED	ECS PROVIDED
PERMISSIBLE	458,346.231	78,573.640	60.00%		
PROVIDED IN OC GRANTED BUILDING -2&3 (A+B)	109,355.360	20,751.690	15.85%	2,187	1117
PROPOSED IN OC GRANTED BUILDING -2&3 BASEMET FLOOR + GUARD ROOM (D)	1,022.774	-	0.00%	20	0
SANCTION UNDER PROCESS IN BUILDING 4 (C)	131,940.297	9,830.706	7.51%	2,639	2693
PROPOSED FAR (In building 5,6,7,8 & 9) (E)	214,814.209	51,217.106	11.17%	4,296	6606
TOTAL (A+B+C+D+E)	457,132.640	81,799.502	34.53%		
BALANCE	1,213.591	(3,225.862)	25.47%	24	
			TOTAL	9,167	10,416

ECS CALCULATION

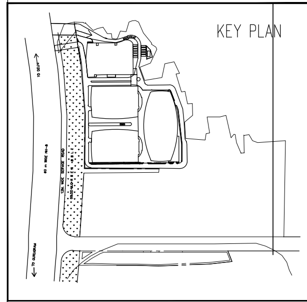
	BLOCK	FLOOR PLAN	BUILT UP AREA (A)	SERVICE AREA (A-B-C)	PARKING AREA (B)	FAR (C)	ACTUAL PARKING PROVIDED
OCCUPATION	BUILDING 2&3 (A)	BASEMENT 1	19558.20	4898.99	14659.21	0.00	494
		BASEMENT 2	20053.42	4982.41	14910.41	160.60	497
	SURFACE	SURFACE					126
		TOTAL	39611.62	9881.40	29569.62	160.60	1117
Sanction under process	BUILDING 4 (C)	BASEMENT 1	15092.776	2553.135	12539.641	0.00	323
		BASEMENT 2	15052.626	764.617	14288.009	0.00	417
		BASEMENT 3	14712.600	402.77	14309.830	0.00	395
		BASEMENT 4	15034.764	702.873	14331.891	0.00	768
		BASEMENT 5	15249.764	253.915	14995.849	0.00	788
	SURFACE	SURFACE					2
		TOTAL	75142.53	4677.31	70465.22	0.00	2693
PROPOSED	BUILDING 5,6,7,8 & 9 (D)	BASEMENT 1	66287.947	4241.081	62046.866	0.00	1185
		BASEMENT 2	67782.565	4181.100	63601.465	0.00	1347
		BASEMENT 3	67421.672	3980.81	63440.863	0.00	1360
		BASEMENT 4	67746.158	2142.939	65603.219	0.00	1360
		BASEMENT 5	68390.406	2787.187	65603.219	0.00	1354
		TOTAL	337628.75	17333.12	320295.63	0.00	6606
	TOTAL (A+B+C+D)		452382.90	31891.83	420330.47	160.60	10416



(PART B)

Note :-

1. Building has Automatic sprinkler system wherever required by NBC.
2. Building will be designed (structures) as per relevent is codes for earth quake resistance.
3. Building is artificially lighted mechanically ventilated & centrally airconditioned with 100% power backup.



PROJECT

PROPOSED SUBMISSION OF 32.36 ACRES SITE OF SHOPPING/ COMMERCIAL IN BLOCK - V, SECTOR - 25A, OF DLF CITY, DLF PHASE - III, GURGAON, HARYANA

OWNER: DLF LIMITED AND OTHERS.
(THE SHOPPING MALL COMPLEX ,ARJUN MARG, DLF CITY,PHASE-I ,GURGAON - 122002 , HARYANA.)

ASSOCIATE ARCHITECTS

RSMS ARCHITECTS

RSMS ARCHITECTS PVT. LTD.
69,Nora Niwas Bhawani Kunj
(Behind D2), Vasant Kunj,
New Delhi-110070.
Tel.:011-26898616,26898617
www.rsms-arch.com

OWNER'S SEAL & SIGNATURE

ARCHITECT'S SEAL & SIGNATURE

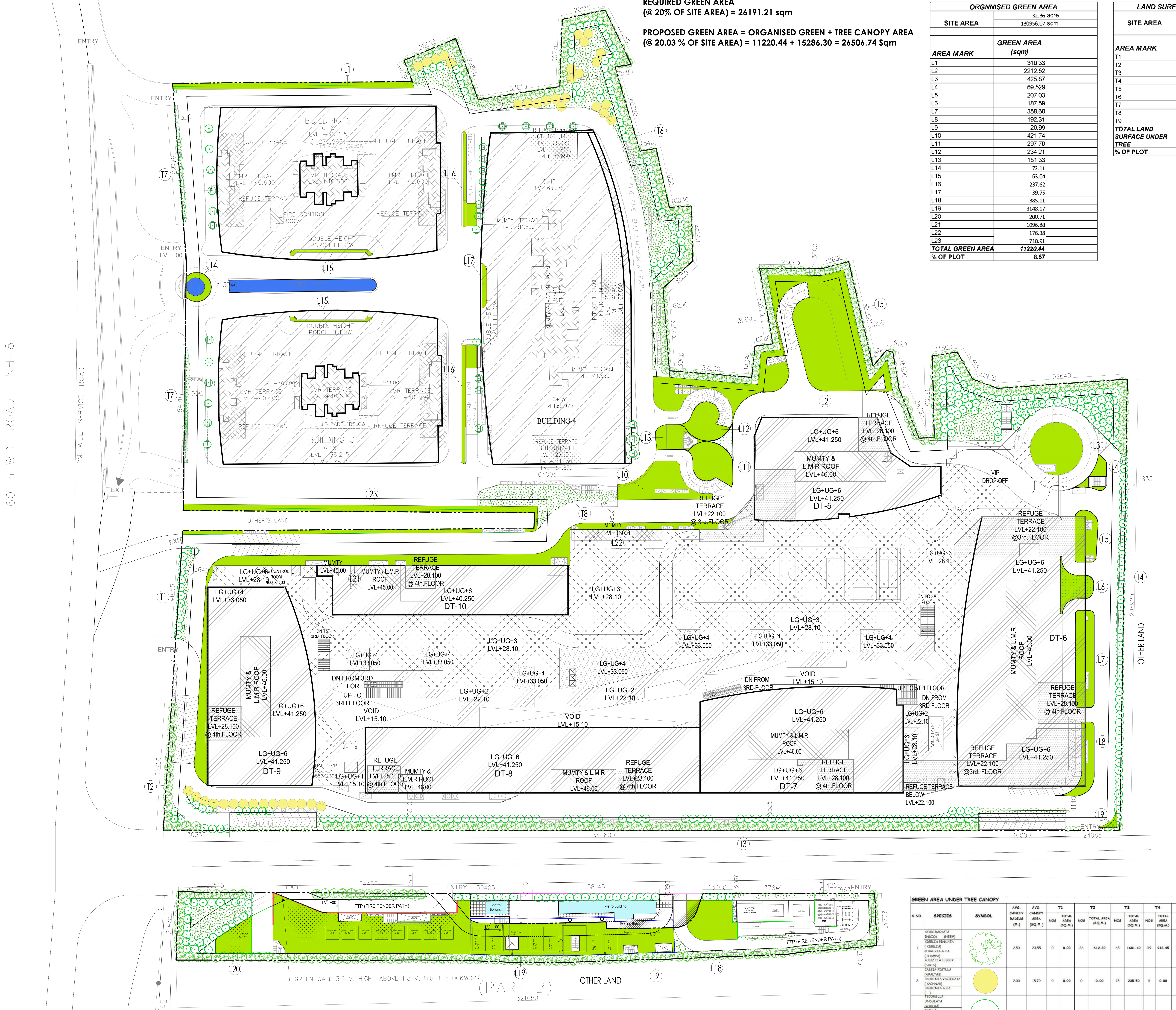
NOV.-2022.	Scale : 1:700	
Drawing Title:- SITE PLAN WITH AREA STATEMENT		Drawing No:- ST-01

1032

SITE AREA = 130956.07 sqm

REQUIRED GREEN AREA
(@ 20% OF SITE AREA) = 26191.21 sqm

PROPOSED GREEN AREA = ORGANISED GREEN + TREE CANOPY AREA
(@ 20.03 % OF SITE AREA) = 11220.44 + 15286.30 = 26506.74 Sqm



ORGNNISED GREEN AREA		
SITE AREA	32.36	acre
	130956.07	sqm
AREA MARK	GREEN AREA (sqm)	
L1	310.33	
L2	2212.52	
L3	425.87	
L4	69.529	
L5	207.03	
L6	187.59	
L7	358.60	
L8	192.31	
L9	20.99	
L10	421 74	
L11	297 70	
L12	234 21	
L13	151 33	
L14	72.11	
L15	63.04	
L16	237.62	
L17	39.75	
L18	385.11	
L19	3148.17	
L20	200.71	
L21	1096.88	
L22	176.38	
L23	710.91	
TOTAL GREEN AREA	***11220.44***	
% OF PLOT	**8.57**	

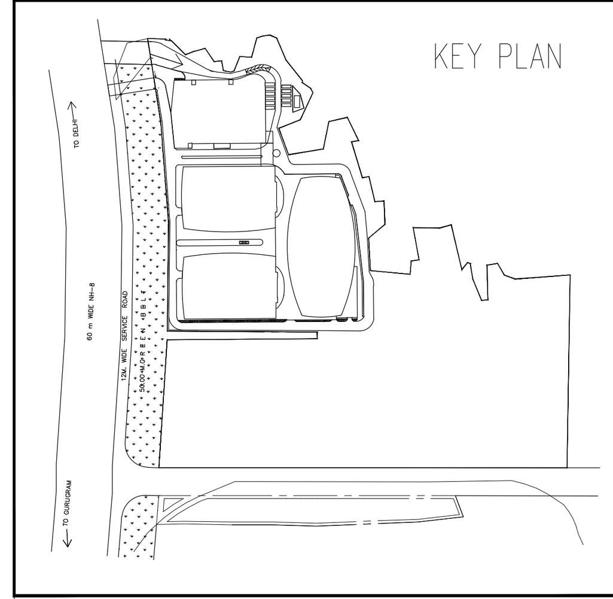
LAND SURFACE AREA UNDER TREE		
SITE AREA	32.36	
	130956.07	
AREA MARK	LAND AREA (sqm)	
T1	173.50	
T2	208.50	
T3	2102.00	
T4	2348	
T5	712.00	
T6	3469.00	
T7	210.00	
T8	508.00	
T9	2242.80	
TOTAL LAND SURFACE UNDER TREE	***11973.80***	
% OF PLOT	**9.14**	

GREEN AREA UNDER TREE CANOPY

S.NO.	SPECIES	SYMBOL	AVG. CANOPY RADIUS (M.)	AVG. CANOPY AREA (SQ.M.)	T1 NOS	T1 TOTAL AREA (SQ.M.)	T2 NOS	T2 TOTAL AREA (SQ.M.)	T3 NOS	T3 TOTAL AREA (SQ.M.)	T4 NOS	T4 TOTAL AREA (SQ.M.)	T5 NOS	T5 TOTAL AREA (SQ.M.)	T6 NOS	T6 TOTAL AREA (SQ.M.)	T7 NOS	T7 TOTAL AREA (SQ.M.)	T8 NOS	T8 TOTAL AREA (SQ.M.)	T9 NOS	T9 TOTAL AREA (SQ.M.)
1	AZADIRACHATA INDICA (NEEM) KIGELIA PINNATA (KIGELIA) PLUMERIA ALBA (CHAMPA) ALBIZZIA LEBBEK (SIRIS)		2.50	23.55	0	0.00	26	612.30	68	1601.40	39	918.45	56	1318.80	80	1884.00	0	0.00	0	0.00	113	2661.15
2	CASSIA FISTULA (AMALTAS) BAHHINIA VARIEGATA (KACHNAR) BAHHINIA ALBA ( )		2.00	15.70	0	0.00	0	0.00	15	235.50	0	0.00	0	0.00	24	376.80	0	0.00	0	0.00	0	0
3	TECOMELLA UNDULATA (ROHERA) ACACIA AURICULTARIMS (AURI) FICUS BENGHALENSIS VARIEGATED (BARH)		1.50	9.42	23	216.66	17	160.14	85	800.70	146	1375.32	0	0.00	70	659.40	31	292.02	0	0.00	62	584.04
4	ANTHOCEPHATUS CADAMBA (KADAM) CONOCARPUS ERECTUS (BUTTONWOOD)		1.00	3.93	36	141.30	37	145.23	41	160.93	23	90.28	180	706.50	171	671.18	67	262.98	128	502.40	112	439.6
	TOTAL				59	357.96	80	305.37	209	2798.53	208	1465.6	236	2025.30	345	3591.38	98	555.00	128	502.4	287	3684.79
	TOTAL TREE PLANTED							1650														
	TOTAL GREEN AREA UNDER TREE CANOPY							15286.31														

Note :-

1. Building has Automatic sprinkler system wherever required by NBC.
2. Building will be designed (structures) as per relevent is codes for earth quake resistance.
3. Building is artificially lighted mechanically ventilated & centrally airconditioned with 100% power backup.



PROJECT

PROPOSED SUBMISSION OF 32.36 ACRES SITE OF SHOPPING/ COMMERCIAL IN BLOCK - V, SECTOR - 25A, OF DLF CITY, DLF PHASE - III, GURGAON, HARYANA

OWNER: DLF LIMITED AND OTHERS.
(THE SHOPPING MALL COMPLEX ,ARJUN MARG, DLF CITY,PHASE-I ,GURGAON - 122002 , HARYANA.)

ASSOCIATE ARCHITECTS

RSMS ARCHITECTS PVT. LTD.
69,Nora Niwas Bhawani Kunj
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New Delhi-110070.
Tel.: 011-26898616,26898617
www.rsms-arch.com

OWNER'S SEAL & SIGNATURE

ARCHITECT'S SEAL & SIGNATURE

NOV.-2022. | Scale : 1:700

Drawing Title:- SITE PLAN GREEN

Drawing No:- R-2

ANNEXURE – 8

Water assurance letter

OFFICE OF THE EXECUTIVE ENGINEER, HSVP, DIV NO. III, GURUGRAM

To

M/s DLF City Centre Limited,
O/o Jhandewalan Extension,
Naaz Cinema Complex,
New Delhi-110055

Memo No. 9528 **Dated:** 24/7/18

Sub:- **Assurance for water supply to proposed "Shopping/Commercial Building on 32.36 acres site (Mall of India)" in Block-V, DLF City Phase-III, Sector-25A Gurugram.**

Ref:- **Your application dated 11.05.2018.**

With reference to the cited subject assurance is given for supply of 1945 KLD drinking water through already laid master water supply line of HSVP in this area based on canal water system.

However the regular water supply connection may be applied after completion of project for drinking purpose as per HSVP Rule & Regulations.

EXECUTIVE ENGINEER,
HSVP, DIV NO. III,
GURUGRAM

Assurance File

ANNEXURE – 9

Power assurance letter

DAKSHIN HARYANA BIJLI VITRAN NIGAM
(A Govt. of Haryana Undertaking)
Office of
Superintending Engineer (OP) Circle-II, DHBVN, Gurugram
SCO No. 384, HUDA Shopping Complex, Sec-31, Gurugram, Haryana
Ph.:-0124-2582106, Fax:- 0124-2582107
E-mail – gurgaonse2@gmail.com Website - www.dhbvn.com

To,

M/s DLF City Centre Ltd.
Block-V, DLF City, Phase-III,
Sector-25A, Gurugram.

Memo No. Ch- 32 /DGR-26 Dated: 12/09/2018

Sub: Assurance Certificate of DHBVN for electrical load requirement of "Shopping / Commercial Building on 32.36 acres site (Mall of India) in Block-V, DLF City, Phase-III, Sector-25A, Gurugram.

Refer your letter No. Nil dated 11/09/2018.

It is here by assured that the power requirement of tentative load of 28310 KW shall be considered form the nearest S/Stn. at the time of actual requirement as per DHBVN Norms. However voltage level will depend upon the nearest S/Stn at the time of requirement of load subject to the following conditions.

1. Subject to availability of power and infrastructure.
2. Necessary charges will be got deposited by you as per Nigam instruction and compliance of all other instructions of Nigam will be ensured as per standing instructions of Nigam / HERC Regulations.
3. The necessary infrastructure will be layed by you at your cost.
4. The validity of this letter will be for a period of maximum one year from date of its issuance as per sales instruction No. 7/2018 circulated by SE/Comml, DHBVN, Hisar vide Memo No. Ch-7/SE/Comml/R-17/380/F-21 dated 16/08/2018.

S.E (OP) Circle –II
DHBVN, Gurugram

ANNEXURE – 10

Structure Stability Certificate

भारतीय प्रौद्योगिकी संस्थान रूड़की
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
सिविल अभियांत्रिकी विभाग
DEPARTMENT OF CIVIL ENGINEERING
रूड़की - 247 667, उत्तराखण्ड, भारत
ROORKEE-247 667, UTTARAKHAND, INDIA
Fax/फैक्स : 01332-275568, 273560
Tele/टेली : 01332-284319, 285219
E-mail/इ-मेल:civil@iitr.ac.in

No. CED/AC/DLF/DT/1

Date: 17.03.2022

TO WHOMSOEVER IT MAY CONCERN

We have been engaged by DLF City Centre Limited, Registered address at Shopping Mall Complex, Arjun Marg, DLF City, Phase-I, Gurugram-122002 for Peer Review of Structural Design of the Project "Downtown" (Block 2 & Block-3), NH-8, Sec-25A at Gurugram.

We have reviewed the designs and drawings and certify that:

a. The structural design has been carried out in accordance with the provisions of NBC, IS Codes, Standard Codes of Practices. Manuals & Hand-books issued by Bureau of Indian Standard and or any amendments thereof building bye-laws and specifications as stipulated by the Bureau of Indian Standards.

b. All towers and high rise buildings have been designed as per Seismic consideration for Zone-V (IS 1893: 2016).

c. The buildings/ structures have been designed for appropriate wind loads, all dead loads, live loads, shrinkage & temperature load etc. in all cases normal strengthening to resist distress during earthquake has been provided in the designs.

d. The roof slab of extended basement (near ground level) external to the building has been designed to take fire tender load up to 75 MT.

e. The Site conditions, such as conditions of soil, its load bearing capacity and the underground water table etc. has been considered while designing.

f. The building structures are stable and meet all the safety, serviceability, durability, fire rating etc. and all relevant design criteria as stipulated in the latest BIS codes.

17/03/22

(Dr. A. Chakrabarti)

Dr. Anupam Chakrabarti
Professor
Department of Civil Engineering
Indian Institute of Technology Roorkee
Roorkee-247 667, Uttarakhand, INDIA

ANNEXURE – 11

Baseline monitoring report

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

NABL Accredited & MoEF&CC Recognized Laboratory
(ISO 9001:2015/ISO14001:2015/ ISO 45001:2018)
C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)
Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT
(Ambient Air)

Report No. :	IRDH-0322-EIA-AAQ-861(01)
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085,
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana by M/s DLF Limited
Location	Project Site(AAQ1) 28°30'07.79"N 77°05'40.60"E
Month of Sampling	March 2022, April 2022 & May 2022
Type of Monitoring	Ambient Air Monitoring(24 hourly)
Parameters to be sampled	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO
Method of sampling	As per standard Method
Sampled By	IRDH Team

RESULTS

S. No.	Date	Project Site(AAQ1)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
1.	01/03/2022	142	67	8.1	23.3	1.09
2.	05/03/2022	118	62	6.6	19.9	1.02
3.	08/03/2022	225	107	12.2	32.1	1.22
4.	11/03/2022	149	72	8.5	25.4	1.08
5.	15/03/2022	183	98	10.1	28.7	1.14
6.	19/03/2022	160	82	9.9	26.2	1.11
7.	22/03/2022	128	63	7.4	21.5	1.03
8.	26/03/2022	173	87	10.6	26.4	1.14
9.	30/03/2022	244	118	13.1	33.7	1.23
10.	02/04/2022	176	84	10.9	27.7	1.14
11.	06/04/2022	201	106	11.7	30.3	1.19
12.	10/04/2022	148	73	8.3	23.4	1.09

Quality Manager

JAS-ANZ

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

NABL Accredited & MoEF&CC Recognized Laboratory
(ISO 9001:2015/ISO14001:2015/ ISO 45001:2018)
C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)
Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

Report No. : IRDH-0322-EIA-AAQ-861(01) Page-2/2

S. No.	Date	Project Site (AAQ1)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
13.	14/04/2022	165	80	9.6	25.1	1.11
14.	18/04/2022	199	108	10.8	29.9	1.18
15.	21/04/2022	214	113	11.6	31.2	1.21
16.	25/04/2022	170	82	10.4	27.6	1.16
17.	29/04/2022	157	75	8.3	24.8	1.07
18.	02/05/2022	145	71	8.8	26.3	1.09
19.	06/05/2022	161	86	9.2	29.1	1.12
20.	09/05/2022	107	56	6.6	23.5	1.02
21.	13/05/2022	139	68	7.9	20.3	1.07
22.	17/05/2022	144	76	8.2	25.4	1.08
23.	20/05/2022	262	140	13.7	35.1	1.25
24.	24/05/2022	86	50	6.1	16.6	1.01
Minimum		86.00	50.00	6.10	16.60	1.01
Maximum		262.00	140.00	13.70	35.10	1.25
98th Percentile		253.72	129.88	13.42	34.46	1.24
Average Values		166.50	84.33	9.53	26.40	1.12

NAAQ Standards*

S.No.	Parameters	Industrial /Residential Area	Ecologically /Sensitive Area
01.	PM_{10} (µg/m3)	100	100
02.	$PM_{2.5}$ (µg/m3)	60	60
03.	SO_2 (µg/m3)	80	80
04.	NO_2 (µg/m3)	80	80
05.	CO (mg/m^3), 8 hourly	02	02

End of Report

Dr. SNA Rizvi
Authorized Signatory

1- Test Report is limited to the invoice raised
2-Test Report cannot be reproduced in a part or as whole in court without laboratory permission.
3- Samples shall be retained for 4 weeks after test report submitted.

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

NABL Accredited & MoEF&CC Recognized Laboratory
(ISO 9001:2015/ISO14001:2015/ ISO 45001:2018)
C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)
Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT
(Ambient Air)

Report No. :	IRDH-0322-EIA-AAQ-861(02)
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085,
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana by M/s DLF Limited
Location	Govt. Boys Sr Sec school, Ayanagar (AAQ2) 28°28'36.63"N 77°07'48.60"E
Month of Sampling	March 2022, April 2022 & May 2022
Type of Monitoring	Ambient Air Monitoring(24 hourly)
Parameters to be sampled	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO
Method of sampling	As per standard Method
Sampled By	IRDH Team

RESULTS

S. No.	Date	Govt. Boys Sr Sec school, Ayanagar (AAQ2)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
1.	01/03/2022	135	63	7.9	22.1	1.07
2.	05/03/2022	107	56	6.2	18.3	1.03
3.	08/03/2022	236	122	12.8	33.6	1.24
4.	11/03/2022	127	65	7.9	23.3	1.04
5.	15/03/2022	161	82	9.4	25.7	1.11
6.	19/03/2022	186	92	10.5	28.2	1.13
7.	22/03/2022	134	65	7.7	22.9	1.05
8.	26/03/2022	158	75	9.8	26.1	1.11
9.	30/03/2022	228	116	12.2	32.8	1.19
10.	02/04/2022	153	71	8.9	26.5	1.12
11.	06/04/2022	189	87	10.2	29.7	1.15
12.	10/04/2022	166	79	9.4	25.3	1.13

Quality Manager

JAS-ANZ

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Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

Report No. : IRDH-0322-EIA-AAQ-861 (02)

S. No.	Date	Govt. Boys Sr Sec school, Ayanagar (AAQ2)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
13.	14/04/2022	152	73	8.8	24.1	1.07
14.	18/04/2022	184	92	9.6	28.4	1.14
15.	21/04/2022	196	102	10.3	28.8	1.22
16.	25/04/2022	160	77	9.4	25.5	1.13
17.	29/04/2022	148	68	7.9	25.2	1.06
18.	02/05/2022	134	64	7.2	23.3	1.11
19.	06/05/2022	173	95	10.2	28.8	1.15
20.	09/05/2022	113	58	6.7	22.5	1.06
21.	13/05/2022	114	63	6.5	19.3	1.04
22.	17/05/2022	135	68	7.3	24.4	1.09
23.	20/05/2022	247	129	12.1	34.9	1.23
24.	24/05/2022	89	51	6.3	15.3	1.03
Minimum		89.00	51.00	6.20	15.30	1.03
Maximum		247.00	129.00	12.80	34.90	1.24
98th Percentile		241.94	125.78	12.52	34.30	1.24
Average Values		159.38	79.71	8.97	25.63	1.11

NAAQ Standards*

S.No.	Parameters	Industrial /Residential Area	Ecologically /Sensitive Area
01.	PM_{10} (µg/m3)	100	100
02.	$PM_{2.5}$ (µg/m3)	60	60
03.	SO_2 (µg/m3)	80	80
04.	NO_2 (µg/m3)	80	80
05.	CO (mg/m^3), 8 hourly	02	02

End of Report

Dr. SNA Rizvi
Authorized Signatory

Quality Manager

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Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT
(Ambient Air)

Report No. :	IRDH-0322-EIA-AAQ-861(03)
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085,
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana by M/s DLF Limited
Location	MCD Primary School, Kapashera (AAQ3) 28°31'29.17"N 77°04'57.55"E
Month of Sampling	March 2022, April 2022 & May 2022
Type of Monitoring	Ambient Air Monitoring(24 hourly)
Parameters to be sampled	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO
Method of sampling	As per standard Method
Sampled By	IRDH Team

RESULTS

S. No.	Date	MCD Primary School, Kapashera (AAQ3)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
1.	01/03/2022	147	69	8.8	25.3	1.09
2.	05/03/2022	120	65	6.4	21.2	1.05
3.	08/03/2022	209	101	12.5	31.9	1.17
4.	11/03/2022	156	81	9.2	25.5	1.09
5.	15/03/2022	174	85	9.8	28.1	1.15
6.	19/03/2022	198	106	11.2	30.5	1.16
7.	22/03/2022	143	69	8.2	24.8	1.04
8.	26/03/2022	162	82	10.4	28.2	1.13
9.	30/03/2022	215	111	13.1	30.5	1.18
10.	02/04/2022	166	85	10.5	29.4	1.15
11.	06/04/2022	208	114	12.4	32.1	1.22
12.	10/04/2022	154	75	9.1	24.7	1.07

Quality Manager

JAS-ANZ

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Report No. : IRDH-0322-EIA-AAQ-861 (03)

S. No.	Date	MCD Primary School, Kapashera (AAQ3)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
13.	14/04/2022	179	97	10.8	26.9	1.14
14.	18/04/2022	217	110	12.8	32.2	1.21
15.	21/04/2022	205	105	12.2	31.5	1.22
16.	25/04/2022	183	95	11.6	28.8	1.15
17.	29/04/2022	166	82	9.3	27.3	1.09
18.	02/05/2022	140	74	9.1	25.2	1.07
19.	06/05/2022	154	78	8.8	26.7	1.11
20.	09/05/2022	117	62	7.3	22.8	1.06
21.	13/05/2022	125	68	7.1	23.1	1.08
22.	17/05/2022	155	76	9.6	25.9	1.12
23.	20/05/2022	272	150	13.8	35.2	1.25
24.	24/05/2022	93	62	6.5	17.7	<1
Minimum		93.00	62.00	6.40	17.70	<1
Maximum		272.00	150.00	13.80	35.20	1.25
98^{th} Percentile		246.70	133.44	13.48	33.82	1.24
Average Values		169.08	87.58	10.02	27.31	1.13

NAAQ Standards*

S.No.	Parameters	Industrial /Residential Area	Ecologically /Sensitive Area
01.	PM_{10} (µg/m3)	100	100
02.	$PM_{2.5}$ (µg/m3)	60	60
03.	SO_2 (µg/m3)	80	80
04.	NO_2 (µg/m3)	80	80
05.	CO (mg/m^3), 8 hourly	02	02

End of Report

Dr. SNA Rizvi
Authorized Signatory
Quality Manager

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TEST REPORT
(Ambient Air)

Report No. :	IRDH-0322-EIA-AAQ-861(04)
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085,
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana by M/s DLF Limited
Location	Govt. Boys Sr Sec school, Rajokri (AAQ4) 28°31'04.13"N 77°06'34.27"E
Month of Sampling	March 2022, April 2022 & May 2022
Type of Monitoring	Ambient Air Monitoring(24 hourly)
Parameters to be sampled	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO
Method of sampling	As per standard Method
Sampled By	IRDH Team

RESULTS

S. No.	Date	Govt. Boys Sr Sec school, Rajokri (AAQ4))				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
1.	01/03/2022	129	65	7.3	24.4	1.08
2.	05/03/2022	124	68	6.9	22.8	1.06
3.	08/03/2022	204	108	10.9	29.9	1.18
4.	11/03/2022	132	67	6.6	22.1	1.06
5.	15/03/2022	176	89	10.8	25.2	1.13
6.	19/03/2022	153	74	9.5	27.6	1.15
7.	22/03/2022	119	62	6.3	20.9	1.02
8.	26/03/2022	177	85	10.4	27.7	1.11
9.	30/03/2022	224	104	11.9	31.5	1.18
10.	02/04/2022	163	79	8.4	26.3	1.07
11.	06/04/2022	171	85	9.2	28.8	1.09
12.	10/04/2022	155	71	8.6	23.6	1.05

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S. No.	Date	Govt. Boys Sr Sec school, Rajokri (AAQ4)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
13.	14/04/2022	146	67	7.4	25.2	1.08
14.	18/04/2022	172	81	9.2	28.8	1.19
15.	21/04/2022	207	109	11.3	31.1	1.21
16.	25/04/2022	142	65	8.8	26.5	1.09
17.	29/04/2022	151	72	7.5	24.8	1.04
18.	02/05/2022	157	76	8.2	20.6	1.07
19.	06/05/2022	149	72	7.8	25.4	1.11
20.	09/05/2022	117	65	7.2	22.9	1.03
21.	13/05/2022	108	62	6.5	21.2	1.06
22.	17/05/2022	129	64	7.6	23.6	1.04
23.	20/05/2022	239	122	13.3	33.5	1.22
24.	24/05/2022	87	57	6.6	16.3	1.02
Minimum		87.00	57.00	6.30	16.30	1.02
Maximum		239.00	122.00	13.30	33.50	1.22
98th Percentile		232.10	116.02	12.66	32.58	1.22
Average Values		155.46	77.88	8.68	25.45	1.10

NAAQ Standards*

S.No.	Parameters	Industrial /Residential Area	Ecologically /Sensitive Area
01.	PM_{10} (µg/m3)	100	100
02.	$PM_{2.5}$ (µg/m3)	60	60
03.	SO_2 (µg/m3)	80	80
04.	NO_2 (µg/m3)	80	80
05.	CO (mg/m^3), 8 hourly	02	02

End of Report

Dr. SNA Rizvi
Authorized Signatory

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TEST REPORT
(Ambient Air)

Report No. :	IRDH-0322-EIA-AAQ-861(05)
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085,
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana by M/s DLF Limited
Location	Sanatan Dharm Mandir, Sukhrali (AAQ5) 28°28'37.76"N 77°03'27.18"E
Month of Sampling	March 2022, April 2022 & May 2022
Type of Monitoring	Ambient Air Monitoring(24 hourly)
Parameters to be sampled	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO
Method of sampling	As per standard Method
Sampled By	IRDH Team

RESULTS

S. No.	Date	Sanatan Dharm Mandir, Sukhrali (AAQ5)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
1.	03/03/2022	144	69	8.4	23.9	1.08
2.	07/03/2022	201	107	10.9	29.9	1.22
3.	10/03/2022	133	65	7.9	24.4	1.07
4.	13/03/2022	159	77	9.2	27.1	1.11
5.	16/03/2022	145	71	8.5	26.9	1.09
6.	20/03/2022	139	67	7.5	23.5	1.05
7.	24/03/2022	212	109	12.6	31.1	1.21
8.	28/03/2022	166	86	9.8	27.3	1.16
9.	01/04/2022	131	65	7.4	22.8	1.07
10.	05/04/2022	197	105	11.3	29.5	1.17
11.	08/04/2022	184	97	10.9	30.1	1.14
12.	11/04/2022	159	78	9.4	27.0	1.12

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Report No. : IRDH-0322-EIA-AAQ-861(05) Page-2/2

S. No.	Date	Sanatan Dharm Mandir, Sukhrali (AAQ5)				
		$PM_{10}(\mu g/m^3)$	$PM_{2.5}(\mu g/m^3)$	$SO_2(\mu g/m^3)$	$NO_2(\mu g/m^3)$	CO (mg/m^3)
13.	15/04/2022	125	64	6.2	25.1	1.09
14.	19/04/2022	192	95	11.9	30.2	1.21
15.	23/04/2022	183	86	8.4	27.7	1.18
16.	26/04/2022	176	91	9.6	29.4	1.16
17.	30/04/2022	132	68	7.7	23.8	1.06
18.	03/05/2022	207	110	12.2	32.5	1.21
19.	07/05/2022	124	64	6.7	20.3	1.03
20.	11/05/2022	109	57	6.2	19.9	1.01
21.	14/05/2022	163	88	9.9	25.7	1.11
22.	18/05/2022	149	68	8.5	26.3	1.07
23.	21/05/2022	251	135	13.4	33.4	1.23
24.	25/05/2022	129	72	6.5	24.1	1.04
Minimum		109.00	57.00	6.20	19.90	1.01
Maximum		231.00	135.00	13.40	33.40	1.23
98th Percentile		233.06	123.50	13.03	32.99	1.23
Average Values		162.92	83.08	9.21	26.75	1.12

NAAQ Standards*

S.No.	Parameters	Industrial /Residential Area	Ecologically /Sensitive Area
01.	PM_{10} (µg/m3)	100	100
02.	$PM_{2.5}$ (µg/m3)	60	60
03.	SO_2 (µg/m3)	80	80
04.	NO_2 (µg/m3)	80	80
05.	CO (mg/m^3), 8 hourly	02	02

End of Report

Dr. SNA Rizvi
Authorized Signatory
Quality Manager

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TEST REPORT
(AMBIENT NOISE)

Report No. :	IRDH-0322-EIA-ANQ-861
Date of Reporting	01/06/2022
Name and Address	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana. By M/s DLF Limited
Location	Project-Site(ANQ1) 28°30'07.79"N 77°05'40.60"E, Govt. Boys Sr Sec school, Ayanagar (ANQ2) 28°28'36.63"N 77°07'48.60"E, MCD Primary School, Kapashera (ANQ3) 28°31'29.17"N 77°04'57.55"E, Govt. Boys Sr Sec school, Rajokri (ANQ4) 28°31'04.13"N 77°06'34.27"E & Sanatan Dharm mandir, Sukhrali (ANQ5) 28°28'37.76"N 77°03'27.18"E
Type of Monitoring	Hourly Reading for One time (24 hours)
Date of Sampling	ANQ-1 (01/03/2022-02/03/2022), ANQ-2 (05/03/2022-06/03/2022), ANQ-3 (08/03/2022-09/03/2022), ANQ4 (11/03/2022-12/03/2022) & ANQ5 (03/03/2022-04/03/2022)
Method of sampling	As per standard Method
Sampling Protocol	IRDH/SOP-NS/22
Sampled by	IR&DH Team

RESULTS — All Values in dB (A)

Time (Hrs)	Leq. day Time				
	ANQ1- (Project Site)	ANQ2– (Govt. Boys Sr Sec school, Ayanagar)	ANQ3 - (MCD Primary School, Kapashera)	ANQ4 - (Govt. Boys Sr Sec school, Rajokri)	ANQ5 - (Sanatan Dharm mandir, Sukhrali)
06:00 - 07:00 AM	46.2	44.3	45.1	43.9	44.4
07:00 - 08:00 AM	50.2	46.1	48.2	47.2	48.5
08:00 - 09:00 AM	52.9	48.1	50.5	49.5	50.2
09:00 - 10:00 AM	53.7	50.7	52.8	51.2	51.9
10:00 - 11:00 AM	56.2	52.3	53.1	52.9	52.5
11:00 - 12:00 PM	55.1	51.1	54.2	50.4	53.3
12:00 - 13:00 PM	55.3	50.4	50.9	51.3	52.8
13:00 - 14:00 PM	54.6	52.3	53.6	52.7	51.4
14:00 - 15:00 PM	53.8	51.9	52.4	51.1	50.2
15:00 - 16:00 PM	52.4	50.4	53.8	51.4	50.7
16:00 - 17:00 PM	54.6	52.2	52.1	52.9	54.4
17:00 - 18:00 PM	52.9	50.2	51.7	51.1	52.6
18:00 - 19:00 PM	53.3	49.3	50.2	49.9	50.2
19:00 - 20:00 PM	49.8	48.4	48.3	49.2	48.5
20:00 - 21:00 PM	46.5	47.8	47.1	48.4	46.3
21:00 - 22:00 PM	45.9	45.2	46.6	44.2	44.3
Lday	**53.28**	**50.24**	**51.63**	**50.71**	**51.20**

Quality Manager

JAS-ANZ

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Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

Report No. : IRDH-0322-EIA-ANQ-861

Time (Hrs)	Leq. Night Time				
	ANQ1- (Project Site)	ANQ2– (Govt. Boys Sr Sec school, Ayanagar)	ANQ3 - (MCD Primary School, Kapashera)	ANQ4 - (Govt. Boys Sr Sec school, Rajokri)	ANQ5 - (Sanatan Dharm mandir, Sukhrali)
22:00 - 23:00 PM	44.2	43.3	44.2	41.1	41.4
23:00 - 24:00 PM	42.1	41.6	41.9	39.5	40.1
24:00 - 01:00 AM	40.8	39.9	40.2	38.8	39.5
01:00 - 02:00 AM	40.2	40.1	40.1	38.2	40.6
02:00 - 03:00 AM	39.7	39.5	39.6	39.4	39.8
03:00 - 04:00 AM	40.1	39.3	40.2	39.6	41.1
04:00 - 05:00 AM	41.6	40.7	41.7	40.1	40.9
05:00 - 06:00 AM	43.6	41.5	42.4	42.5	41.5
Lnight	**42.32**	**41.16**	**41.80**	**40.34**	**40.79**

All Values in dB(A)

CPCB Limits			
Sr. No		*Day Time*	*Night Time*
1.	*Industrial area*	*75*	*70*
2.	*Commercial area*	*65*	*55*
3.	*Residential area*	*55*	*45*
4.	*Silence Zone*	*50*	*40*

NOTE: Day reckon- 6:00 AM- 10:00 PM
Night reckon- 10:00 PM- 06:00 AM

End of Test Report

Dr. SNA Rizvi
Authorized Signatory

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TEST REPORT

(Soil)

Report No. :	IRDH-0322-EIA-SL-861
Date of Reporting	01/06/2022
Issued to	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana By M/s DLF Limited
Nature of Sample	Soil
Identification of Sample	Soil sample collected from Project site (SL_1), (28°30'7.79"N 77°05'40.60"E), Govt. Boys Sr. Sec school, Ayanagar (SL_2), (28°28'36.63"N 77°07'48.60"E), Sanatan Dharm mandir, Sukhrali (SL_3), (28°28'37.76"N 77°03'27.18"E)
Date of Sampling	02/03/2022
Method of sampling	USDA method
Date of testing:	02/03/2022 To 11/03/2022
Sampled by	IR&DH - Team

RESULTS

S. No.	Parameter	Test Method	SL_1	SL_2	SL_3	Unit
1.	pH	IS 2720 P-26 (1987)	8.35	8.26	8.22	--
2.	Conductivity	IS 14767 (RA 2016)	515.0	495.0	484.0	µS/cm
3.	Moisture	IS 2720 P-25 (1972)	13.7	13.2	13.0	% by mass
4.	Water Holding Capacity	IRDH/SOP-SL/07	18.4	17.5	17.0	%
5.	Specific Gravity	IS 2720 P-3 (1980)	1.95	1.94	1.93	-
6.	Bulk density	IRDH/SOP-SL/06	1.43	1.43	1.41	gm/cc
7.	Chloride	IRDH/SOP-SL/14	309.0	285.0	261.0	mg/kg
8.	Calcium	IRDH/SOP-SL/17	1366.0	1345.0	1332.0	mg/kg
9.	Sodium	IRDH/SOP-SL/11	196.0	182.0	164.0	mg/kg
10.	Potassium	IRDH/SOP-SL/12	96.2	87.4	70.5	mg/kg
11.	Magnesium	IRDH/SOP-SL/16	226.0	215.0	192.0	mg/kg
12.	Organic matter	IS 2720 P-22 (1972)	0.58	0.56	0.54	% by mass
13.	Cation Exchange Capacity(CEC)	IRDH/SOP-SL/09	14.6	14.4	14.2	meq/100gm
14.	Available nitrogen	IS 14684	50.5	48.2	42.5	mg/kg
15.	Available Phosphorous	IRDH/SOP-SL/10	8.7	8.2	7.76	mg/kg

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

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C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)

Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

S. No.	Parameter	Test Method	SL_1	SL_2	SL_3	Unit
16.	Iron as Fe	IRDH/SOP-SL/22	2115.0	2106.0	2090.0	mg/kg
17.	Copper as Cu	IRDH/SOP-SL/21	30.4	28.0	26.0	mg/kg
18.	Zinc as Zn	IRDH/SOP-SL/20	44.0	38.0	36.5	mg/kg
19.	Texture	IRDH/SOP-SL/08				% by mass
	Sand		58.6	58.2	57.8	
	Slit		16.3	17.0	17.6	
	Clay		25.1	24.8	24.6	
20.	Sodium Adsorption Ratio(SAR)	IRDH/SOP-SL/13	1.29	1.21	1.11	By calculation

End of Report

Dr.SNA Rizvi
Authorized Signatory

1- Test Report is limited to the invoice raised
2-Test Report cannot be reproduced in a part or as whole in court without laboratory permission.
3- Samples shall be retained for 4 weeks after test report submitted.

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

MoEF&CC Recognized Laboratory

(ISO 9001:2015/ISO14001:2015/ISO 45001:2018)

C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)

Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT

(Water)

Report No. :	IRDH-0322-EIA-WQ-861
Date of Reporting	01/06/2022
Issued to	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana By M/s DLF Limited
Nature of Sample	Ground Water
Identification of Sample	Water collected from Sanatan Dharm Mandir, Sukhrali (28°28'37.76"N 77°03'27.18"E)
Date of Sampling	02/03/2022
Method of sampling	IS 3025- Part 1(1987)
Date of testing:	02/03/2022 To 11/03/2022
Sampled by	IR&DH – Team

RESULTS

S No.	Parameter	Test Protocol	Results	Unit	Requirements as per IS 10500- 2012	
					Acceptable Limits(Max)	Permissible Limits(Max)
1.	pH	IS 3025 P-11 1983	7.91	--	6.5-8.5	No Relaxation
2.	Turbidity	IS 3025 P-10 (1984)	<0.5	NTU	1	5
3.	Total Hardness	IS 3025 P-21 (2009)	476.0	mg/l	200	600
4.	Total Dissolved Solids (TDS)	IS 3025 P-16(1984)	1034.0	mg/l	500	2000
5.	Calcium as Ca	IS 3025 P-40 (1991)	91.2	mg/l	75	200
6.	Magnesium as Mg	IS 3025 P-46 (1994)	60.26	mg/l	30	100
7.	Total Alkalinity as $CaCO_3$	IS 3025 P-23 (1986)	388.0	mg/l	200	600
8.	Chloride as Cl	IS 3025 P-32 (1988)	290.0	mg/l	250	1000
9.	Barium as Ba	Annex F of IS:13428	<0.05	mg/l	0.7	No Relaxation
10.	Ammonia as N	IS 3025 P-34 (1988)	<0.1	mg/l	0.5	No Relaxation
11.	Sulphate as SO_4	IS 3025 P-24 (1986)	86.5	mg/l	200	400
12.	Nitrate as NO_3	IS 3025 P-34 (1988)	31.4	mg/l	45	No Relaxation

Quality Manager

JAS-ANZ

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

MoEF&CC Recognized Laboratory

(ISO 9001:2015/ISO14001:2015/ISO 45001:2018)

C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)

Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

Report No. - IRDH-0322-EIA-WQ-861 Page: 2/2

S No.	Parameter	Test Protocol	Results	Unit	Requirements as per IS 10500- 2012	
					Acceptable Limits(Max)	Permissible Limits(Max)
13.	Fluoride as F	APHA,22nd Edition	0.33	mg/l	1	1.5
14.	Iron as Fe	IS 3025 P-53 (2003)	0.18	mg/l	1.0	No Relaxation
15.	Aluminium as Al	IS 3025 P-55(2003)	<0.01	mg/l	0.03	0.2
16.	Anionic Detergent	Annex K of IS:13428	<0.05	mg/l	0.2	1
17.	Phenolic Compounds	IS 3025 P-43 (1992)	<0.001	mg/l	0.001	0.002
18.	Boron as B	IS 3025 P-57 (2005)	<0.1	mg/l	0.5	2.4
19.	Chromium as Cr	IS 3025 P-52 (2003)	<0.01	mg/l	0.05	No Relaxation
20.	Lead as Pb	IS 3025 P47 (1994)	<0.01	mg/l	0.01	No Relaxation
21.	Copper as Cu	IS 3025 P42 (1992)	<0.01	mg/l	0.05	1.5
22.	Mercury as Hg	IS 3025 P-48 (1994)	<0.001	mg/l	0.001	No Relaxation
23.	Manganese as Mn	IS 3025 P-59 (2006)	<0.01	mg/l	0.1	0.3
24.	Zinc as Zn	IS 3025 P-49 (1994)	<0.01	mg/l	5	15
25.	Arsenic as As	IS 3025 P-37 (1988)	<0.01	mg/l	0.01	No Relaxation
26.	Nickel as Ni	IS 3025 P-54 (2003)	<0.01	mg/l	0.02	No Relaxation
27.	Cadmium as Cd	IS 3025 P-41 (1992)	<0.001	mg/l	0.003	No Relaxation

End of Report

Dr.SNA Rizvi
Authorized Signatory

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C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)

Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT

(Water)

Report No.	IRDH-0322-EIA-SWQ-861
Date of Reporting	01/06/2022
Issued to	M/s Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085
Project Name	Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana By M/s DLF Limited
Nature of Sample	Surface Water
Identification of Sample	Surface Water collected from Najafgarh Drain (28°32'39.31"N 77°00'37.63"E)
Date of Sampling	02/03/2022
Method of sampling	IS 3025- Part 1(1987)
Date of testing:	02/03/2022 To 11/03/2022
Sampled by	IR&DH-Team

RESULTS

S.NO.	Parameter	Test Method	Results	Units
1.	pH	IS 3025 P-11 1983	7.61	-
2.	Conductivity	IS 3025 P-14 1984	908.0	µs/cm
3.	Turbidity	IS 3025 P-10 (1984)	92.0	NTU
4.	Free Residual Chlorine	IS 3025 P-26 (1986)	<0.1	mg/l
5.	Total Hardness	IS 3025 P-21 (2009)	208.0	mg/l
6.	Total Dissolved Solids (TDS)	IS 3025 P-16(1984)	576.0	mg/l
7.	Calcium as Ca	IS 3025 P-40 (1991)	35.2	mg/l
8.	Magnesium as Mg	IS 3025 P-46 (1994)	29.16	mg/l
9.	Total Alkalinity as $CaCO_3$	IS 3025 P-23 (1986)	244.0	mg/l
10.	Chloride as Cl	IS 3025 P-32 (1988)	129.0	mg/l
11.	Barium as Ba	Annex F of IS:13428	<0.05	mg/l
12.	Ammonia as N	IS 3025 P-34 (1988)	<0.1	mg/l
13.	Sulphate as SO_4	IS 3025 P-24 (1986)	55.2	mg/l

Quality Manager

JAS-ANZ

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

MoEF&CC Recognized Laboratory

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Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

Report No- IRDH-0322- EIA-SWQ-861 Page: 2/2

S.NO.	Parameter	Test Method	Results	Units
14.	Nitrate as NO_3	IS 3025 P-34 (1988)	26.5	mg/l
15.	Fluoride as F	APHA 4500F⁻(D)	0.41	mg/l
16.	Iron as Fe	IS 3025 P-53 (2003)	0.62	mg/l
17.	Chemical Oxygen Demand(COD)	IS 3025 P-58 2006	150.0	mg/l
18.	Biochemical Oxygen Demand(BOD)at 27° C for 3 days	IS 3025 P-44 1993	34.0	mg/l
19.	Dissolve Oxygen	IS 3025 P-38 1989	2.2	mg/l
20.	Aluminium as Al	IS 3025 P-55(2003)	<0.01	mg/l
21.	Anionic Detergent	Annex K of IS:13428	<0.05	mg/l
22.	Phenolic Compounds	IS 3025 P-43 (1992)	<0.001	mg/l
23.	Boron as B	IS 3025 P-57 (2005)	<0.1	mg/l
24.	Chromium as Cr	IS 3025 P-52 (2003)	<0.01	mg/l
25.	Lead as Pb	IS 3025 P47 (1994)	<0.01	mg/l
26.	Copper as Cu	IS 3025 P42 (1992)	<0.01	mg/l
27.	Mercury as Hg	IS 3025 P-48 (1994)	<0.001	mg/l
28.	Manganese as Mn	IS 3025 P-59 (2006)	<0.01	mg/l
29.	Zinc as Zn	IS 3025 P-49 (1994)	<0.01	mg/l
30.	Arsenic as As	IS 3025 P-37 (1988)	<0.01	mg/l
31.	Nickel as Ni	IS 3025 P-54 (2003)	<0.01	mg/l
32.	Cadmium as Cd	IS 3025 P-41 (1992)	<0.001	mg/l

End of Report

Dr.SNA Rizvi
Authorized Signatory

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IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

NABL Accredited & MoEF&CC Recognized Laboratory
(ISO 9001:2015/ISO14001:2015/ ISO 45001:2018)
C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)
Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT
(MICROBIOLOGY)

Report No. :	**IRDH-MBL-0322-EIA-WQ-861**
Date of Reporting :	01/06/2022
Name of the Customer & Address :	M/s. Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085.
Project Name:	**Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana By M/s. DLF Limited**
Nature of Sample :	Ground Water
Sample Description :	Water sample without suspended particles collected in sterilized 250ml PVC bottle from Sanatan Dharm mandir, Sukhrali (GW1) (28°28'37.76"N 77° 3'27.18"E)
Date of Sampling :	02/03/2022
Method of Sampling:	IS:1622: 1981 (Reaffirmed 2014)
Sample Received on :	02/03/2022
Sample Code No.	WQ-861
Date of Testing:	02/03/2022 to 11/03/2022
Sample Drawn By :	IRDH – Team

RESULTS

Sr. No.	Parameter	Test Method	Unit	Results	Requirements as per IS 10500:2012
1.	Total coliform	IS:1622: 1981 (R.A. 2014)	MPN / 100ml	<2	Shall not be detectable in any 100 ml sample
2.	E.coli	IS:1622: 1981 (R.A. 2014)	Present or Absent / 100ml	Absent	Shall not be detectable in any 100 ml sample

MPN*- Most Probable Number

****End of Report****

Vandana Gupta
Authorized Signatory

Note:

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IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

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(ISO 9001:2015/ISO14001:2015/ ISO 45001:2018)
C-10, 2nd Floor, Sector-6, Noida-201301 (U.P.)
Tel. : +91 120 4215489, E-mail : contact.irdh@gmail.com

TEST REPORT
(MICROBIOLOGY)

Report No. :	**IRDH-MBL-0322-EIA-SWQ-861**
Date of Reporting :	01/06/2022
Name of the Customer & Address :	M/s. Ind Tech House Consult, G-8/6, Ground Floor, Sector-11, Rohini, Delhi-110085.
Project Name:	**Expansion of Environmental Clearance for Shopping/Commercial Building on 32.36 acres (DLF Downtown formally known as Mall of India) to 36.36 acres at Sector 25A, Gurugram, Haryana By M/s. DLF Limited**
Nature of Sample :	Surface Water
Sample Description :	Water sample with suspended particles collected in sterilized 250ml PVC bottle from Najafgarh Drain (28°32'39.31"N 77° 0'37.63"E)
Date of Sampling :	02/03/2022
Method of Sampling:	IS:1622: 1981 (Reaffirmed 2014)
Sample Received on :	02/03/2022
Sample Code No.	SWQ-861
Date of Testing:	02/03/2022 to 11/03/2022
Sample Drawn By :	IRDH – Team

RESULTS

Sr. No.	Parameter	Test Method	Unit	Results
1.	Total coliform	IS:1622: 1981 (R.A. 2014)	MPN / 100ml	1600
2.	E.coli	IS:1622: 1981 (R.A. 2014)	Present or Absent / 100ml	Present

MPN*- Most Probable Number ****End of Report****

Vandana Gupta
Authorized Signatory

Ind Research & Development House Pvt. Ltd. NOIDA

Note:
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ANNEXURE – 12

Height NOC

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

AAI/RHQ/NR/ATM/NOC/2019/208/1002-1005

DLF City Centre Ltd.

DLF Shopping Mall 3rd Floor, Arjun Marg
DLF City Phase I, Gurgaon 122002

Date: 11-06-2019

Valid Upto: 10-06-2027

No Objection Certificate for Height Clearance (Review)

1. This NOC is issued by Airports Authority of India (AAI) in pursuance of responsibility conferred by and as per the provisions of Govt. of India (Ministry of Civil Aviation) order GSR751 (E) dated 30th Sep. 2015 for Safe and Regular Aircraft Operations.

2. This office has no objection to the construction of the proposed structure as per the following details:

NOC ID :	[illegible]
Applicant Name*	Pawan Chawla
Site Address*	32.36 Acres Shopping/Commercial Block V Sector 25a ,DLF Phase III,Gurgaon,Haryana
Site Coordinates*	77 05 35.29-28 30 06.93, 77 05 43.30-28 30 17.43, 77 05 45.25-28 30 16.09, 77 05 46.68-28 30 08.94, 77 05 46.74-28 30 01.07, 77 05 46.84-28 30 15.57, 77 05 47 13-28 30 14.34, 77 05 48.71-28 30 05.98, 77 05 49.30-28 30 04.18
Site Elevation in mtrs AMSL as submitted by Applicant*	243.32 M
Permissible Top Elevation in mtrs Above Mean Sea Level(AMSL)	282.49 M (Restricted)

*As provided by applicant

3. This NOC is subject to the terms and conditions as given below:

a. Permissible Top elevation has been issued on the basis of Site coordinates and Site Elevation submitted by Applicant. AAI neither owns the responsibility nor authenticates the correctness of the site coordinates & site elevation provided by the applicant. If at any stage it is established that the actual data is different, this NOC will stand null and void and action will be taken as per law. The office in-charge of the concerned aerodrome may initiate action under the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994.

b. The Site coordinates as provided by the applicant in the NOC application has been plotted on the street view map and satellite map as shown in ANNEXURE. Applicant/Owner to ensure that the plotted coordinates corresponds to his/her site. In case of any discrepancy, Designated Officer shall be requested for cancellation of the NOC.

c. Airport operator or his designated representative may visit the site (with prior coordination with applicant or owner) to ensure that NOC terms & conditions are complied with.

d. The Structure height (including any superstructure) shall be calculated by subtracting the Site elevation in AMSL from the Permissible Top Elevation in AMSL i.e. Maximum Structure Height = Permissible Top Elevation minus (-) Site Elevation.

e. The issue of the 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and any notifications issued there under from time to time including the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994.

क्षेत्रीय मुख्यालय उत्तरी क्षेत्र, परिचालन कार्यालय परिसर रंगपुरी, नई दिल्ली - 110037 दूरभाष संख्या - 91-11-25653566
Regional Headquarter Northern Region, Operational Offices Complex Rangpuri, New Delhi-110 037 Tel: 91-11-25653566

" हिंदी पत्रों का स्वागत है "

K. Kabir
11.06.2019

के के ए कबीर / K. K. A. KABIR
महाप्रबंधक (वायु यातायात प्रबंधन-उत्तरी क्षेत्र) / General Manager (ATM), NR
भारतीय विमानपत्तन प्राधिकरण / Airports Authority of India
परिचालन कार्यालय / Operational Offices
रंगपुरी, नई दिल्ली-37 / Rangpuri Complex, New Delhi-37

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

No radio/TV Antenna, lightning arrestors, staircase, Mumty, Overhead water tank and attachments of fixtures of any kind shall project above the missible Top Elevation of 252.49 M (Restricted) AMSL as indicated in para 2

Use of oil, electric or any other fuel which does not create smoke hazard for flight operations is obligatory, within 8 KM of the Aerodrome Reference Point.

The certificate is valid for a period of 5 years from the date of its issue.One time revalidation without assessment may be allowed, provided instruction work has commenced,subject to the condition that such request shall be made within the validity period of the NOC and the delay is due circumstances which are beyond the control of the developer

No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground hts of the Airport shall be installed at the site at any time, during or after the construction of the building. No activity shall be allowed which may fect the safe operations of flights

The applicant will not complain/claim compensation against aircraft noise, vibrations damages etc caused by aircraft operations at or in the unity of the airport.

Day marking & night lighting with secondary power supply shall be provided as per the guidelines specified in chapter 6 and appendix 6 of Civil iation Requirement Series B Part I Section 4, available on DGCA India website: www.dgca.nic.in

The applicant is responsible to obtain all other statutory clearances from the concerned authorities including the approval of building plans. This OC for height clearances is to ensure the safe and regular aircraft operations and shall not be used as document for any other purpose/claim whatsoever, including ownership of land etc.

This NOCID has been assessed w.r.t I.G.I Airport,Rohini Heliport,Safdarjung Airport Airport(s). NOC has been issued w.r.t. the AAI aerodromes d other licensed civil aerodromes as listed in Schedule-III, Schedule-IV(Part-1), Schedule-IV(Part-2:RCS Airports Only) and Schedule-VII of GSR751(E)

Applicant needs to seek separate NOC from Defence, if the site lies within the jurisdiction of Defence Aerodromes as listed in Schedule-V of GSR751(E). As per Rule 13 of GSR751(E), applicants also need to seek NOC from the concerned State Govt. for sites which lies in the jurisdiction of un-licensed aerodromes as listed in Schedule-IV (Part-2:other than RCS airports) of GSR751(E).

In case of any discrepancy/interpretation of NOC letter, English version shall be valid.

In case of any dispute w.r.t site elevation and/or AGL height, top elevation in AMSL shall prevail

This NOC supersedes any previously issued NOC

airman NOC Committee

gion Name: NORTH

ress: General Manager Airports Authority of India, Regional Headquarter, Northern Region, Operational Offices, Gurgaon Road, New Delhi-110037

ail ID: noc_nr@aai.aero

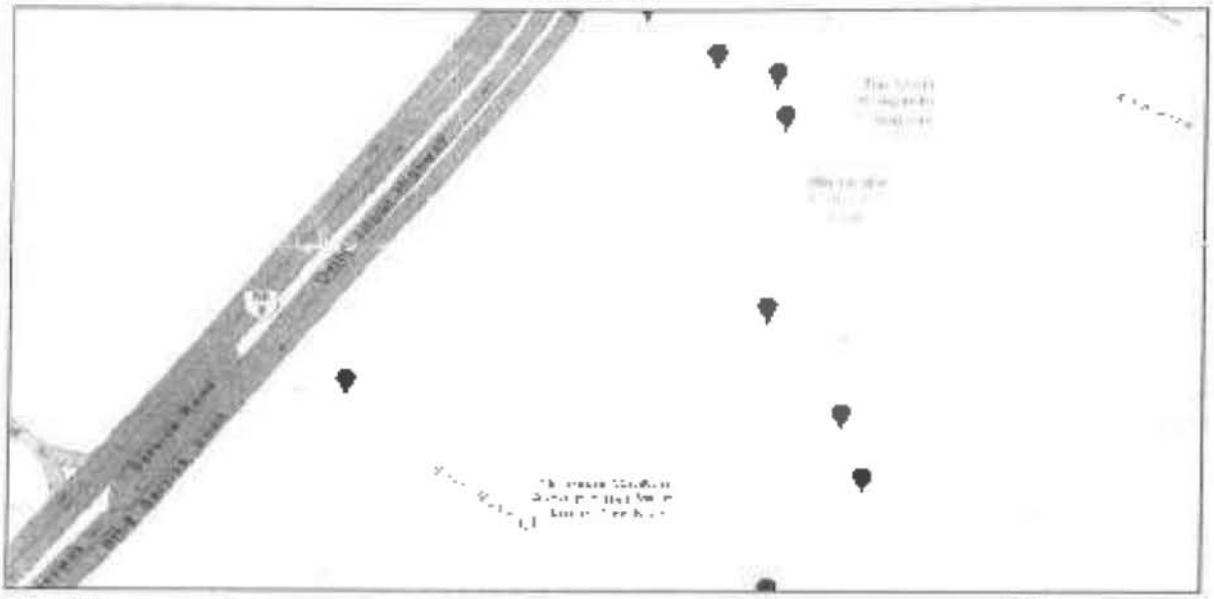
ntact No: 011-25653551

Name / Designation / Sign with Date
Prepared By :
Verified By :

Distance From Nearest Airport And Bearing

Airport Name	Distance (Metres) from Nearest ARP	Bearing (Degree) from Nearest ARP
I.G I Airport	3270.22	190.18
Rohini Heliport	27636.12	71.26
Safdarjung Airport	13997.5	228.21
NOCTD	PALAM/NORTH/E/012315/275881	

Street View

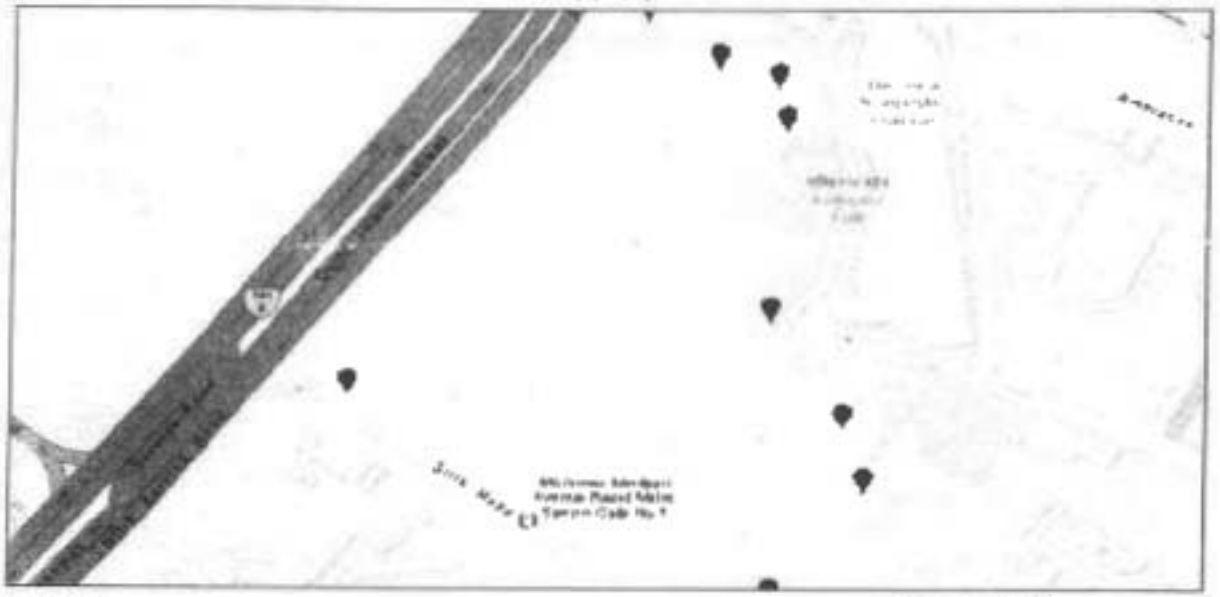


Satellite View

Distance From Nearest Airport And Bearing

Airport Name	Distance (Meter) from Nearest ARP	Bearing (Degree) from Nearest ARP
I.G.I Airport	7270.22	190.38
Rohini Heliport	27636.12	191.26
Safdarjung Airport	13997.3	228.21
NOCID	PALM/NORTH/B/012318/275861	

Street View



Satellite View

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

File No. AAI/RHQ/NR/ATM/NOC/2019/208/1002-1005

Copy to:

1. The Distt. Town Planner, Gurgaon, HUDA, Complex, Sector-14, Gurgaon, Haryana.
2. The Chief Executive Officer, Delhi International Airport,New Uddan Bhawan, I.G.I Airport Terminal -3, New Delhi-110037.
3. Guard file.

ANNEXURE – 13

Copy of Aravali NOC

प्रेषक,

उपायुक्त, गुरूग्राम।

सेवा मे,

M /S DLF Limited
Gateway Tower(5th Floor),
DLF City, Phase-III,
Gurugram-122002.

क्रमांक 01 /एस.डी दिनांक 04/01/2018

विषयः- **Report of the Tehsildar Gurgaon through the office of DC that the land of the project does not fall under MOEF Aravali Notification S.O. 319(E) dated 7th May 1992: NOC Forest and Aravalli Certificate for Proposed Shopping/Commercial Building "Mall of India" in Block-V, DLF City Phase-III, Sector-25A, Village Nathupur, Gurgaon, Haryana.**

उपरोक्त विषय पर आपके प्रार्थना पत्र के संदर्भ में।

विषयोक्त मामले पे आपके प्रार्थना पत्र पर इस कार्यालय द्वारा तहसीलदार, गुरूग्राम व उप वन संरक्षक, गुरूग्राम से रिर्पोट ली गई। जो निम्न प्रकार है।

तहसीलदार, गुरूग्राम ने अपने पत्र क्रमांक 1933/ओ0के0 दिनांक 28.08.2017 की रिर्पोट अनुसार मौजा नाथूपुर तह0 व जिला गुरूग्राम के संदर्भ मे खसरा न0 8(0-8-0), 9(0-18 0), 14(0-9-0), 15(0-18-0), 31/2(0-13-0), 424(2 18-0), 436(1-6-0), 21(0-17-0), 22(0-14-0), 23(0-19-0), 25(0-1-0) की मैसर्ज डी0एल0एफ0 होम डवलपर्स लिमिटेड व खसरा न0 18/1(0-5-10), 19(0-11-0), 20(0-7-0), 427(0-18-0) की मैसर्ज डी0एल0एफ0 लिमिटेड व खसरा न0 10(2-0 0), 11(1 1-0), 12(1-2-0), 13(0-9-0), 16(2-5 0), 24(0-15-0), 26(1-18-0), 27(2-13-0), 28(3 9-0), 29(1-15-0), 30(2-13-0), 32(2-18-0), 33(3-18-0), 34(8-16-0), 35(5-2-0), 36(4-18-0), 425/1/2(2-9-11), 426/1(2-4-0), 428(0-12-0), 429(1-0-0), 430(3-9-0), 431(0-16-0), 432(1-6-0), 427/1(0-6-0) की मैसर्ज डी0एल0एफ0 सिटी सेंटर लिमिटेड व खसरा न0 31/1/1(0-13-0) के राजेन्द्र सिंह, रानेश कुमार, सुरेन्द्र सिंह, राकेश कुमार पुत्रान बलबीर सिंह पुत्र रामरिख समभाग के नाम मलकियत है। जिसकी मांगी गई रिर्पोट निम्नवार निम्न प्रकार है:-

1. उपरोक्त अराजी दिनांक 07.05.1992 के नोटिफिकेशन के अनुसार अरावली क्षेत्र मे नही है।
2. दिनांक 07.05.1992 के नोटिफिकेशन से पूर्व व पश्चात मिसल हकीयत/चकबन्दी तक कभी भी अराजी की किस्म कभी भी गैर मुमकिन पहाड-राडा बीहड-बंजड बीहड या रून्द्र नही रही है।

3. दिनांक 07.05.1992 के नोटिफिकेशन से पूर्व व पश्चात किला नम्बरान 8,9,10,11,12,13,14,15,16,18/1,24,25,26,27,28,29,30,31/1/1,31/2,32,33,34,35, 36,424,425/1/2,426/1,427,427/1,428,429,430,431,432,436 की किस्म गैर मुमकिन काश्तनी है। खसरा न0 19 की किस्म खरीफ 1991 ता रबी 2016 तक बंजर कदीम व खरीफ 2016 ता हाल गैर मुमकिन है। व खसरा न0 22,20,21,23 की किस्म खरीफ 1991 ता 2011 तक बंजर कदीम व खरीफ 2011 ता हाल गैर मुमकिन है

4. वर्णित प्रार्थना पत्र मे दर्शाई गई अराजी खसरा न0 8,9,10,11,12,13,14,15,16,18/1 ,24,25,26,27,28,29,30,31/1/1,31/2,32,33,34,35,36,424,425/1/2,426/1,427,4 27/1,428,429,430,431,432,436 पिसन हर्कियत ता हाल कभी भी शामलात देह/पंचायत देह/नगर पालिका/नगर निगम की मलकियत नही रही है खसरा न0 18 व 22 की मलकियत जमाबन्दी 1995-96 तक पंचायत की मलकियत व 18 न0 खसरा पर श्रीमति दया आदि गैर मैरूसीयान व खसरा न0 22 पर रामचन्द्र आदि गैर मौरूसीयान काबिज रहे है। इसके बाद इन्तकाल न0 1687 तबदील मलकियत पर खसरा न0 18(0 16 0) का 1/3 भाग के श्रीमति तिरपती, विरो पुत्रयान श्रीमति कालिया विधवा रतीराम मालकान बने व बाकी हिस्से के पंचायत रही इन्तकाल न0 1688 बेय पर श्रीमति दया आदि ने सुषमा यादव पत्नी महावीर सिंह को 1/3 भाग बेय कर दिया व इन्तकाल न0 1969 तकसीम पर खसरा न0 18/1(0-5-10) श्रीमति सुषम यादव व खसरा न0 18/2 रकबा 0-10-10 ग्राम पंचायत के हिस्से मे आया। इसके बाद इन्तकाल न0 2671 बेय पर श्रीमति सुषम यादव ने मैसर्स डी0एल0एफ0 लिमिटेड को खसरा न0 18/1(0-5-10) बेय कर दिया इसी प्रकार खसरा न0 22(0-14-0) पर इन्तकाल न0 1824 तबदील मलकियत पर रामचन्द्र आदि मालकान बने व इन्तकाल न0 1826, 1827, 1832, 1833, 1834 बेय से मैसर्स डी0एल0एफ0 हाउसिंग एण्ड कन्सट्रक्शन लिमिटेड मालिक बनी है। तथा इन्तकाल न0 2643 त0म0 पर मैसर्स डी0एल0एफ0 होम डेवलपर्स लिमिटेड मालिक बनी है।

5. उपरोक्त अराजी पर मुताबिक जमाबन्दी साल 2005-06 के अलावा कैफियत मे किसी भी माननीय न्यायालय का कोई केस इन्द्राज नही है

Dy. Conservator of Forests, Gurugram ने अपने कार्यालय के पत्र क्रमांक 867-70-G Dated 06-07-2017 के द्वारा लिखा है कि Applicant **M/S DLF Ltd. Gateway Tower(5th Floor), DLF City, Phase-III, Gurugram-122002, Haryana** letter no. Nil dated 29-12-2016 made a request in connection with land measuring 42.29 Acres having Khasra No. 8,9,10,11,12,13,14,15,16,18/1,19,20,21,22,23,24,25,26,27,28,29,30,31/1/1,31/2,32,33,34,35,36,424,425/1/2,426/1,427,427/1,428,429,430min,431,432,436min Land located at Village Nathupur, District-Gurugram. Applicant made a proposal to use this land for Proposed Shopping/commercial Building "Mall of India" Purpose. In reference to the information provided by the user agency in form of facts/maps & GPS co-ordinates and subsequent verification of the provided facts with the available official records & Geo-referencing done of the co-ordinates provided by user agency on Google Earth the following is made clear that :-

A) As per records available above said land is not part of notified Reserved Forest, protected Forest under Indian Forest Act, 1927 or any area closed under section 4 & 5 Punjab Land Preservation Act 1900.

B) It is clarified that by the Notification No. S.O 8/P.A/2/1900/S 4/2013 dated 04-01-13 whole Revenue Estate of Gurugram is notified u/s 4 of PLPA 1900 and S.O 81/PA/2/1900/S.3/2012 dated 19-12-12 u/s 3 of PLPA 1900. The area is however not recorded as Forest in the Government record but felling of any tree is strictly prohibited without the permission of Divisional Forest officer, Gurugram.

C] It is clarified that by the Notification No. S.O 8/P A/2/1900/S 4/2013 dated 04-01-13 whole Revenue Estate of Gurugram is notified u/s 4 of PLPA 1900. anot recorded as Forest in the Government record but felling of any tree is strictly prohibited without the permission of Divisional Forest officer, Gurugram

D) If approach is required from Protected Forest by the user agency, the clearance/regularization under Forest Conservation Act 1980 will be required without prior clearance from Forest Department the user of Forest land for approach road is strictly prohibited. **M/S DLF Ltd.** whose land is located at **Village NathupurDistrict Gurugram** must obtain clearance as applicable under Forest Conservation Act,1980.

E) As per the records available with the Forest Department Gurugram the area does not fall in areas where plantations were raised by the Forest Department under Aravali project.

F) All other statutory clearances mandated under the Environment protection Act 1986, as per the notification of Ministry of Environment and Forest, Government of India dated 07-05-1992 or any other Act/Order shall be obtained as applicable by the project proponents from the concerned authorities.

G) The project proponent will not violate and Judicial Order/Direction issued by the Hon'ble Supreme Court/High Courts

K) It is clarified that the Hon'ble Supreme Court has issued various judgement dated 07-05-2002, 29-10-2002, 16-12-2002, 18-03-2004, 14-05-2008 etc pertaining to Aravali region in Haryana, which should b e complied with.

l) The aforesaid clarification is for the facts/location maps/GPS Co-ordinates provided by the user agency.

GPS Co-ordinates :-

(i) 28° 30' 15.88" N 77" 05' 42.24" E

(ii) 28° 30' 12.41" N 77° 05' 48.01" E

(iii) 28° 30' 08.41" N 77° 05' 46.24" E

(iv) 28° 30' 07.37" N 77° 05' 49.82" E

(v) 28° 29' 59.37" N 77° 05' 43.33" E

(vi) 28° 30' 06.59" N 77° 05' 35.12" E

l) It shall be the responsiblity of user agency/applicant to get necessary clearance/ permissions under various Acts and Rules applicable if any, from the respective authorities/department.

अतः तहसीलदार, गुरुग्राम व उप वन संरक्षक, गुरुग्राम की रिपोर्ट अनुसार वर्णित किला न अरावली क्षेत्र में नहीं आते हैं।

कृते: उपायुक्त, गुरुग्राम।

ANNEXURE – 14

Copy of Forest NOC

Forest Department, Govt. of Haryana
Office of Dy. Conservator of Forests, Gurugram
Forest Complex, Sohna Road, Near Court, Gurugram, Ph. 0124-2655401

No.: 866-G **Dated:** 6/7/17

To,

M/s DLF Ltd.,
Gateway Tower (5th Floor), DLF City, Phase-III,
Gurugram-122002, Haryana

Sub.: Clarification regarding Applicability of forest laws on Non Forest land Applied by **Sh M/s DLF Ltd.**, land located at village **Nathupur** District Gurugram.

Applicant **M/s DLF Ltd., Gateway Tower(5th Floor), DLF City, Phase-III, Gurugram-122002, Haryana** letter no. **Nil** dated **29.12.2017** made a request in connection with land measuring **42.29 Acres** having Khasra No. **8, 9, 10, 11, 12, 13, 14, 15, 16, 18/1, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31/1/1, 31/2, 32, 33, 34, 35, 36, 424, 425/1/2, 426/1, 427, 427/1, 428, 429, 430min, 431, 432, 436min** located at village **Nathupur** District **Gurugram**. Applicant made a proposal to use this land for **Proposed Shopping/Commercial Building "Mall of India" Purpose.** In reference to the information provided by the User Agency in form of facts/ Maps & GPS Co-ordinates and subsequent verification of the provided facts with the available official records & Geo-referencing done of the co-ordinates provided by User Agency on Google Earth the following is made clear that:-

a) As per records available above said land is not part of notified Reserved Forest, Protected Forest under Indian Forest Act, 1927 or any area closed under section 4 & 5 of Punjab Land Preservation Act, 1900.

b) It is clarified that by the Notification No. S.O.8/P.A 2/1900/S.4/2013 dated 4th January, 2013, whole Revenue Estate of Gurugram is notified u/s 4 of PLPA 1900 and S.O.81/PA.2/1900/S.3/2012 dated 19th December, 2012 u/s 3 of PLPA 1900. The area is however not recorded as forest in the Government record but felling of any tree is strictly prohibited without the permission of Divisional Forest Officer, Gurugram.

c) It is clarified that by the Notification No. S.O.8/P.A 2/1900/S.4/2013 dated 4th January, 2013, whole Revenue Estate of Gurugram is notified u/s 4 of PLPA 1900 anot recorded as forest in the Government record but felling of any tree is strictly prohibited without the permission of Divisional Forest Officer, Gurugram.

d) If approach is required from Protected Forest by the user agency, the clearance/regularization under Forest Conservation Act 1980 will be required. Without prior clearance from Forest Department, the use of Forest land for approach road is strictly prohibited. **M/s DLF Ltd.**, whose land is located at village **Nathupur** District **Gurugram** must obtain clearance as applicable under Forest Conservation Act 1980.

e) As per the records available with the Forest Department, Gurugram, the area does not fall in areas where plantations were raised by the Forest Department under Aravalli project.

f) All other statutory clearances mandated under the Environment Protection Act,1986, as per the notification of Ministry of Environment and Forests, Government of India, dated 07-05-1992 or any other Act/order shall be obtained as applicable by the project proponents from the concerned authorities.

g) The project proponent will not violate any Judicial Order/ direction issued by the Hon'ble Supreme Court/ High Courts.

h) It is clarified that the Hon'ble Supreme Court has issued various judgments dated 07.05.2002, 29.10.2002, 16.12.2002, 18.03.2004, 14.5.2006 etc. pertaining to Aravalli region in Haryana, which should be complied with.

i) The aforesaid clarification is for the facts/location maps/GPS Co-ordinates provided by the user agency.

GPS Co-ordinates:-

(i) 28° 30' 15.88" N 77° 05' 42.24" E	(ii) 28° 30' 12.41" N 77° 05' 48.01" E
(iii) 28° 30' 08.41" N 77° 05' 46.24" E	(iv) 28° 30' 07.37" N 77° 05' 49.82" E
(v) 28° 29' 59.37" N 77° 05' 43.33" E	(vi) 28° 30' 06.59" N 77° 05' 35.12" E

l) It shall be the responsibility of user agency/applicant to get necessary clearances/permissions under various Acts and Rules applicable if any, from the respective authorities/Department.

Date:
Place. **Gurugram**

Divisional Forest Officer Gurgaon

Dy. Conservator of Forests,
Gurugram

Endst.No. Dated:

A copy is forwarded to:-

1. Conservator of Forests, South Circle, Gurugram for kind information.
2. D.G, T.C.P, Chandigarh SCU 71-75 2nd Floor, Sec-17C, Chandigarh for kind information.
3. District Magistrate, Gurugram w.r.t. his letter no. **358/MB Dated 13.01.2017** for kind information.
4. Guard File.

Dy. Conservator of Forests,
Gurugram

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ANNEXURE – 15

Copy of License

Annexure 4

Directorate Of Town & Country Planning, Haryana

SCO 71-75, 2nd Floor, Sector 17C, Chandigarh Phone:0172-2549349;
Website tcpharyana.gov.in, email:tcphry@gmail.com

To

DLF Ltd. & others
DLF Home Developers Limited
DLF Centre, Sansad Marg,
New Delhi-110001, India

Memo No:- LC-50-Asstt.(RK)/2019/ 15565 Dated:- 01-07-2019

Subject **Renewal of License No. 95 of 1984 dated 17.05.1984, 117 of 1984 dated 03.12.1984, 1 & 2 of 1985 dated 21.01.1985, 27 & 28 of 1985 dated 13.09.1985, 45 of 1985 dated 27.11.1985, 8 of 1986 dated 25.01.1986, 30 of 1986 dated 07.04.1986, 3 of 1987 dated 18.03.1987, 56 of 1992 dated 19.06.1992, 6 of 2001 dated 31.08.2001, 36 of 2004 dated 31.03.2004 & 69 of 2013 dated 25.07.2013 granted for development of residential plotted colony in Phase-I, II & III, DLF City, Sector 24, 25, 25A, Gurugram Manesar Urban Complex - DLF Ltd.**

Please refer to your application dated 24.04.2019 on the matter as subject cited above.

1. The following licenses granted for setting up of a residential plotted colony in Phase - I, II & III, DLF City, Sector 24,25,25A Gurugram Manesar Urban Complex, are hereby renewed as per detail given as under:-

Sr.No.	License No & Date.	Area	Renewed upto	Name of the licensee
1.	95 of 1984 dated 16.05.1984	20.16	15.05.2021	(Apollo Land & Housing Co. Ltd) Now DLF Home Developers Ltd.
2.	117 of 1984 dated 03.12.1984	22.11	02.12.2021	(Apollo Land & Housing Co. Ltd) Now DLF Home Developers Ltd.
3.	01 of 1985 dated 21.01.1985	13.88	20.01.2022	(Delhi & Land Finance Ltd.) Now DLF Home Developers Ltd.
4.	02 of 1985 dated 21.01.1985	4.32	20.01.2022	(Apollo Land & Housing Co. Ltd) Now DLF Home Developers Ltd.
5.	27 of 1985 dated 13.09.1985	20.56	12.09.2021	(Apollo Land & Housing Co. Ltd) Now DLF Home Developers Ltd.
6.	28 of 1985 dated 13.09.1985	20.26	12.09.2021	(Delhi & Land Finance Ltd.) Now DLF Home Developers Ltd.
7.	45 of 1985 dated 27.11.1985	8.09	26.11.2021	(Vee Dee Investment Agencies Ltd) Now DLF Home Developers Ltd.
8.	08 of 1986 dated 25.01.1986	7.09	24.01.2022	(Vee Dee Investment Agencies Ltd) Now DLF Home Developers Ltd.
9.	30 of 1986 dated 07.04.1986	1.28	06.04.2021	(Apollo Land & Housing Co. Ltd) Now DLF Home Developers Ltd.
10.	03 of 1987 Dated 18.03.1987	12.11	17.03.2021	(Vee Dee Investment Agencies Ltd.) Now DLF Home Developers Ltd.
11.	56 of 1992 dated 19.06.1992	2.53	18.06.2021	(Delhi & Land Finance Ltd.) Now DLF Home Developers Ltd.
12.	06 of 2001 dated 31.08.2001	5.17625	30.08.2021	(DLF Housing & Construction Ltd.) Now DLF Home Developers Ltd.

13.	36 of 2004 dated 31.03.2004	2.469	30.03.2021	(DLF Universal Ltd.) Now DLF Ltd.
14.	69 of 2013 dated 25.07.2013	12.3875	24.07.2021	DLF Ltd. & others in collaboration with DLF Ltd.

2. It is further clarified that this renewal will not tantamount to certification of your satisfactory performance entitling you for renewal of license of further period and you will get the licenses renewed upto the period till the final completion of colony is granted.
3. You shall complete the construction of community buildings as per provisions of section 3(3)(a)(iv) of Act 8 of 1975.
4. The BG on account of IDW will be revalidated one month before its expiry.
5. Renewal is issued subject to final decision of Hon'ble Punjab & Haryana High Court in CWP No. 6229 of 2008.
6. You shall submit the NOC from MOEF, GOI & ultimate power load requirement of the project to the power utility against license No. 69 of 2013 as per requirement notification dated 14.09.2006.

(K. Makrand Pandurang, IAS)
Director,
Town & Country Planning,
Haryana, Chandigarh.

Endst No:LC-50-Asstt.(RK)/2019/ Dated:-

A copy is forwarded to following for information and further necessary action.

1. Chief Administrator, HSVP, Panchkula.
2. Chief Engineer, HSVP, Panchkula.
3. Chief Accounts officer of this Directorate.
4. Senior Town Planner, Gurugram.
5. Website Administrator with request to update the status on website.
6. District Town planner, Gurugram.

(Narender Kumar)
District Town Planner (HQ)
For :Director, Town & Country Planning,
Haryana, Chandigarh.

Directorate of Town & Country Planning, Haryana

Nagar Yojana Bhawan, Plot No. 3, Block-A, Sector 18A, Madhya Marg Chandigarh;
Phone:0172-2549349; http://tcpharyana.gov.in

To

DLF Ltd & Others,
DLF Centre, Sansad Marg,
New Delhi-110001.

Memo No. LC-50/JE(S)/2021/ 33355 Dated: 30-12-2021

Subject: **Renewal of license granted for setting up of Plotted Colony of Phase-I, II & III Gurugram being developed by DLF Ltd (Formerly known as DLF Universal Ltd).**

Please refer to your application dated 26.03.2018 & 18.08.2021 on the matter as subject cited above.

Your request for renewal of licenses of Phase-I, II & III Gurugram granted for setting up of setting up of Plotted Colony has been considered on the reason submitted that you have applied for issuance of completion certificate. The licenses are hereby renewed upto the date of mentioned in the table given as under on the terms and condition mentioned therein.

PHASE-I				
Sr. Nos.	**Licence Nos & Date**		**Valid upto**	**Renewed upto**
1	1-5 of 1981 dated 20.04.1981	01 of 1981	19.04.2001	19.04.2024
		02 of 1981	19.04.1999	
		03 of 1981	19.04.2001	
		04 of 1981	19.04.2001	
		05 of 1981	19.04.1985	
2	1-3 of 1982 dated 27.04.1982	01 of 1982	26.04.1984	26.04.2024
		02 of 1982	26.04.1984	
		03 of 1982	26.04.1984	
3	4-8 of 1982 dated 27.04.1982	04 of 1982	26.04.2013	26.04.2024
		05 of 1982	26.04.2011	
		06 of 1982	26.04.2013	
		07 of 1982	26.04.1986	
		08 of 1982	26.04.2013	
4	9-11 of 1982 dated 29.04.1982	09 of 1982	28.04.1999	28.04.2024
		10 of 1982	28.04.2001	
		11 of 1982	28.04.2001	
5	12 of 1982 dated 28.07.82	12 of 1982	27.07.1986	27.07.2024
6	16-18 of 1983 dated 23.05.1983	16-18 of 1983	22.05.1987	22.05.2024
7	20 of 1983 dated 26.07.1983	20 of 1983	25.07.1987	25.07.2024
8	25-28 of 1983 dated 04.10.1983	25-28 of 1983	03.10.1987	03.10.2024
9	31-32 of 1983 dated 06.10.1983	31 of 1983	05.10.2013	05.10.2024
		32 of 1983	05.10.1986	
10	33-35 of 1983 dated 07.10.1983	33 of 1983	06.10.2011	06.10.2024
		34 of 1983	06.10.1987	
		35 of 1983	06.10.2011	
11	44 of 1983 dated 14.10.1983	44 of 1983	13.10.1987	13.10.2024

Director
Town & Country Planning
Haryana, Chandigarh

12	47-52 of 1983 dated 14.10.1983	47 of 1983	13.10.1987	13.10.2024
		48 of 1983	13.10.1987	
		49 of 1983	13.10.1987	
		50 of 1983	13.10.2013	
		51 of 1983	13.10.1987	
		52 of 1983	13.10.1987	
13	53-56 of 1983 dated 27.10.1983	53 of 1983	26.10.2013	26.10.2024
		54 of 1983	26.10.2011	
		55 of 1983	26.10.2011	
		56 of 1983	26.10.1987	
14	57 of 1983 dated31.10.1983	57 of 1983	30.10.1987	30.10.2024
15	66-68 of 1983 dated15.02.1984	66 of 1983	14.02.1987	14.02.2025
		67 of 1983	14.02.2012	
		68 of 1983	14.02.2014	
16	72-75 of 1984 dated15.03.1984	72 of 1984	14.03.1987	14.03.2025
		73 of 1984	14.03.2012	
		74 of 1984	14.03.1987	
		75 of 1984	14.03.1987	
17	82 of 1984 dated16.04.1984	82 of 1984	15.04.2011	15.04.2024
18	93 of 1984 dated16.05.1984	93 of 1984	15.05.1987	15.05.2024
19	97-98 of 1984 dated22.06.84	97 of 1984	21.06.1987	21.06.2024
		98 of 1984	21.06.2013	
20	5 of 1985 dated 21.01.1985	05 of 1985	20.01.2012	20.01.2025
21	23 of 1985 dated09.09.1985	23 of 1985	08.09.1987	08.09.2024
22	4 of 1986 dated 25.01.1986	04 of 1986	24.01.1988	24.01.2025
23	10-15 of 1989 dated 02.12.1989	10 of 1989	01.12.2011	01.12.2024
		11 of 1989	01.12.1991	
		12 of 1989	01.12.2011	
		13 of 1989	01.12.1991	
		14 of 1989	01.12.2011	
		15 of 1989	01.12.1991	
24	82-83 of 1996 dated 06.05.1996	82 of 1996	05.05.1998	05.05.2024
		83 of 1996	05.05.1998	

PHASE-II

Sr. Nos	Licence Nos & Date		Valid upto	Renewed upto
1	14-20 of 1982 dated 26.08.1982	14 of 1982	25.08.1986	25.08.2024
		15 of 1982	25.08.1986	
		16 of 1982	25.08.2011	
		17 of 1982	25.08.2011	
		18 of 1982	25.08.2008	
		19 of 1982	25.08.2003	
		20 of 1982	25.08.2001	
2	2-7 of 1983 dated 03.02.1983	02 of 1983	02.02.1987	02.02.2025
		03 of 1983	02.02.1987	
		04 of 1983	02.02.1987	
		05 of 1983	02.02.1987	
		06 of 1983	02.02.2012	
		07 of 1983	02.02.2012	

Director
Town & Country Planning
Haryana, Chandigarh

3	19 of 1983 dated 23.05.1983	19 of 1983	22.05.1987	22.05.2024
4	21 of 1983 dated 26.07.1983	21 of 1983	25.07.2011	25.07.2024
5	29-30 of 1983 dated 06.10.1983	29 of 1983	05.10.2011	05.10.2024
		30 of 1983	05.10.1987	
6	1-9 of 1989 dated 02.12.1989	01 of 1989	01.12.1991	01.12.2024
		02 of 1989	01.12.1991	
		03 of 1989	01.12.1991	
		04 of 1989	01.12.2008	
		05 of 1989	01.12.1991	
		06 of 1989	01.12.2011	
		07 of 1989	01.12.2011	
		08 of 1989	01.12.2000	
		09 of 1989	01.12.1991	
7	3 of 1993 dated 22.02.1993	03 of 1993	21.02.1995	21.02.2025
8	2 of 1993 dated 22.02.1993	02 of 1993	21.02.2001	21.02.2025
9	46 of 1983 dated 14.10.1983	46 of 1983	13.10.1987	13.10.2024
10	58 of 1983 dated 31.10.1983	58 of 1983	30.10.2011	30.10.2024
11	60-65 of 1984 dated 02.02.1984	60 of 1984	01.02.2012	01.02.2025
		61 of 1984	01.02.1987	
		62 of 1984	01.02.2012	
		63 of 1984	01.02.1987	
		64 of 1984	01.02.1987	
		65 of 1984	01.02.1987	
12	76-78 of 1984 dated 15.03.1984	76 of 1984	14.03.1987	14.03.2025
		77 of 1984	14.03.2005	
		78 of 1984	14.03.2002	
13	83-85 of 1984 dated 16.04.1984	83 of 1984	15.04.2000	15.04.2024
		84 of 1984	15.04.1987	
		85 of 1984	15.04.1987	
14	96 of 1984 dated22.06.1984	96 of 1984	21.06.1987	21.06.2024
15	3-4 of 1985 dated 21.01.1985	03 of 1985	20.01.2002	20.01.2025
		04 of 1985	20.01.2003	
16	24-26 of 1985 dated 09.09.1985	24 of 1985	08.09.1987	08.09.2024
		25 of 1985	08.09.1987	
		26 of 1985	08.09.1987	
17	41-44 of 1985 dated 27.11.1985	41 of 1985	26.11.2007	26.11.2024
		42 of 1985	26.11.1988	
		43 of 1985	26.11.2007	
		44 of 1985	26.11.1988	
18	5-6 of 1986 dated 25.01.1986	05 of 1986	24.01.1989	24.01.2025
		06 of 1986	24.01.1989	
19	22-28 of 1986 dated07.04.1986	22 of 1986	06.04.2009	06.04.2024
		23 of 1986	06.04.1988	
		24 of 1986	06.04.2009	
		25 of 1986	06.04.2002	
		26 of 1986	06.04.2009	
		27 of 1986	06.04.1988	
		28 of 1986	06.04.1988	
20	58-64 of 1992 dated	58 of 1992	18.06.1994	18.06.2024

Director
Town & Country Planning
Haryana, Chandigarh

	19.06.1992	59 of 1992	18.06.1994	
		60 of 1992	18.06.1994	
		61 of 1992	18.06.2002	
		62 of 1992	18.06.1994	
		63 of 1992	18.06.2002	
		64 of 1992	18.06.1994	
21	20 of 1993 dated 03.09.1993	20 of 1993	02.09.2011	02.09.2024
22	75-81 of 1996 dated 06.05.1996	75 of 1996	05.05.1998	05.05.2024
		76 of 1996	05.05.1998	
		77 of 1986	05.05.2003	
		78 of 1986	05.05.2003	
		79 of 1986	05.05.2003	
		80 of 1996	05.05.1998	
		81 of 1996	05.05.2011	

PHASE-III

Sr. Nos	Licence Nos & Date		Valid upto	Renewed upto
1	36-43 of 1983 dated07.10.1983	36 of 1983	06.10.2011	06.10.2024
		37 of 1983	06.10.1987	
		38 of 1983	06.10.1987	
		39 of 1983	06.10.2011	
		40 of 1983	06.10.2011	
		41 of 1983	06.10.2011	
		42 of 1983	06.10.1987	
		43 of 1983	06.10.2011	
2	59 of 1984 dated02.02.1984	59 of 1984	01.02.2012	01.02.2025
3	94-95 of 1984 dated 16.05.1984	94 of 1984	15.05.2011	15.05.2024
		95 of 1984	15.05.2021	
4	99-100 of 1984 dated22.06.1984	99 of 1984	21.06.1987	21.06.2024
		100 of 1984	21.06.2011	
5	45 of 1983 dated14.10.1983	45 of 1983	13.10.1987	13.10.2024
6	108-110 of 1984 dated18.09.1984	108 of 1984	17.09.1987	17.09.2024
		109 of 1984	17.09.2011	
		110 of 1984	17.09.2011	
7	117-118 of 1984 dated 03.12.1984	117 of 1984	02.12.2021	02.12.2024
		118 of 1984	02.12.2011	
8	1-2 of 1985 dated 21.01.1985	01 of 1985	20.01.2022	20.01.2025
		02 of 1985	20.01.2022	
9	27-29 of 1985 dated 13.09.1985	27 of 1985	12.09.2021	12.09.2024
		28 of 1985	12.09.2021	
		29 of 1985	12.09.1987	
10	45-47 of 1985 dated 27.11.1985	45 of 1985	26.11.2021	26.11.2024
		46 of 1985	26.11.2011	
		47 of 1985	26.11.1988	
11	7-9 of 1986 dated 25.01.1986	07 of 1986	24.01.1988	24.01.2025
		08 of 1986	24.01.2022	
		09 of 1986	24.01.1989	

12	29-30 of 1986 dated 07.04.1986	29 of 1986	06.04.1988	06.04.2024
		30 of 1986	06.04.2021	
13	34-37 of 1986 dated 16.04.1986	34 of 1986	15.04.2002	15.04.2024
		35 of 1986	15.04.2002	
		36 of 1986	15.04.2009	
		37 of 1986	15.04.2000	
14	1-4 of 1987 dated 18.03.1987	01 of 1987	17.03.2002	17.03.2024
		02 of 1987	17.03.2000	
		03 of 1987	17.03.2021	
		04 of 1987	17.03.2000	
15	16 of 1989 dated02.12.1989	16 of 1989	01.12.1991	01.12.2024
16	17-22 of 1989 dated 02.12.1989	17 of 1989	01.12.2011	01.12.2024
		18 of 1989	01.12.2003	
		19 of 1989	01.12.1991	
		20 of 1989	01.12.2011	
		21 of 1989	01.12.2000	
		22 of 1989	01.12.1991	
17	55 -57 of 1992 dated 19.06.1992	55 of 1992	18.06.2002	18.06.2024
		56 of 1992	18.06.2021	
		57 of 1992	18.06.2009	
18	66-68 of 1996 dated 03.05.1996	66 of 1996	02.05.1998	02.05.2024
		67 of 1996	02.05.1998	
		68 of 1996	02.05.1998	
19	6 of 2001 dated 31.08.2001	06 of 2001	30.08.2021	30.08.2024
20	36 of 2004 dated 31.03.2004	36 of 2004	30.03.2021	30.03.2024
21	125-134 of 1998 dated 16.10.1998	125 of 1998	15.10.2002	15.10.2024
		126 of 1998	15.10.2002	
		127 of 1998	15.10.2002	
		128 of 1998	15.10.2002	
		129 of 1998	15.10.2011	
		130 of 1998	15.10.2002	
		131 of 1998	15.10.2011	
		132 of 1998	15.10.2011	
		133 of 1998	15.10.2002	
		134 of 1998	15.10.2002	
22	11-21 of 2003 dated 02.07.2003	11 of 2003	01.07.2017	01.07.2024
		12 of 2003	01.07.2017	
		13 of 2003	01.07.2017	
		14 of 2003	01.07.2017	
		15 of 2003	01.07.2017	
		16 of 2003	01.07.2017	
		17 of 2003	01.07.2017	
		18 of 2003	01.07.2017	
		19 of 2003	01.07.2017	
		20 of 2003	01.07.2017	
		21 of 2003	01.07.2017	
23	37-39 of 2004 dated 30.03.2004	37 of 2004	30.03.2011	30.03.2024
		38 of 2004	30.03.2011	
		39 of 2004	30.03.2011	

Director
Town & Country Planning
Haryana, Chandigarh

24	69 of 2013 dated 25.07.2013	69 of 2013	24.07.2021	24.07.2024

1. It is further clarified that this renewal will not tantamount to certification of your satisfactory performance entitling you for renewal of license of further period.
2. The construction of community building will be completed as per provisions of section 3(3)(a)(iv) of Act of 8 of 1975.
3. That you shall transfer the land falling in the sector road free of cost to the Govt.
4. That you shall get the license renewed till final completion of the colony is granted.
5. The renewal of license will be void-ab-initio, if any of the conditions mentioned above are not complied with.

(K. Makrand Pandurang IAS)
Director
Town & Country Planning
Haryana, Chandigarh

Endst no:LC-50 /JE(S)/2021/ Dated:

A copy is forwarded to following for information and further necessary action:-

1. Chief Administrator, HSVP, Panchkula.
2. Chief Engineer, HSVP, Panchkula.
3. Chief Account officer of this Directorate.
4. Senior Town Planner, Gurugram.
5. District Town Planner, Gurugram.
6. Project Manager (IT Cell) of this Department for updation on website.

(RAJESH KAUSHIK)
District Town Planner (HQ)
For: Director, Town & Country Planning
Haryana, Chandigarh

ANNEXURE – 16

Certified Compliance Report

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
एकीकृत क्षेत्रीय कार्यालय, चंडीगढ़ / Integrated Regional Office, Chandigarh

सत्यमेव जयते

फा. सं.: 16-08/2019/IRO/Env.

सेवा मे

अधिकृत हस्ताक्षरकर्ता, मेसर्स डीएलएफ लिमिटेड
गेटवे टॉवर *(द्वितीय तल)*, डीएलएफ सिटी, चरण- *III*, जिला- गुरुग्राम, हरियाणा-*122002*।
Email: choudhury-abhijit@dlf.in; bakshi-rc@dlf.in; ankur.ithc2@gmail.com

विषय: Environment Clearance for shopping complex/commercial building on 32.36 acres site (Mall of India) in block-V, DLF city, Phase-III, Sector-25A, Gurgaon, Haryana - Certified compliance monitoring report reg.

संदर्भ: 1. ई.सी. पत्र संख्या SEIAA/HR/2019/81 dated 06.05.2019 & amended SEIAA(125)/HR/2020/541 dated 06.11.2020 SEIAA(125)/HR/2020/535 dated 04.11.2020
2. आपका पत्र प्राप्ती दिनांक 14.07.2022

श्रीमान,

आपके उपरोक्त **(2)** पर वर्णित पत्र के सन्दर्भ में आपके संज्ञान में लाया जाता है कि उपरोक्त परियोजना का निरीक्षण, जो कि सेक्टर-25 ए, गुड़गांव, हरियाणा हरियाणा में स्थित है, अधोहस्ताक्षरी द्वारा दिनांक 03.08.2022 को किया गया था। परियोजना की मानीटरिंग रिपोर्ट निम्नलिखित गैर-अनुपालना (non-compliance) बिन्दुओं के साथ तैयार की जा चुकी है:

i. PP has not submitted the copy of purchase bills of the Diesel to ensure to utilize low sulphur. ***(Cp. Condi. – 7)***
ii. PP has reported the concentration of PM10 higher than the permissible limit in ambient air. ***(Cp. Condi. – 9)***
iii. PP has not submitted copy of water and energy conservation plan to be adopted at project site. ***(Cp. Condi. – 17)***
iv. PP has not submitted copy of license of 32.36 acres land to set up shopping/commercial building at sector 25A, Gurgaon Manesar Urban Complex. ***(Cp. Condi. – 24)***
v. PP has not submitted copy of affidavit regarding not to use ground water for construction purpose. ***(Cp. Condi. – 25)***
vi. PP has not provided the link of company website where copy of EC and status of compliance of EC conditions has been uploaded for public awareness. ***(Gen. condi. – vii)***
vii. PP has not submitted the copy of environmental statement of form-v for compliance of the condition. ***(Gen. condi. – xvi)***

अतः आपको इस पत्र के जारी होने की तारीख के **अधिकतम दो सप्ताह** के भीतर उपरोक्त गैर- अनुपालनों (non-complied) की Action Taken Report जमा करने का अवसर दिया जा रहा है। दिए गए समय में कार्रवाई रिपोर्ट जमा न करने के स्थिति में परियोजना की रिपोर्ट उपरोक्त आंशिक-अनुपालनों / गैर- अनुपालनों के साथ अग्रिम आवश्यक कार्रवाई हेतु सक्षम प्राधिकारी को प्रस्तुत कर दी जाएगी।

भवदीय,

Signed by Krishan Kishor Garg
Date: 16-08-2022 13:52:40
Reason: Approved

(डॉ. के. के. गर्ग)
उप निदेशक / वैज्ञानिक-सी

Ministry of Environment, Forest and Climate Change
Integrated Regional Office, Chandigarh
Monitoring the Implementation of Environmental Safeguards
Monitoring Report
PART – I: DATA SHEET

1.	Project Type: River Valley/ Mining/ Industry/ Thermal/Nuclear/Other (Specify)	Category-8(a): Building and Construction project (As mentioned in the EC)
2.	Name of the Project	Construction of Shopping/Commercial building by M/s DLF City Centre Ltd.
3.	Clearance letter (s)/OM no. and date	i. SEIAA/HR/2019/81 dated 06.05.2019 & amended SEIAA(125)/HR/2020/541 dated 06.11.2020 ii. SEIAA(125)/HR/2020/535 dated 04.11.2020
4.	Location: a) District b) State c) Location: Lat/Long	 Sector-25A, Gurgaon Haryana 28^0 30' 9.2"N/77^0 05' 43.03"E
5.	Address for correspondence a) Address of concerned project chief engineer b) Address of executive project engineer/manager	Authorized Signatory, M/s DLF Limited Gateway Tower (2nd Floor), DLF City Phase-III, District- Gurugram, Haryana-122002. Email: choudhury-abhijit@dlf.in; bakshi-rc@dlf.in; ankur.ithc2@gmail.com
6.	Salient Feature a) of the Project b) of the EMP	<table><tr><th>Particulars</th><th>As per EC dated 06.05.2019</th><th>After proposed Expansion</th></tr><tr><td>Plot Area</td><td>32.36 acres (1,30,956.07 sqm)</td><td>36.6 acres (147143.8 sqm)</td></tr><tr><td>Built-up Area</td><td>10,57,114.09 m^2</td><td>10,69,491.63 m^2</td></tr></table> • First aid facilities, drinking water and sanitary facilities for the workers • Establishment of STP, Rain Water Harvesting • Green Belt Development & landscaping • Energy Conservation measures in the building • Solid Waste disposal, • Air and noise quality monitoring
7.	Break-up of Project area a) Submergence forest area and non forest area b) Others	NA
8.	Break-up of the project affected population with enumeration of	NA

	those losing houses/dwelling units only agricultural land only both dwelling units & agricultural land & landless laborers/artisans: a) SC, ST/Adivasi b) Others	
9.	Financial Details: a) Project Cost as originally planned and subsequent revised estimates and the year of price reference b) Allocation made for EMP with item wise and year wise break-up c) BC ratio/IRR and the year of assessment d) Whether includes the cost of EMP as shown above e) Actual expenditure incurred on project so far f) Actual expenditure incurred on EMP so far	Rs. 3563 Crore **No details provided by PP** **NA** **No details provided by PP** **No details provided by PP** **No details provided by PP**
10.	Forest lad Requirement a) The status of approval for diversion of forest land for non forestry use b) The status of clearing felling c) The status of CA, if any d) Comments on the viability & sustainability of CA program in the light of actual field experience so far	NA
11.	The status of clear felling in the non forest areas	NA
12.	Status of Construction (Actual &/or Planned) a) Date of commencement b) Date of completion	Under construction July 2019 Not completed yet
13.	Reason for delay if the project is yet to start	NA.
14.	Dates of site visits a) Date of previous site visit: b) Date of present site visit:	Not visited previously 03.08.2022
15.	Details of correspondence with project Authorities of last 3 years for obtaining act on plans/information on status of compliance to safeguards other than the routine letters for logistic support for site visits). (The first	<table><tr><th>Period of SMCR</th><th>Date of submission</th><th>Analytical reports</th></tr><tr><td>June-22</td><td>03.05.2022</td><td>Yes</td></tr><tr><td>Dec-21</td><td>23.11.2021</td><td>Yes</td></tr><tr><td>June-21</td><td>14.05.2021</td><td>Yes</td></tr><tr><td>Dec-2020</td><td>Nov.2020</td><td>Yes</td></tr></table>

	monitoring report may contain the details of all the letters issued so far, but the later reports may cover only the letter issued subsequently	

PART – II & III
DESCRIPTIVE REPORT ON STATUS OF COMPLIANCE TO CONDITIONS OF ENVIRONMENTAL CLEARANCE AND ENVIRONMENTAL MANAGEMENT

EC No.: SEIAA/HR/2019/81 dated 06.05.2019 & amended SEIAA(125)/HR/2020/541 dated 06.11.2020 & SEIAA(125)/HR/2020/535 dated 04.11.2020

S. No.	CONDITION	COMPLIANCE
	PRESENT STATUS:	

- PP has obtained environment clearance from SEIAA, Haryana vide letter no. SEIAA/HR/201983 dated 06.05.2019 for construction of shopping/commercial building at built up area 10,57,114.09 m2 on plot area 32.36 acres at sector 25A, Gurgaon, Haryana.
  The construction work of towers B2 & B3 is going on at project site and going to be in operation very soon.

- PP has also obtained EC from SEIAA, Haryana vide letter no. SEIAA(125)/HR/2020/535 dated 04.11.2020 for construction of Multi-level Car Parking (MLCP) for built up area 1,12,767.00 m2 and plot area 4.0 acres at the vicinity of the shopping/commercial building. PP has not completed the construction work of MLCP and still going on under construction.

- Now, PP is going for expansion/revision of the both project and going for merger of both ECs. Detailed expansion summary is given in the data sheet of this report.
- PP has submitted copy of licenses vide letter dated 29.08.2019 and obtained from T&CP department vide dated 17.05.1984, 05.12.1984, 25.01.1985, 28.1.1995, 13.09.1986, 13.09.1985, 22.11.1985, 28.01.1986, 08.04.1988, 19.03.1987, 19.06.1992, 02.04.2004, 30.07.2013and 01.07.2019 for seeting up of residential plotted colony at Phase-1, II, III, DLF city, Sector-24, 25, 25A, Gurgaon Manesar

	Urban Complex. • PP has obtained license from T&CP department vide letter dated 10.09.2018 to set up commercial colony at 4 acres land at sector 25A Gurgaon Manesar Urban Complex. **PP has not submitted copy of license of 32.36 acres land to set up shopping/commercial building at sector 25A, Gurgaon Manesar Urban Complex.** • PP has obtained OC from T&CP for building no. 2, 3, MLCP building and 2 nos basements falling in commercial colony on area measuring 36.36 acres vide letter no. ZP-1156/AD(RA)/2022/17429 dated 27.06.2022. As observed that construction work of the proposed projects or both ECs are still going on. However, PP is going for expansion from 32.36 acres plot area to 36.36 acres plot area. Therefore, compliance status of the EC conditions (EC:2019) of shopping/commercial building in addition of the construction phase related EC conditions (EC:2020) of the multilevel car parking as per present site visit is given below:

PART-A: SPECIFIC CONDITIONS: CONSTRICTION PHASE:		
1.	"Consent for Establish" shall be obtained from Haryana State Pollution Control Board under Air and Water Act and a copy shall be submitted to the SEIAA, Haryana before the start of any construction work at site.	**Being complied with. (EC:2019; EC:2020)** • PP has obtained CTE from HSPCB vide letter no. HSPCB/Consent/329962319 GUN OCTE 6766889 dated 30.07.2019 valid up to 05.05.2026. • PP has obtained CTE of MLCP from HSPCB vide letter no. 329962321GUNOC TE8953748 dated 22.02.221 03.11.2027.
2.	A First aid room as proposed in the project report will be provided in both during construction and operation phase of project.	**Being complied with.** • First aid room facility has been observed at project site during the visit.
3.	Adequate drinking water and sanitary facilities should be provided for construction workers at the site. Provision should be made for mobile toilets. Open defecation by the laborers is strictly prohibited. The safe disposal of waste water and solid wastes generated during the construction phase should be ensured.	**Being complied with. (EC:2019; EC:2020)** • Adequate drinking water and sanitary facility has been observed at construction site during the visit. • PP has also provided adequate washroom facility for construction workers. • No open defecation has been observed during the site visit. • No waste water and solid wastes generation was noticed during the site visit. • PP has submitted the copy of waste management plan along with vide email dated 10.08.2022 and prepared by M/s Bl Kashyap & Sons Limited. To reduce, reuse and recycle of different kind of waste to be generated at project site.
4.	All the top soil excavated during construction activities should be	**Being complied with. (EC:2019; EC:2020)** • PP has submitted in June-2022 SMCR

	stored for use in horticulture/ landscape development within project site.	they have stored the top soil at project site for further use of horticulture purpose. Same has been observed during the site visit. • No unutilized excavated soil has been observed at project site during the visit.
5.	The project proponent shall ensure that the building material required during construction phase is properly stored within the project area and disposal of construction waste should not create any adverse effect on the neighboring communities and should be disposed of after taking necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.	**Assured to comply. (EC:2019; EC:2020)** • Proper storage of construction material has been observed at project site. • PP has informed that they have utilized the construction waste at project site without creating adverse effect on neighboring communities. • PP has submitted the copy of waste management plan along with vide email dated 10.08.2022 and prepared by M/s Bl Kashyap & Sons Limited. To reduce, reuse and recycle of different kind of waste to be generated at project site.
6.	Construction spoils including bituminous materials and other hazardous materials must not be allowed to contamination water courses and the dump site for such materials must be secured so that they should not leak into groundwater and any hazardous waste generated during construction phase should be disposed off as per applicable rules and norms with necessary approval of Haryana State pollution control Board.	**Being complied with. (EC:2019; EC:2020)** • PP has assured in June-2022 SMCR that they are not generating any bituminous materials and HW at construction site of the project. • PP has submitted the copy of waste management plan along with vide email dated 10.08.2022 and prepared by M/s Bl Kashyap & Sons Limited. To reduce, reuse and recycle of different kind of waste to be generated at project site. • PP has submitted ground water quality monitoring data along with June-2022 SMCR and reported the data within permissible limit.
7.	The diesel generator sets to be used during construction phase should be of low sulphur diesel type and should confirm to Environment (Protection) Rules prescribed for air and noise emission standard.	**Partially complied with. (EC:2019; EC:2020)** • Currently construction work of shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site. DG sets working at project site has been observed for temporary purpose. However, **PP has not submitted the copy of purchase bills of the Diesel to ensure to utilize low sulphur.**
8.	The diesel required for operating DG sets shall be stored in underground tank if required clearance from chief controller of explosive shall be taken.	**Assured to comply. (EC:2019; EC:2020)** • No underground storage of diesel tank has been observed at project site during the visit. Same has been informed by PP

		during the visit.
9.	Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be taken to reduce ambient air and noise level during construction phase, to conform to the stipulated residential standards of CPCB/MoEF.	**Partially complied with. (EC:2019; EC:2020)** • PP has submitted air and noise quality monitoring data around the project area along with June-2022 SMCR. PP has reported the noise quality of project area within the permissible limit for day and night conditions, **while reported, concentration of PM10 higher than the permissible limit in the ambient air.**
10.	Fly ash should be used as building materials in the construction as per the provision of fly ash notification of September 1999 and amendment as on 27th August 2003.	**Being complied with. (EC:2019; EC:2020)** • Utilization of fly ash bricks has been observed at project site during the visit. • PP has informed that they are using fly ash as per the provisions of fly ash notification of 14.09.1999 and as amended on 27.8.2003. 
11.	Storm water control and its use as per CGWB and BIS standard for various applications should be ensured.	**Assured to comply.** • PP has assured to storm water control and its use as per CGWB and BIS standard for various applications in their Dec-2020 SMCR. • PP has submitted copy of water balance of the project site along with vide letter dated 29.08.2019 and reported the total water requirement 3193.2 KLD including 1419.7 KLD fresh water and 1773.5 kld treated water.
12.	Water demand during construction phase should be reduced by uses of premix concrete, curing agent and other best practices.	**Being complied with. (EC:2019; EC:2020)** • Utilization of RMC has been observed at project site.
13.	In view of the severe constrains in water supply augmentation in the region and sustainability of water resources, the developer will submit the NOC from CGWA specifying water extraction quantities and assurance from HUDA/utility provider indicating source of water supply and quantity of water with details of intended use of water-	**Assured to comply.** • PP has submitted copy of water balance of the project site along with vide letter dated 29.08.2019 and reported the total water requirement 3193.2 KLD including 1419.7 KLD fresh water and 1773.5 kld treated water. • PP has obtained assurance of water supply from HSVP vide letter no. 9528 dated

	potable and non-potable. Assurance is required for both construction and operation stages separately. It shall be submitted to the SEIAA and RO, MoEF, Chandigarh before the start of construction.	24.07.2018. • PP has informed that they are using HUDA supply water for construction purpose. • PP has also assured that they are not using any ground water at project site. No bore well has been observed at project site during the visit.
14.	Roof should meet prescribed requirements as per energy conservation building code by using appropriate thermal insulation materials.	**Assured to comply.** • Currently construction work of shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site. PP has assured to comply the condition as per requirement. • No opaque wall has been observed at project site.
15.	Opaque wall should meet prescribed requirements as per energy conservation building code which is proposed to be mandatory for all air conditioned spaces while it is desirable for non air conditioned spaces by use of appropriate thermal insulation to fulfill the requirements.	
16.	The approval of competent authority shall be obtained for structural safety of the building due to earthquake, adequacy in firefighting equipment etc as per national building code including protection measures for light etc. If any forest land is involved in the proposed site, clearance under Forest conservation act shall be taken from the competent authority.	**Under compliance. (EC:2019; EC:2020)** • PP has also obtained clarification regarding applicability of forest law from state forest department, Gurgaon vide letter no. 866-G dated 06.07.2017. • PP has also obtained clarification from Tehsildar report vide dated 04.01.2018 regarding Applicability of Aravali notification and forest law. • PP has also obtained clarification regarding applicability of forest law at 04 acre land of MLCP vide letter dated 17.07.2020. • PP has submitted the copy of approval of fire plan from fire service department vide letter no. FS/2022/37 dated : 23/03/2022**.**
17.	Overexploited groundwater and impending severe shortage of water supply in the region requires the developer to redraw the water and energy conservation plan. Developer shall reduce the overall footprint of the proposed development. Project proponent shall incorporate water efficiency/savings measures as well as water reuse/recycling within 3 months and before start of construction to the SEIAA, Haryana and RO, MoEF, GOI, Chandigarh.	**Partially complied with.** • PP has informed that they are not using ground water for construction purpose. Same has been observed during the site visit. • **PP has not submitted copy of water and energy conservation plan to be adopted at project site.** • PP has obtained assurance of water supply from HSVP vide letter no. 9528 dated 24.07.2018.

18.	The project proponent as stated in proposal shall construct 28 nos of rain water harvesting pit for recharging the ground water within the project premises. Rain water harvesting pit shall be designed to make provisions for silting chamber and removal of floating matter before entering harvesting pit. Maintenance budget and persons responsible for maintenance must be provided. Care shall also be taken that contaminated water do not enter any RWH pit.	**To be complied.** • Currently construction work of shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site. • PP has also constructed a tank to store rain water for further utilization at project activities. • As per the records submitted by PP , they are going to install total 28 nos of RWH pits at project site. • PP has submitted the detailed calculation of requirement of RWH pits and submitted the copy of design along with vide email dated 29.08.2019. • PP has submitted ground water quality monitoring data along with June-2022 SMCR and reported the data within permissible limit. 
19.	The project proponent shall provide for adequate fire safety measures and equipments as required by Haryana Fire service Act, 2009 and instructions issued by the local Authority/Directorate of fire from time to time. Further the project proponent shall take necessary permission regarding fire safety scheme/NOC from competent Authority as required	**Noted. (EC:2019; EC:2020)** • PP has submitted the copy of approval of fire plan from fire service department vide letter no. FS/2022/37 dated : 23/03/2022.
20.	The project proponent shall obtain assurance from the DHBVN for supply of 28,310 KW of power supply before the start of construction. In no case project will be operational solely on generators without any power supply from any external power utility.	**Being complied with. (EC:2019; EC:2020)** • PP has obtained assurance of power supply for tentative load of 28310 KW from DBVN vide letter no. 32.DGR-26 dated 12.09.2018.
21.	Detail calculation of power load and ultimate power load of the project shall be submitted to DHBVN under intimation to SEIAA, Haryana before the start of construction. Provision shall be made for electrical	

	infrastructure in the project area.	
22.	The project proponent shall not raise any construction in the natural land depression /nallah/water course and shall ensure that the natural flow from the nallah/water course is not obstructed.	**Noted.** • No nallah, depression or water course was observed at project site during the visit.
23.	The project proponent shall keep the plinth level of the building blocks sufficiently above the level of the approach road to the project as per prescribed by laws. Levels of the other areas in the projects shall also be kept suitably so as to avoid flooding.	**Assured to comply.** • PP has informed that they are keeping plinth level of building blocks sufficiently above the level of the approach road to the project.
24.	Construction shall be carried out so that density of population does not exceed norms approved by Director General Town and Country Department Haryana.	**Noted. (EC:2019; EC:2020)** • PP has submitted copy of licenses vide letter dated 29.08.2019 and obtained from T&CP department vide dated 17.05.1984, 05.12.1984, 25.01.1985, 28.1.1995, 13.09.1986, 13.09.1985, 22.11.1985, 28.01.1986, 08.04.1988, 19.03.1987, 19.06.1992, 02.04.2004, 30.07.2013and 01.07.2019 for **setting up of residential plotted colony** at Phase-1, II, III, DLF city, Sector-24, 25, 25A, Gurgaon Manesar Urban Complex. • PP has obtained OC from T&CP for building no. 2, 3, MLCP building and 2 nos basements falling in commercial colony on area measuring 36.36 acres vide letter no. ZP-1156/AD(RA)/2022/17429 dated 27.06.2022. • PP has obtained license from T&CP department vide letter dated 10.09.2018 **to set up commercial colony at 4 acres** land at sector 25A Gurgaon Manesar Urban Complex. • **PP has not submitted copy of license of 32.36 acres land to set up shopping/commercial building at sector 25A, Gurgaon Manesar Urban Complex.**
25.	The project proponent shall submit an affidavit with the declaration that ground water will not be used for construction and only treated water should be used for construction.	**Partially complied with. (EC:2019; EC:2020)** • **PP has not submitted copy of affidavit regarding not to use ground water for construction purpose**. However, no ground water source has been observed at

		project site during the visit. Same has been informed by PP during the site visit. • PP has submitted ground water quality monitoring data along with June-2022 SMCR and reported the data within permissible limit.
26.	The project proponent shall not cut any existing tree and project landscaping plan should be modified to include those trees in green area.	**Being complied with. (EC:2019; EC:2020)** • PP has obtained clarification regarding applicability of forest law from state forest department, Gurgaon vide letter no. 866-G dated 06.07.2017. • PP has obtained clarification from Tehsildar report vide dated 04.01.2018 regarding Applicability of Aravali notification and forest law. • PP has obtained clarification regarding applicability of forest law at 04 acre land of MLCP vide letter dated 17.07.2020. • PP has submitted copy of LOI along with vide email dated 10.08.2022 for execution of horticulture work at project site of amount Rs. 23,01,650 dated 28.02.2022.
27.	The Project Proponent shall ensure that ECBC norms for composite climate zone are met. In particular building envelope, HVAC service, water heating, pumping, lightening, and electrical infrastructure must meet ECBC norms.	**Assured to comply.** • Currently construction work of shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site.
28.	The Project proponent shall provide 3 meter high barricade around the project area, dust screen for every floor above the ground, proper sprinkling and covering of stored material to restrict dust and air pollution during construction.	**Being complied with. (EC:2019; EC:2020)** • PP has provided barricade at proper height and water sprinkler at project site. • PP has provided anti smog gun at project site to reduce the dust emission. • PP has submitted the details of the mitigation measures along with vide email dated 27.07.2022 and to be adopted at project site during the construction and operation of the project site.
29.	The project proponent shall construct a sedimentation basin in the lower level of the project site to trap pollutant and other wastes during rains.	**Being complied with. (EC:2019; EC:2020)** • PP has informed that they have the provision of RWH pits at project site to trap the pollutants and other waste during rains. • PP has submitted the detailed calculation of requirement of RWH pits and submitted the copy of design along with vide email dated 29.08.2019. • As per the records submitted by PP , they

		are going to install total 28 nos of RWH pits at project site. • PP has submitted ground water quality monitoring data along with June-2022 SMCR and reported the data within permissible limit.
30.	The project proponent shall provide proper rasta of proper width and proper strength for each project before start of the construction.	**Being complied with**. • Proper rasta with adequate width and strength was observed at project site.
31.	The Project proponent shall ensure that the U-value of the glass is less than 3.177 and maximum solar heat gain co-efficient is 0.25 for vertical fenestration.	**Not determined.** • PP has ensured to utilize the U-value of glass as per norms. However not started the installation of glass work at project site.
32.	The project proponent shall adequately control construction dusts like silica dust, non-silica dust, and wood dust. Such dust shall not spread outside project premises. Project proponent shall provide respiratory protective equipment to all construction workers.	**Being complied with**. • PP has provided water sprinklers to control the dusts like silica dust, non-silica dust, and wood dust at project site. • PP has also provided all safety equipments to workers. • PP has provided anti smog gun at project site to reduce the dust emission. • PP has submitted the details of the mitigation measures along with vide email dated 27.07.2022 and to be adopted at project site during the construction and operation of the project site.
33.	The project proponent shall provide fire control room and fire officer for building above 30 m as per NBC.	**Assured to provide.** • PP has submitted the copy of approval of fire plan from fire service department vide letter no. FS/2022/37 dated : 23/03/2022.
34.	The project proponent shall obtain permission of Mines and Geology Department for excavation of soil before starting of construction.	**Beng complied with. (EC:2019; EC:2020)** • PP has submitted the copy of NOC obtained from Mines and Geology Department vide letter no. 2173 dated 18.07.2019 for excavation of soil.
35.	The project proponent shall provide one refuge area till 24 meter and one till 39 meter each, as per National Building Code. The project proponent shall not convert any refuse area in the habitable space and it should not be sold out/ commercialized.	**Agreed by PP.**
36.	The project proponent shall seek prior approval from concerned local Authority/HUDA regarding provision	**To be complied.** • Currently construction work of

	of storm drainage and sewerage system including their integration with external services of HUDA/Local Authorities beside other required services before taking up any construction activity.	shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site. PP has assured to provide the same during operation of the project.
37.	The PP shall discharge excess treated waste water/storm water in the public drainage system and shall seek permission of HUDA before the start of construction.	
38.	The Project Proponent shall maintain the distance between STP and water supply line.	**To be complied.** • PP has not started the installation work of STP at project site. • PP has submitted in vide email dated 10.08.2022 that they have proposed 3200 KLD capacity of STP at project site during the operation of the project. • PP has assured to maintain proper distance between STP and water supply line.
39.	The Project Proponent shall ensure that stack height is 6 meter more than the highest tower.	**Assured to comply.** • PP has assured to provide stack height more than 6 meter the highest tower.
40.	The Project Proponent shall ensure that structural stability to withstand earthquake of magnitude 8.5 on Richter scale.	**Being complied with. (EC:2019; EC:2020)** • PP has obtained structural stability certificate from Dr. Anupam Chakrabatti, Professor, IIT Roorkee vide dated 17.03.2022. • PP has submitted copy of structure stability certificate of MLCP from Vinetech Consultant (Reg. no. M-118865-2) dated 07.08.2020.
41.	Vertical fenestration shall not exceed 60% of total wall area.	**Assured to comply.** • PP has assured that no construction activity will be undertaken either on surface or below or above surface of revenue rasta passing through the project area.
I.	**Operational Phase:** Currently project is in under construction phase.	
PART-B: GENERAL CONDITIONS:		
i.	The Project proponent shall ensure the commitments made in Form-1, Form-1A, EIA/EMP and other documents submitted to the SEIAA for the protection of environment and proposed environmental safeguards are complied with in letter and spirit. In case of contradiction between the	**Assured to comply.** • PP has assured to comply the all commitment made in Form-1, Form-1A, EIA/EMP and other documents submitted to the SEIAA for the protection of environment. • PP has also submitted copy of Form-1 and conceptual plan of the project along with

	two or more documents on any point, the most environmentally friendly commitment on the point shall be taken as commitment on the point shall be taken as commitment by project proponent.	vide email dated 27.07.2022. • PP has submitted copy of LOI along with vide email dated 10.08.2022 for execution of horticulture work at project site of amount Rs. 23,01,650 dated 28.02.2022. • PP has submitted in vide email dated 10.08.2022 that they have proposed 3200 KLD capacity of STP at project site during the operation of the project.
ii.	The Project Proponent shall also submit Six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the northern Regional Office of MoEF, the respective Zonal Office of CPCB,HSPCB and SEIAA Haryana.	**Being complied with.** • PP has submitted copy of six monthly compliance reports of the project on regular basis.
iii.	STP Outlet after stabilization and stack emission shall be monitored monthly. Other environmental parameters and green belt shall be monitored on quarterly basis. After every 3 (three) months, the project proponent shall conduct environmental audit and shall take corrective measures, if required without delay.	**To be complied.** • PP has not started the installation work of STP at project site. • PP has submitted copy of LOI along with vide email dated 10.08.2022 for execution of horticulture work at project site of amount Rs. 23,01,650 dated 28.02.2022. • PP has submitted in vide email dated 10.08.2022 that they have proposed 3200 KLD capacity of STP at project site during the operation of the project.  • PP has started the development work of green belt at project site and now in initial phase. 
iv.	The SEIAA, Haryana reserves the right to add additional safeguard	**Noted.**

	measure subsequently, if found necessary. Environmental Clearance granted will be revoked if it is found that false information has been given for getting approval of this project. SEIAA reserves the right to revoke the clearance if conditions stipulated are not implemented to the satisfaction of SEIAA/MoEF	
v.	The PP shall not violate any judicial orders/ pronunciations issued by any court/Tribunal.	**Agreed by PP.**
vi.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972, , Forest Act, 1927, PLPA, 1900 etc. shall be obtained, as applicable by project proponents from the respective authorities prior to construction of the project.	**Under compliance. (EC:2019; EC:2020)** • PP has informed that they are not storing the diesel at project site. No underground storage tank of diesel has been observed at project site during the site visit. • PP has also obtained clarification regarding applicability of forest law from state forest department, Gurgaon vide letter no. 866-G dated 06.07.2017. • PP has also obtained clarification from Tehsildar report vide dated 04.01.2018 regarding Applicability of Aravali notification and forest law. • PP has also obtained clarification regarding applicability of forest law at 04 acre land of MLCP vide letter dated 17.07.2020. • PP has submitted the copy of approval of fire plan from fire service department vide letter no. FS/2022/37 dated : 23/03/2022. • PP has also obtained NOC from AAI vide letter no. AAI/RHQ/NR/ATM/NOC/2018/47 /220-223 dated 26.02.2018 and valid up to 26.02.2026. • PP has submitted in vide email dated 10.08.2022 that requirement of wild life NOC is not applicable for them. However, required to obtain as per rules, if applicable.
vii.	The Project proponent should inform the public that the project has been accorded Environment Clearance by SEIAA and copies of the clearance letter are available with State pollution Control Board & SEIAA. This should be advertised within 7	**Partially complied with. (EC:2019; EC:2020)** • PP has submitted the copy of news paper advertisements 'Financial Express' and 'Jansatta' vide dated 22.05.2019. However, not followed the clause of 07 days.

	days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region and copy of the same should be forwarded to SEIAA, Haryana. A copy of Environment Clearance conditions shall also be put on project proponent's website for public awareness.	• PP has also published the news of EC of MLCP in the 'Financial Express' and 'Jansatta' vide dated 10.12.2020. However, not followed the clause of 07 days. • **PP has not provided the link of company website where copy of EC and status of compliance of EC conditions has been uploaded.**
viii.	Under the provision of Environment (Protection) Act, 1986 legal action shall be initiated against the project proponent if it was found that construction of the project has been started before obtaining prior environment clearance.	**Noted. (EC:2019; EC:2020)**
ix.	Any appeal against this Environmental Clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	**Agreed by PP. (EC:2019; EC:2020)**
x.	The project proponent shall put in place Corporate Environment Policy as mentioned in MoEF, GoI OM No. J-IIOI3/41/2006-IA II (I) dated 26.4.2012 within 3 months period. Latest Corporate Environment Policy should be submitted to SElAA within 3 months of issuance of this letter.	**Being complied with. (EC:2019; EC:2020)** • PP has submitted the copy of Corporate Environment Policy of the company along with vide letter dated 09.09.2019 and email dated 10.08.2022. • PP has submitted the details of the activity carried out under CSR during 2019-2022. Along with vide email dated 27.07.2022. • PP has also submitted the item wise fund utilized for the activities.
xi.	The fund earmarked for environment protection measures should be kept in separate account and should not be diverted for other purposes and year wise expenditure shall be reported to the SEIAA/ RO MoEF GOI under rules prescribed for Environment Audit.	**Being complied with. (EC:2019; EC:2020)** • PP has submitted the details of fund earmarked for environmental protection measures along with year wise expenditure details. • PP has submitted the details of the activity carried out under CSR during 2019-2022. Along with vide email dated 27.07.2022. • PP has also submitted the item wise fund utilized for the activities.
xii.	The project proponent shall ensure the compliance of Forest Department, Haryana Notification no. S.O 121/PA2/1900/S.4/97 dated 28.11.1997	**Assured to comply. (EC:2019; EC:2020)** • PP has also obtained clarification regarding applicability of forest law from state forest department, Gurgaon vide letter no. 866-G dated 06.07.2017. • PP has also obtained clarification from Tehsildar reports vide dated 04.01.2018

		regarding Applicability of Aravali notification and forest law. • PP has also obtained clarification regarding applicability of forest law at 04 acre land of MLCP vide letter dated 17.07.2020.
xiii.	The project proponent shall ensure that no vehicle during construction/operation phase enter the project premises without valid 'Pollution Under Control' certificate from competent authority.	**Being complied with. (EC:2019; EC:2020)** • PP has informed that no vehicle without valid PUC is allowed to enter in project premises. PP has also submitted copy of PUC of the vehicles working at project site along with vide email dated 10.08.2022. • As submitted in vide email dated 10.08.2022 that, PP has proposed total 11863 ECS at project site.
xiv.	The project proponent is responsible for compliance of all conditions in Environment Clearance letter and project proponent cannot absolve himself/herself of the responsibility by shifting it to any contractor engaged by project Proponent.	**Agreed by PP. (EC:2019; EC:2020)**
xv.	The Proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, the respective zonal office of CPCB and the SPCB. The criteria pollutant levels namely; PM2.5, PM10, SOX, NOX, (Ambient level as well as Stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	**Being complied with. (EC:2019; EC:2020)** • PP has submitted copy of six monthly compliance report along with analytical data to this office.
xvi.	The Environmental statement for each financial year ending 31st march in form5 is as mandated to be submitted by the project proponent to the HSPCB, Panchkula as per prescribed under the Environmental Protection Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of the EC	**Not complied with. (EC:2019; EC:2020)** • **PP has not submitted the copy of environmental statement of form-v for compliance of the condition.**

	conditions and shall also sent to the respective Regional officer of MoEF by mail.	
xvii.	The project proponent shall conduct environment audit at every three months interval & there after corrected measures shall be taken without any delay. Details of environmental audit and corrective measures shall be submitted in the monitoring report.	**Noted. (EC:2019; EC:2020)** • Currently construction work of shopping/commercial building and Multi level Car Parking (MLCP) is going to partially complete at project site. PP has assured to provide the same during operation of the project.
xviii.	The project proponent shall seek fresh Environment Clearance in case any modification/ revision is required at a later stage due to exchange of revenue Rasta existing in the project area or change in any plan due to combined zoning plan.	**Agreed by PP. (EC:2019; EC:2020)**
xix.	The validity of this environment clearance letter is valid upto 7 years from the date of issuance of EC letter. The environment clearance condition applicable till life space project in case of residential project will continue to apply. The resident welfare association/ Housing Co-operative societies shall responsible to comply condition laid down in law of land. Compliance report should be sent to this office till life of the project.	**Noted. (EC:2019; EC:2020)**
xx.	If project is not completed within the validity period then the project proponent shall submit the application for extension of validity within one month before lapse of validity period of environment clearance i.e. 7 years.	**Noted. (EC:2019; EC:2020)**
xxi.	The project proponent should intimate to the authority well before shifting their address of communication.	**Noted. (EC:2019; EC:2020)**

Concluding Remarks:

1. **Implementation of Conditions:**
   i. PP has not submitted the copy of purchase bills of the Diesel to ensure to utilize low sulphur. ***(Cp. Condi. – 7)***
   ii. PP has reported the concentration of PM10 higher than the permissible limit in ambient air. ***(Cp. Condi. – 9)***
   iii. PP has not submitted copy of water and energy conservation plan to be adopted at project site. ***(Cp. Condi. – 17)***

iv. PP has not submitted copy of license of 32.36 acres land to set up shopping/commercial building at sector 25A, Gurgaon Manesar Urban Complex. ***(Cp. Condi. – 24)***

v. PP has not submitted copy of affidavit regarding not to use ground water for construction purpose. ***(Cp. Condi. – 25)***

vi. PP has not provided the link of company website where copy of EC and status of compliance of EC conditions has been uploaded for public awareness. ***(Gen. condi. – vii)***

vii. PP has not submitted the copy of environmental statement of form-v for compliance of the condition. ***(Gen. condi. – xvi)***

2. **Housekeeping:** Overall it was found satisfactory.
3. **Review w.r.t. MOEFs letter dated 16.08.2012:** The report was prepared after site visit on 03.08.2022.
4. **Uploading of compliance on web site:** Not provided By PP.
5. **With regards to issuance of show cause/closure notices/court cases:** PP has submitted that no court case/show cause notice pertains to the project. Same may be sought during consideration of the project for expansion/modification/revision.

Signed by Krishan Kishor Garg
Date: 23-08-2022 17:20:47
Reason: Approved

Dr. K. K. Garg
(Deputy Director/Scientist 'C')

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
एकीकृत क्षेत्रीय कार्यालय, चंडीगढ़ / **Integrated Regional Office, Chandigarh**

सत्यमेव जयते

फा. सं.: 16-08/2019/IRO/Env.

सेवा मे

सदस्य सचिव,
राज्य स्तरीय पर्यावरण प्रभाव आकलन प्राधिकरण, हरियाणा, (SEIAA Haryana),
बैस नं 55-58, Parytan भवन, प्रथम तल, सेक्टर-2, पंचकुला, हरियाणा - 134115
(Email: seiaa-21.env@hry.gov.in)

विषय: Environment Clearance for shopping complex/commercial building on 32.36 acres site (Mall of India) in block-V, DLF city, Phase-III, Sector-25A, Gurgaon, Haryana - Certified compliance monitoring report reg.

संदर्भ: ई.सी. पत्र संख्या SEIAA/HR/2019/81 dated 06.05.2019 & amended SEIAA(125)/HR/2020/541 dated 06.11.2020 SEIAA(125)/HR/2020/535 dated 04.11.2020

महोदय,

उपरोक्त वर्णित पत्र के सन्दर्भ में आपके संज्ञान में लाया जाता है कि उपरोक्त परियोजना का निरीक्षण अधोहस्ताक्षरी द्वारा दिनांक **03.08.2022** को किया गया था। उक्त परियोजना की विस्तृत मानीटरिंग रिपोर्ट (संलग्नक-A) निम्नलिखित गैर-अनुपालना (non-compliance) बिन्दुओं सहित अग्रिम कार्रवाई हेतु संलग्न है:-

i. PP has not submitted the copy of purchase bills of the Diesel to ensure to utilize low sulphur. ***(Cp. Condi. – 7)***
ii. PP has reported the concentration of PM10 higher than the permissible limit in ambient air. ***(Cp. Condi. – 9)***
iii. PP has not submitted copy of water and energy conservation plan to be adopted at project site. ***(Cp. Condi. – 17)***
iv. PP has not submitted copy of license of 32.36 acres land to set up shopping/commercial building at sector 25A, Gurgaon Manesar Urban Complex. ***(Cp. Condi. – 24)***
v. PP has not submitted copy of affidavit regarding not to use ground water for construction purpose. ***(Cp. Condi. – 25)***
vi. PP has not provided the link of company website where copy of EC and status of compliance of EC conditions has been uploaded for public awareness. ***(Gen. condi. – vii)***
vii. PP has not submitted the copy of environmental statement of form-v for compliance of the condition. ***(Gen. condi. – xvi)***

उपरोक्त गैर-अनुपालना की जानकारी PP को दिनांक 17.08.2022 के पत्र द्वारा Action Taken Report (ATR) प्रस्तुत करने हेतु दी जा चुकी है ताकि वह विस्तृत मानीटरिंग रिपोर्ट को Ministry को अग्रेषित करने से पहले गैर-अनुपालना (non-compliance) बिंदुओं पर अपनी टिप्पणी प्रस्तुत कर सके (संलग्नक-B)। PP ने सभी गैर-अनुपालना (non-compliance) बिंदुओं पर अपनी प्रतिक्रिया / स्पष्टीकरण दिनांक 23.08.2022 के ईमेल से प्रस्तुत किया है, जो मूल स्वरुप में अग्रेषित है (संलग्नक-C)।

भवदीय,

संलग्नक: उपरोक्तानुसार।

Signed by Krishan Kishor Garg
Date: 23-08-2022 17:18:02
Reason: Approved
(डॉ के.के. गर्ग)
उप निदेशक / वैज्ञानिक-सी

Copy to:

1. अतिरिक्त निदेशक (IA- Monitoring Cell), पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, जोर बाग रोड, नई दिल्ली (Email: **shruti.rai@nic.in**).
2. अधिकृत हस्ताक्षरकर्ता, मेसर्स डीएलएफ लिमिटेड, गेटवे टॉवर *(द्वितीय तल)*, डीएलएफ सिटी, चरण- *III*, जिला- गुरुग्राम, हरियाणा-*122002*। **(Email: choudhury-abhijit@dlf.in; bakshi-rc@dlf.in; ankur.ithc2@gmail.com)**

RE: Environment Clearance for shopping complex/commercial building on 32.36 acres site (Mall of India) in block-V, DLF city, Phase-III, Sector-25A, Gurgaon, Haryana - Certified compliance monitoring report reg.

From : choudhury-abhijit@dlf.in Tue, Aug 23, 2022 12:03 PM

Subject : RE: Environment Clearance for shopping complex/commercial building on 32.36 acres site (Mall of India) in block-V, DLF city, Phase-III, Sector-25A, Gurgaon, Haryana - Certified compliance monitoring report reg. 1 attachment

To : Environment Wing IRO Chandigarh <eccompliance-nro@gov.in>

Cc : bakshi-rc@dlf.in, anand dubey <anand.dubey@indiahouse.co.in>, ankur ithc <ankur.ithc@gmail.com>

Dear Sir,

This has reference to the email dated 17th August 2022 from your good office. We are hereby sending Action Taken Report(ATR) for your reference and kind perusal.

Regards
Abhijit Choudhury

From: Environment Wing IRO Chandigarh <eccompliance-nro@gov.in>
Sent: 17 August 2022 10:25
To: Abhijit Choudhury <choudhury-abhijit@dlf.in>; R.C. Bakhshi <bakshi-rc@dlf.in>; ankur ithc2 <ankur.ithc2@gmail.com>
Subject: Environment Clearance for shopping complex/commercial building on 32.36 acres site (Mall of India) in block-V, DLF city, Phase-III, Sector-25A, Gurgaon, Haryana - Certified compliance monitoring report reg.

Sir,

Please find enclosed attachment w.r.t. the site visit dated 03.08.2022. You are required to submit Action Taken Report (ATR) in response to observations raised during the site visit within two weeks from the date of issue of this letter failing which the monitoring report will be submitted to the competent authority for further necessary action.

(Note: Reply may be sent through email only (in attachments not more than 20 MB in size).

Regards

Dr. K.K. Garg,
Scientist 'C'/Deputy Director,
Environment Wing,
Integrated Regional Office,
Ministry of Environment, Forest & Climate Change,
Bays No. 24-25, Sector 31 A, Dakshin Marg,
Chandigarh – 160030

Complete ATR MOI.pdf
14 MB

ANNEXURE – 17

NABET Accreditation letter of EIA Consultant

1107 QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Ind Tech House Consult,

Ground Floor, G-8/6, Rohini, Sector 11, Delhi-110089

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plant	4	1 (d)	A
5	Coal washeries	6	2 (a)	A
6	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
7	Cement plants	9	3 (b)	A
8	Synthetic organic chemicals industry	21	5 (f)	A
9	Oil & gas transportation pipeline	27	6 (a)	A
10	Isolated storage & handling of Hazardous chemicals	28	-	B
11	Industrial estates/ parks/ complexes/areas, export processing Zones(EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
12	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	32	7 (d)	A
13	Bio-medical waste treatment facilities	32A	7 (da)	B
14	Ports, harbours, break waters and dredging	33	7 (e)	B
15	Aerial ropeways	35	7 (g)	B
16	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
17	Building and construction projects	38	8 (a)	B
18	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated December 07, 2021 and supplementary minutes dated June 03, 2022 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2485 dated August.16, 2022. The accreditation needs to be renewed before the expiry date by Ind Tech House Consult, Delhi following due process of assessment.

Sr. Director, NABET
Dated: August. 16, 2022

Certificate No.
NABET/EIA/2023/SA 0174

Valid up to
April 29, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

ANNEXURE – 18

NABL Certificate of Laboratory

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

C-10, II FLOOR, SECTOR 06, NOIDA, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-5912

Issue Date: 30/06/2022 **Valid Until:** 29/06/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : IND RESEARCH & DEVELOPMENT HOUSE PVT. LTD.

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

ANNEXURE – 19

Copy Of BOR

DLF LIMITED
DLF Gateway Tower, R Block,
DLF City Phase - III, Gurugram - 122 002, Haryana (India)
Tel. :+91-124-4769000

DLF
BUILDING INDIA

CERTIFIED TRUE COPY OF THE RESOLUTION PASSED BY THE FINANCE COMMITTEE OF THE BOARD OF DIRECTORS OF DLF LIMITED IN ITS MEETING HELD ON 11TH SEPTEMBER, 2020

"RESOLVED THAT in partial modification of the resolution dated 7 March 2020 of the Finance Committee of the Board of Directors of the Company, Mr. Devinder Singh, Director, Ms. Neelu Goel, Sr. Vice President (Planning), Mr. Lok Pal Singh, Sr. Vice President, (Co-ordination), Mr. Deepak Bhandari, General Manager (Co-ordination), Ms. Vandana Arora, Assistant General Manager (Planning), DLF Home Developers Limited and Ms. Akanksha Moudgil, General Manager, DLF Home Developers Limited, be and are hereby severally authorized to sign and submit various license applications including application for change/ modification of developer company, transfer of licenses, withdraw of license(s), adjustment/ seek refund of Government fee, charges and to sign and execute related letters, documents, papers, plans, undertakings etc.; to deal with the office of Director General, Town & Country Planning, Haryana/ Haryana Shahari Vikas Pradhikaran (HSVP)/ Gurugram Metropolitan Development Authority (GMDA)/ Haryana State Industrial and Infrastructure Development Corporation (HSIIDC), Chandigarh/ Panchkula/ Gurugram and other authorities/ offices of Haryana Government including under the provisions of the Haryana Development and Regulations of Urban Areas Act, 1975, the Punjab Scheduled Roads & Controlled Areas Restrictions of Unregulated Development Act, 1963 and Haryana Building Code, for and on behalf of the Company and to sign and execute related letters, documents, papers, plans, undertakings etc. and to deal with the office(s) of State Environment Impact Assessment Authority; State Expert Appraisal Committee; Haryana State Pollution Control Board; Ministry of Environment, Forest & Climate Change and Forest Department in the State of Haryana and to obtain Environmental Clearance in relation to the Company's projects situated in the State of Haryana.

RESOLVED FURTHER THAT the Common Seal of the Company may be affixed, if required, on any of such documents as per the provisions contained in the Articles of Association of the Company.

RESOLVED FURTHER THAT the aforesaid powers entrusted to the above executive(s) shall be valid, effective and exercisable by them, so long as they are in the employment of the Company or its associate/ subsidiary companies, unless revoked earlier by the Board or this Committee.

RESOLVED FURTHER THAT all acts, deeds and things done and documents executed aforesaid shall be deemed to be valid and enforceable only, if the same are consistent with this Resolution and that the Board or this Committee shall not be responsible for any illegal and invalid acts and any other act beyond the scope of the aforesaid powers executed by the above executive(s)

Cont....2

DLF LIMITED
DLF Gateway Tower, R Block,
DLF City Phase - III, Gurugram - 122 002, Haryana (India)
Tel. :+91-124-4769000

DLF
BUILDING INDIA

and shall not bind the Company against any third party(ies) or before any authority(ies) in any manner and that the Board or this Committee shall not be answerable in that behalf.

RESOLVED FURTHER THAT a certified copy of this Resolution be furnished to anyone concerned or interested in the matter under the signatures of any Director or the Company Secretary of the Company."

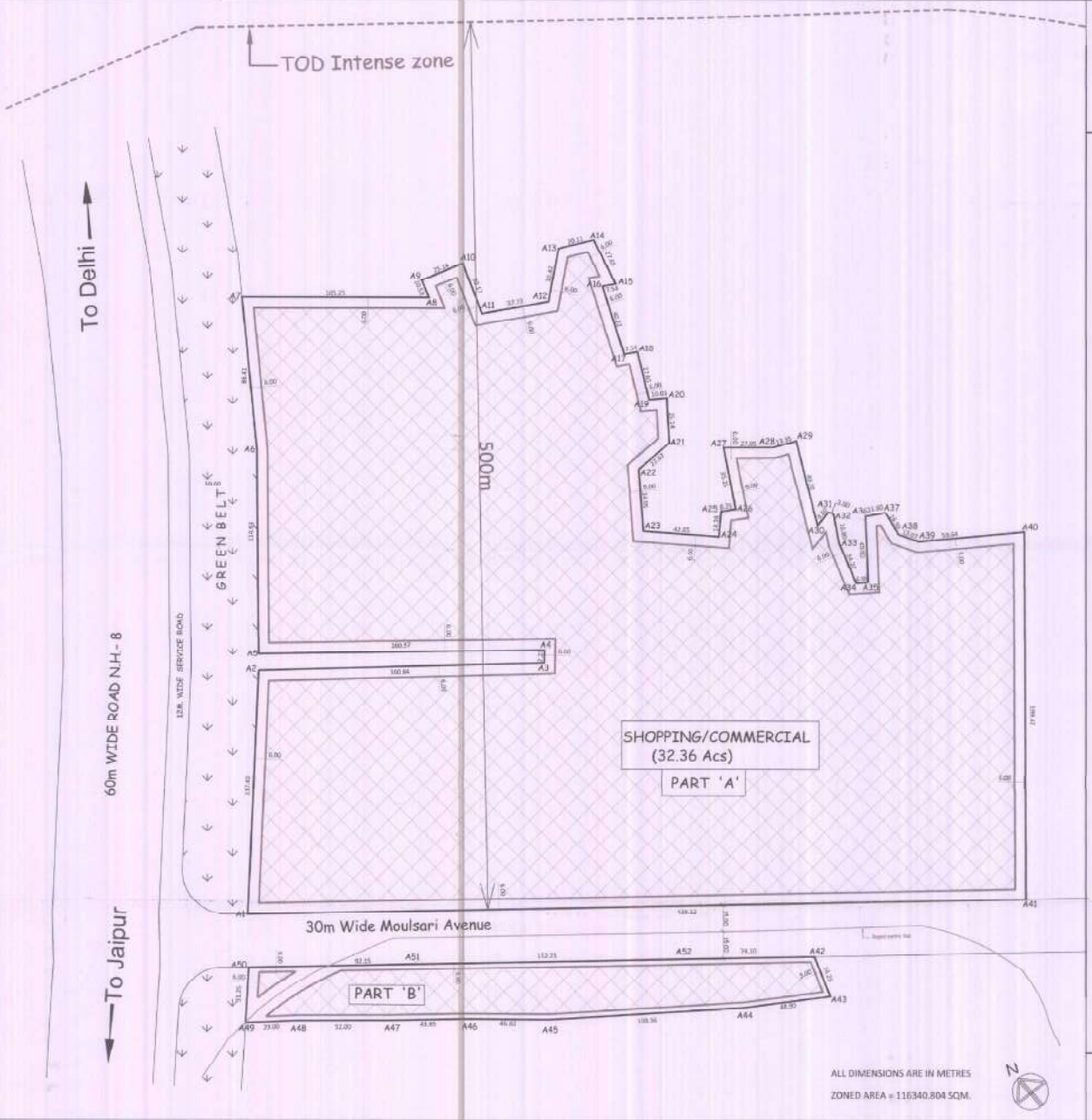
CERTIFIED TRUE COPY
FOR DLF LIMITED

R. P. PUNJANI
COMPANY SECRETARY
FCS:3757
Date: 04.11.2020

ANNEXURE – 20

Approved Zoning Plan

ZONING PLAN UNDER TRANSIT ORIENTED DEVELOPMENT (TOD) POLICY FOR COMMERCIAL SITE MEASURING 32.36 ACRES FALLING IN RESIDENTIAL PLOTTED COLONY NAMELY DLF CITY, PHASE-I, II & III IN SECTOR-24, 25 & 25A GURUGRAM-MANESAR URBAN COMPLEX, BEING DEVELOPED BY DLF LIMITED.



1. **For purpose of Code 1.2 (xcvi) & 6.1 (1) of the Haryana Building Code, 2017, amended from time to time.**

2. **SHAPE & SIZE OF SITE.**

   The shape and size of site is as shown in the zoning plan.

3. **TYPE OF BUILDING PERMITTED AND LAND USES.**

   (a) The type of Commercial buildings permissible in this site shall confirm to provisions of the Commercial zone as provided in the Appendix 'B' to the Final Development Plan of Gurugram Manesar Urban Complex, and Haryana Building Code 2017, as amended from time to time, as applicable.
   (b) The site shall be developed and building constructed thereon as indicated in and explained in the table below :-

Notation	Land use Zone	Type of building permitted / permissible structure
	Open Space Zone	Open parking , garden , landscaping features, underground services etc.
	Building Zone	Building as per permissible land use in clause a above and uses permissible in the open space zone as per table above.

4. **SITE COVERAGE AND FLOOR AREA RATIO (FAR)**

   (a) The building or buildings shall be constructed only within the portion of the site marked as Building zone as explained above, and nowhere else.
   (b) The proportion up to which the site can be covered with building on the ground floor and subsequent floors shall not exceed overall 50% of the area of 32.36 acres as per TOD Policy dated 09.02.2016 & its subsequent amendments thereafter.
   (c) Maximum permissible FAR shall be 350 under Commercial use only on the area of 32.36 acres. Not less than 60% of the earlier approved 150 FAR should be used for neighborhood shopping.

5. **HEIGHT OF BUILDING.**

   The height of the building block, subject of course to the provisions of the site coverage and FAR, shall be governed by the following:-
   (a) The maximum height of the buildings shall be as per the Haryana Building Code , 2017.
   (b) The plinth height of building shall be as per the Haryana Building Code , 2017.
   (c) All building block(s) shall be constructed so as to maintain an inter-se distance not less than the set back required for each building according to the table below:-

S. No.	Height of building (in meters)	Set back / inter space to be left (in meters)
1.	10	6
2.	15	7
3.	18	8
4.	21	9
5.	24	9
6.	27	9
7.	30	10
8.	35	12
9.	40	13
10.	45	15
11.	50	16
12.	55 & above	18

   (d) If, such interior or exterior open space is intended to be used for the benefit of more than one building belonging to the same owner, then the width of such open air space shall be the one specified for the tallest building as specified in (c) above.

6. **PARKING**

   (a) Adequate parking spaces, covered, open or in the basements shall be provided for vehicles of users and occupiers, within the site.
   (b) The parking spaces for commercial use shall not be less than 1 ECS for every 50 Sqm. of the covered area on all floors. The area for parking per car shall be as under:
   1 ECS = 23 Sqm. for open parking
   1 ECS = 28 Sqm. for stilt parking
   1 ECS = 32 Sqm. for basement parking
   (c) In no circumstance, the vehicle(s) belonging/ related to the plot/ premises shall be parked outside the plot area.

7. **APPROACH TO SITE**

   (i) The vehicular approach to the site shall be planned and provided giving due consideration to the junctions with the surrounding roads to the satisfaction of the Competent Authority.

8. **GATE POST AND BOUNDARY WALL**

   (i) Such Boundary wall railings or their combination, hedges or fences along with gates and gate posts shall be constructed as per design approved by Competent Authority. In addition to the gate/ gates an additional wicket gate not exceeding 1.25 meters width may be allowed in the front and side boundary wall provided that no main gate or wicket gate shall be allowed to open on the sector road/public open space.
   (ii) The boundary wall shall be constructed as per the Haryana Building Code , 2017.

9. **BAR ON SUB-DIVISION OF SITE**

   (a) The site shall not be sub-divided in any manner what so ever.

10. **APPROVAL OF BUILDING PLANS**

    The building plans of the building to be constructed at site shall have to be got approved from the Director, Town & Country Planning, Haryana/ any other persons or the committee authorized by him, under section 8 (2) of the Punjab Scheduled Roads and Controlled Areas Restriction of the Unregulated Development Act, 1963, before starting up the construction.

11. **BASEMENT**

    (a) The number of basement in this colony shall be as per the Haryana Building Code , 2017.
    (b) The construction of basement shall be executed as per the Haryana Building Code , 2017.

12. **PROVISIONS OF PUBLIC HEALTH FACILITIES**

    The W.C. and urinals provided in the buildings shall conform to the Haryana Building Code, 2017 and National Building Code, 2016.

13. **EXTERNAL FINISHES**

    (a) The external wall finishes, so far as possible shall be in natural or permanent type of materials like bricks, stone, concrete, terracotta, grits, marble, chips, class metals or any other finish which may be allowed by the Competent Authority.
    (b) All sign boards and names shall be written on the spaces provided on buildings as per approved buildings plans specifically for this purpose and at no other places, whatsoever.
    (c) For building services, plumbing services, construction practice, building material, foundation and Damp Proof Course as per the Haryana Building Code, 2017 shall be followed.

14. **LIFTS AND RAMPS**

    (a) Lift and Ramps in building shall be provided as per Haryana Building Code, 2017.
    (b) Lift shall be provided with 100% standby generators along with automatic switchover along with staircase of required width and number.

15. **BUILDING BYE-LAWS**

    The construction of the building /buildings shall be governed by provisions of the Haryana Building Code, 2017. On the points where Haryana Building Code, 2017 is silent the National Building Code of India, 2016 shall be followed.

16. **FIRE SAFETY MEASURES**

    (a) The owner will ensure the provision of proper fire safety measures in the multi storied buildings conforming to the provisions of the Haryana Building Code, 2017/ National Building Code of India, 2016 and the same should be got certified from the Competent Authority.
    (b) Electric Sub Station/ generator room if provided should be on solid ground near DG/ LT. Control panel on ground floor or in upper basement and it should be located on outer periphery of the building, the same should be got approved form the Competent Authority.
    (c) No separate fire fighting scheme shall be got approved from the Director, Urban Local Bodies, Haryana or any person authorized by the Director, Urban Local Bodies, Haryana. The approval shall be obtained prior to starting the construction work at site.

17. That the colonizer/owner shall obtain the clearance/NOC as per the provisions of the Notification No. S.O. 1533 (E) Dated 14.9.2006 issued by Ministry of Environment and Forest, Government of India before starting the construction.

18. That the rain water harvesting system shall be provided as per Central Ground Water Authority norms/Haryana Govt. notification as applicable.

19. That the colonizer/owner shall use only Light-Emitting Diode lamps (LED) fitting for internal lighting as well as Campus lighting.

20. That the colonizer/owner shall strictly comply with the directions issued vide Notification No. 19/6/2016-5P dated 31.03.2016 issued by Haryana Government Renewable Energy Department.

21. That colonizer/owner shall ensure the installation of Solar Power Plant as per provisions of Haryana Solar Power Policy, 2016 issued by Haryana Government Renewable Energy Department vide Notification No. 19/4/2016-5 Power dated 14.05.2016.

22. That the colonizer/owner shall ensure the installation of Solar Photovoltaic Power Plant as per the provisions of order No. 22/52/2005-5Power dated 21.03.2016 issued by Haryana Government Renewable Energy Department.

23. **GENERAL**

    (a) Among other plans and papers detailed elevations of buildings along all sides exposed to public view shall be drawn according to scale as mentioned in the Haryana Building Code-2017.
    (b) The water storage tanks and other plumbing works etc. shall not be exposed to view each face of building but shall be suitably encased.
    (c) No applied decoration like inscription, crosses, names of persons or buildings are permitted on any external face of the building.
    (d) Garbage collection center of appropriate size shall be provided within the site.
    (e) Color trade emblem and other symbols shall be subject to the approval of the Competent Authority.

DRG No. DG,TCP- 6501 Dated 11-06-2018

(RAM AVTAR BASSI) AD (HQ)	(BALWANT SINGH) SO(HQ)	(JITENDER SINGH) ARCHITECT (HQ)	(DEVENDRA NIMBOKAR) STP (HQ) M	(JITENDER SIMAG) CTP (HR)	(K.MAKRAND PANDURANG, IAS) DG,TCP (HR)