#### **Corrigendum-02**

#### Amendments and reply/clarification to bidders queries

Name of work: Design, Construction, Testing, Commissioning and Validation of BSL-3 Laboratory, BSL-2 Laboratory and

Animal Facility (EPC Mode) including operation & maintenance at Institute of Advance Virology, Thonnakkal,

Thiruvananthapuram

Tender no. HITES/IDS/IAV-BSL/23/28 dated 07.03.2024

Tender Reference	As per tender	Amended as
Volume 1 Clause 1.4.1 (c) Eligibility Criteria	Rs.8.25 Crore during the immediate last three consecutive financial year ending 31 <sup>st</sup> March, 2023. The turnover should be of the Bidding Company and	<b>Turnover</b> : Average annual financial turnover should be <b>Rs.4.95 Crore</b> during the immediate <b>last three</b> consecutive financial year ending 31 <sup>st</sup> March, 2023. The turnover should be of the Bidding Company and not for Group Company or subsidiary company etc. ITRs for the last three years to be submitted.
		The multiplication factor of 7% per annum simple interest is not applicable on the Annual financial turnover figures.
	Duly filled Form T-1 certified by CA to be submitted. Turnover shall be duly audited & certified by a Chartered Accountant with his seal / signatures and registration number with UDIN.	Duly filled Form T-1 certified by CA to be submitted. Turnover shall be duly audited & certified by a Chartered Accountant with his seal / signatures and registration number with UDIN.
	Volume 1 Clause 1.4.1 (c)	Volume 1 Clause 1.4.1 (c) Eligibility Criteria  Turnover: Average annual financial turnover should be Rs.8.25 Crore during the immediate last three consecutive financial year ending 31st March, 2023. The turnover should be of the Bidding Company and not for Group Company or subsidiary company etc. ITRs for the last three years to be submitted.  The multiplication factor of 7% per annum simple interest is applicable on the Annual financial turnover figures.  Duly filled Form T-1 certified by CA to be submitted. Turnover shall be duly audited & certified by a Chartered Accountant with his seal / signatures and

Sl. No.	Tender Reference	As per tender	Amended as
2	Volume-6 : Tender Drawings	Tender Drawings	Following Revised (R1) Drawings are attached:
	214.11.11.83		HITES/IDD/GOK/BSL3/TNKL/2022-23/A-03,
			HITES/IDD/GOK/BSL3/TNKL/2022-23/A-04
			HITES/IDD/GOK/BSL3/TNKL/2022-23/A-05
			Bidders are requested to follow the above revised
			drawings. All other tender drawings provided in
			tender documents shall remain unchanged.
3	Volume 1	Last Date & time of Submission of Bids online	Last Date & time of Submission of Bids online
	NIT	(Bid due date) :01.04.2024at 3.00 PM	(Bid due date) :15.04.2024 at 3.00 PM
		Date & time of opening of Technical Bids through	Date & time of opening of Technical Bids
		e-tender portal: 02.04.2024at 3.00 PM	through e-tender portal: 16.04.2024at 3.00 PM

Sl. No.	Tender Reference	Query by bidder	Reply / Clarification
1	Volume 1 Clause 1.4 Eligibility Criteria	If the bidder is a specialized agency in BSL3 and intends to engage a civil construction agency, we propose that the combined turnover of both agencies be considered for turnover eligibility.	No Change. Terms & condition of tender prevail.
2	Volume 1 Clause 1.4 Eligibility Criteria	We recommend that on Vol-1, Page 13, where the bidder is an Indian company, the experience of completed BSL3 projects should also be from Indian projects. This is to ensure proper verification and review of project experiences and to prevent the submission of in-genuine experiences.	No change. Tender conditions given at Volume 1 clause 1.4.2 (vii) prevail.
3	Volume 1 General	Regarding the performance report requirement, we request clarification on whether letters from clients, which we have already obtained, can be attached instead of following a new format for each bid submission when all information is available in the issued documents.	The certificates submitted by the bidder against eligibility criteria shall include all the details required for evaluation as per Form –T3 given in the tender document.
4	Volume 1 Form T-7	We suggest an amendment to include experience in executing Animal facilities as part of the eligibility criteria, along with BSL2 and BSL3 aspects. Alternatively, a technical score may be provided to prefer experienced bidders with all-round project experience.	No Change. Terms & condition of tender prevail.
5	Volume 1 Form T-7	We inquire if additional technical scores can be awarded to bidders who are also manufacturers of various BSL3 components.	No Change. Terms & condition of tender prevail.
6	Volume 2 Schedule F	We propose adjustments in Vol 2, page 76, regarding the minimum requirement of qualified technical personnel at the site, suggesting a reduction in the number of Mechanical Engineers required	No Change. Terms & condition of tender prevail.

Sl. No.	Tender Reference	Query by bidder	Reply / Clarification					
7	General	While the contractor is responsible for obtaining all statutory permissions, we seek clarification on whether the fees for statutory liaising will be included in the scope of the client. Additionally, we request information on the support available from the client in resolving matters with statutory officers and whether environmental clearance approval has already been secured.	statutory approvals shall be reimbursed to him after submission of payment receipts and other relevant documents by the contractor. All liasoning expenses are to be borne by the Contractor.					
8	Volume 1 1.4 Eligibility Criteria	For section HVAC eligibility & LVS etc, the similar works should be defined	Refer Form – H provided in tender.					
9	Volume 1 1.4 Eligibility Criteria	The bidder shall have at-least one completed work of BSL-3 Laboratory certified by Department of Bio-Technology (DBT).  It is necessary to have similar works certified by DBT?	Yes, at-least one completed work of BSL-3 Laboratory should have been certified by the Department of Bio-Technology (DBT).					
10	Volume 5 - Technical Specification Section VII - List of Proposed and Preferred Makes / Manufactures	We can also observe the absence of an Indian Make in the List Of Approved makes for Fan Coil Units (FCU) within the tender, which is once again in approved makes mentioned along the FCU category in the tender are - Hitech/Carrier/Voltas/Midea.  Of the mentioned makes, only Hitech is an Indian Manufacturer.  We request you to kindly include other Indian makes for the Fan Coil Units.	No Change. Terms & condition of tender prevail.					
11	General	Please provide AutoCAD drawings	CAD drawings shall be provided to the successful bidder after award of work.					

Sl. No.	Tender Reference	Query by bidder	Reply / Clarification
12	Volume 5 - Technical Specification  Section VII - List of Proposed and Preferred Makes / Manufactures  C. HVAC & Associated Equipments , sl. no.7	The AHU Unit performance, coil performance and Mechanical characteristics shall be "EUROVENT Certified."  In the above-mentioned specifications, it can be clearly seen that Eurovent standards are given a preference. These kind of the restrictive conditions and req companies, local manufacturers, and service providers to participate in the project despite having their names included in the "List of approved makes".	AHRI or equivalent Certification are acceptable subject to meeting other requirements as per tender conditions.
		To conclude, we request you to review the tender clauses and provide fair opportunities to all approved & eligible manufactures to participate in the project and we request to make required in the tender documents, wherever applicable.	
13	Volume 5 - Technical Specification  Section III - Technical Specification for HVAC & Associated Works	HVAC Design - Please confirm false ceiling heights to be considered	Refer revised Drawing No. HITES/IDD/GOK/BSL3/TNKL/2022-23/A-05 issued with this Corrgendum-02
14	Volume 5 - Technical Specification  Section III - Technical Specification for HVAC & Associated Works	HVAC Design - Please provide scientific equipment electrical load details or room wise equipment list.  Please confirm whether supply of CO2, Compressed Air, Power, etc. for scientific equipment is in Bidders scope of works.	Tentative equipment layout already provided in tender drawings. Being an EPC contract, further detailing of works shall be done by the contractor and is in the scope of the contractor.  Yes, supply of CO2, Compressed Air, Power, etc. for scientific equipment is in Bidders scope of works.

Sl. No.	<b>Tender Reference</b>	Query by bidder	Reply / Clarification
15	Volume 6 – Tender Drawings	Please provide door and window schedule along with location for Bio Safety Doors.	Locations of Doors, windows, biosafety doors are already provided in tender drawings. Doors indicated as BD-1 and BD-2 shall be Biosafety Doors. Size of doors indicated in tender drawings shall be as follows:  D - 1000x2100 mm D1- 1200x2100 mm D2- 750x2100 mm BD1- 1200x2100 mm BD1- 1200x2100 mm BD2- 750x2100 mm BD2- 750x2100 mm BD2- 750x2100 mm
16	Volume-6 : Tender Drawings	Office furniture - Please confirm the scope of works	Office furniture is not in scope of this tender.
17	Volume-6 : Tender Drawings	Lab furniture - Please confirm the scope of works	The scope of work includes providing laboratory workstations, hand wash sinks and laboratory chairs in BSL-3 Laboratory, BSL-2 Laboratory and Animal Laboratory as per tender specifications. Tentative locations of workstations are indicated in the tender drawings. Being an EPC contract, further detailing of works shall be done by the contractor and is in the scope of the contractor.
18	General	Please provide us soil report	Indicative soil report of adjacent site is attached for reference purpose only. However, it is the responsibility of the Contractors to do soil investigations and testing at the proposed site for BSL III facility and is included in the scope of work.

Sl. No.	Tender Reference	Query by bidder	Reply / Clarification
19	Volume 5 - Technical Specification Section VII - List of Proposed and Preferred Makes / Manufactures	Please include I-Clean make for below listed items:  Clean Room Wall Panels Garment cubicles, Cross over benches.  Wet & Chemical showers Air handling units Return air risers. Doors & View glass Windows	No Change. Terms & condition of tender prevail.  For any item, wherever makes/manufacturer is not provided, the same shall be supplied from makes/manufacturers having experience of successful installation of the item/equipment in at-least one DBT certified BSL-3 Laboratory. Acceptance/approval shall be subject to obtaining report on satisfactory supply, installation and performance from the end user department.
20	Volume 1	Please provide EMD Bank guarantee format	Terms & Conditions of tender prevails. EMD shall be submitted online.
21	Volume 3 SCC Scope of Work 1.9	Operation and Maintenance: We require draft agreement copy from Client for 7 years of O&M Services mentioning therein all the terms and conditions in advance.	The scope and conditions of O&M Services is given in Volume-5, Section-VI & Section-VII. Agreement shall be issued to the successful contractor.
22	Volume 3 SCC Scope of Work 1.6	We shall follow DBR, tender drawings and technical specifications provided along with the tender documents. However if there are any major changes required to be done for compliance with Laboratory Design Guidelines/standards and the amendments thereof, and because of this if there is any upward revision in the cost, HITES will issue amendment to that effect.	Bidders shall follow DBR, tender drawings and technical specifications provided along with the tender documents. Changes if any required in the project from the DBR, tender drawings and technical specifications shall be taken up only after written approval from Client / HITES.
23	Volume-1 : Notice Inviting Tender, & Instruction to Bidders, Section-1	Exemption for MSME in EMD/ Tender Fee	No change. Terms & Condition of tender prevails

Sl. No.	<b>Tender Reference</b>	Query by bidder	Reply / Clarification
24	Volume 3 SCC Clause 1.7	All statutory approvals are to be applied and obtained by IAV. As a successful Bidder, we shall provide all the necessary documents, technical support and ensure compliance to all the terms and conditions of statute. All the expenses on this account will be borne by us and statutory payments will be reimbursed by Client/HITES. This is applicable for all approvals mentioned in the clause $1.7$ (i) to $1.7(x)$ .	The Contractor shall obtain all statutory approval required as per the scope of work. The fee paid by the contractor for obtaining various statutory approvals shall be reimbursed to him after submission of payment receipts and other relevant documents by the contractor. All liasoning expenses are to be borne by the Contractor. Required assistance will be provided by Client / HITES in obtaining statutory approvals.
25	Volume 5 Technical Specification	Modular Wall and Partitions will be 50-52mm thick for all laboratories except where higher thickness is required due to Riser sizes (as per HVAC Design). 80/100 mm panels will be provided accordingly at respective locations.	No Change. Terms & Conditions of tender prevails.
26	Volume-1 : Notice Inviting Tender, & Instruction to Bidders, Section-1	For finalizing the turnover the income of the subcontractor also to be considered	No change. Terms & Condition of tender prevails.
27	Volume 5 Technical Specification SEC VIIIA SR NO. 112	All clean room panels and clean room equipment will be of Fabtech make. We are OEM for the same and quality of our panels is better than Nicomac/I Clean/ GMP, hence our name (Fabtech) should be included in the list of "Approved Make" of relevant items. We are enclosing herewith our catalog for the same.	No Change. Terms & condition of tender prevail.  For any item, wherever makes/manufacturer is not provided, the same shall be supplied from makes/manufacturers having experience of successful installation of the item/equipment in at-least one DBT certified BSL-3 Laboratory. Acceptance / approval shall be subject to obtaining report on satisfactory supply, installation and performance from the end user department.

#### Important Note:

- This Corrigendum- 02 shall form part of the Tender Document and is to be submitted duly signed & stamped by the applicants along with their Application.
- All other terms & condition of Tender document remains unchanged.

• Prospective bidders are advised to regularly scan through https://etenders.gov.in/eprocure/app and HITES website tender page for corrigendum/amendments etc. and separate advertisement will not be made for this.

For HITES s/d
DGM (ID)

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# GEOTECHNICAL INVESTIGATION REPORT

# FOR THE CONSTRUCTION OF TWO NON-TECHNICAL BUILDINGS AT LIFE SCIENCE PARK, THONNAKKAL THIRUVANANTHAPURAM

FOR M/s. HITES, HLL Lifecare Ltd, Thiruvananthapuram 695012



CENTRE FOR CONTINUING EDUCATION
COLLEGE OF ENGINEERING TRIVANDRUM
GOVERNMENT OF KERALA
THIRUVANANTHAPURAM 695 016

**17 OCTOBER 2017** 

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#### 1. INTRODUCTION

This geotechnical investigation was conducted for the proposed two non-technical buildings (Three storey Biotech Lab building and two storey office building) at Life Science Park, Thonnakkal, Thiruvananthapuram. The objective is to study the subsoil characteristics below the proposed locations of the construction, to enable the design of the most appropriate and economical foundations.

#### 2. SCOPE OF WORK

- (a) Drilling boreholes up to the depth required or refusal whichever is earlier.
- (b) Conducting Standard Penetration Tests in the boreholes as per IS Code of Practice.
- (c) Drilling into the underlying rock, coring, logging, sampling and testing wherever necessary.
- (d) Recording of water table level in the boreholes after completion of boring.
- (e) Conducting all the necessary laboratory tests on the samples collected.
- (f) Preparation of report summarizing the details of soil classification, analysis of test data, type & depth of foundation to be adopted.

#### 3. FIELD WORK

#### 3.1 BORING

The borehole points taken are marked in the Site Plan, Fig 1, attached. The field work was done on September & October 2017. The boreholes of 100mm were drilled using machine augering method (Calyx type), as per I.S. Specifications. All the borehole details are given in log sheets in Annexure- I.

#### 3.2. STANDARD PENETRATION TEST

These tests were conducted at approximately 1.5m depth intervals and wherever there was a change in stratification. The tests were performed by driving into the soil (boreholes cleaned of any loose material) standard split spoon sampler with the help of a standard hammer with a free fall of 75cm on a driving head as specified in IS:2131-1981. The number of blows needed to penetrate the first, second and third stages (each of 15cm

depth) of the sampler length were noted. The SPT values ('N'-value) are given in the borehole log data sheets.

#### 3.3 BORING INTO THE ROCK

Boring into the rock was carried out using diamond bits of NX size (54.7mm) and the details are given in the borehole log sheets and Table 1.

#### 3.4 RECORDING OF WATER TABLE

Water table was generally recorded as per standard practice, 24 hours after the completion of the boreholes. The investigation was done in September & October 2017. The water table level was observed up to the depth bored and is given in the borehole log sheets in Annexure I.

#### 4. LABORTORY TESTS

A preliminary visual examination of the soil samples was made before the laboratory tests. The tests done on soil samples are Grain size analysis, Moisture content etc. The test results of the soil samples are reported in the corresponding borehole log sheets. The rock cores obtained are tested in the laboratory and the results are shown in Table 2.

#### 5.0 LOCATION OF BOREHOLES

The location of all boreholes is given in the Site Plan (Fig. 1).

#### 6. DISCUSSION OF BOREHOLES

The field log sheets of the all boreholes are attached. All depths mentioned are with reference to the ground level as on the date of investigation. A brief description of each borehole is given in Annexure I attached. The sub soil profile details of all six boreholes are given in Fig. 2.

#### Borehole: BH-01 (Three storey biotech lab building)

The soil near the existing ground level is dark brown gravelly sand with silt & some clay, up-to 2.2m. Below this, brownish red & light grey laterite (grain size: silty sand with gravel & clay) was obtained up to 3.70m. Below this, brownish red & light grey laterite (grain size: silty sand) was obtained up to 5.0m. Below this, brownish red & light grey laterite (grain size: silty sand with clay) was obtained up to 6.30m. Below this, light brown & light grey silty sand was obtained up to 8.0m. Below this, brownish red & light grey laterite (grain size: gravelly sand with silt & clay) was obtained up to 9.50m. Below this, light brownish yellow silty sand was obtained up to 13.50m. Below this, brown silty sand was obtained up to 15.50m. Below this, brown & light grey silty sand was obtained up to 19.0m. Below this, brown & light grey silty fine & medium sand was obtained up to 19.0m. Below this, dark greenish grey weathered rock material (silty sand) was obtained and in this layer 'refusal' was encountered at 21.51m. Hence for the further boring drill bits were used.

The brown soft rock with poor core recovery & RQD value was obtained up to 26.54m. Below this, light brownish grey jointed medium hard rock with core recovery & some RQD values was obtained up to 29.73m. The boring was stopped at this depth.

### Borehole: BH-02 (Three storey biotech lab building)

The soil near the existing ground level is brownish red laterite (grain size: sandy gravel with silt & clay) was obtained up to 2.50m. Below this, reddish brown & grey laterite (grain size: silty clay with sand) was obtained up to 4.0m. Below this, reddish brown & grey laterite (grain size: gravelly sand with silt & clay) was obtained up to 5.40m. Below this, brownish red & grey laterite (grain size: clayey silt with sand) was obtained up to 7.50m. Below this, yellow silty sand was obtained up to 9.50m. Below this, brown silty sand was obtained up to 12.0m. Below this, brown silty fine & medium sand was obtained up to 14m. Below this, grey weathered rock material (silty sand) was obtained up to 15.50m. Below this, greenish grey weathered rock material (silty sand) was obtained and in this layer 'refusal' was encountered at 16.56m. Hence for the further boring drill bits were used.

The dark brownish grey soft rock was obtained up to 19.37m. Below this, light greyish brown or yellowish brown soft rock was obtained up to 31.75m. Below this, light brownish grey medium hard rock was obtained up to 32.09m. Below this, brown highly

jointed hard rock with core recovery & poor RQD values was obtained up to 32.9m. The boring was stopped at this depth.

#### Borehole: BH-03 (Three storey biotech lab building)

The soil near the existing ground level is reddish brown laterite (grain size: silty sand) was obtained up to 2.50m. Below this, light grey & brown laterite (grain size: silty clay with fine sand) was obtained up to 4.0m. Below this, grey & some brown silty clay with fine sand was obtained up to 5.50m. Below this, brownish red & light grey laterite (grain size: silty sand with some clay) was obtained up to 8.0m. Below this, dark reddish brown & white laterite (grain size: silty sand with some clay) was obtained up to 10m. Below this, brownish red silty sand was obtained up to 12.5m. Below this, brown silty sand was obtained up to 14m. Below this, reddish brown silty sand was obtained up to 16m. Below this, grey weathered rock material (silty sand) was obtained up to 17.50m. Below this, brown weathered rock material (silty medium sand) was obtained and in this layer 'refusal' was encountered at 18.66m. Hence for the further boring drill bits were used. The brown & grey soft rock was obtained up to 26.2m. Below this, grey jointed medium hard rock was obtained up to 26.94m. Below this, light greyish brown jointed hard rock was obtained up to 28.81m. The boring was stopped at this depth.

#### Borehole: BH-04 (Three storey biotech lab building)

The soil near the existing ground level is brown laterite (grain size: silty sand) was obtained up to 2.50m. Below this, brownish red laterite (grain size: silty sand) was obtained up to 4.0m. Below this, light reddish brown laterite (grain size: silty sand) was obtained up to 6.0m. Below this, reddish brown laterite (grain size: silty sand) was obtained up to 8.0m. Below this, brown laterite (grain size: silty medium sand) was obtained up to 10.0m. Below this, light yellowish grey silty medium sand was obtained up to 12.0m. Below this, yellowish brown silty medium sand was obtained and in this layer 'refusal' was encountered at 12.99m. Hence for the further boring drill bits were used. The brown or light brown or light yellowish brown soft rock was obtained up to 24.34m. Below this, light brownish yellow & grey soft rock was obtained up to 29.06m. The boring was stopped at this depth.

#### Borehole: BH-05 (two storey office building)

The soil near the existing ground level is brown & light grey laterite (grain size: silty sand with clay) was obtained up to 2.0m. Below this, reddish pink laterite (grain size: silty clay) was obtained up to 3.5m. Below this, light reddish pink laterite (grain size: silty sand with clay) was obtained up to 5.50m. Below this, brown silty sand was obtained up to 7.50m. Below this, red & light grey laterite (grain size: silty sand with two cobbles) was obtained up to 9.50m. Below this, dark brown laterite (grain size: sandy gravel with silt & clay was obtained up to 11.5m. Below this, light pinkish brown silty fine & medium sand was obtained up to 13m. Below this, brown & light grey laterite (grain size: silty sand) was obtained up to 14.5m. Below this, grey silty sand with some clay was obtained up to 18m. Below this, white weathered rock material (silty sand) was obtained up to 20m. Below this, light grey weathered rock material (silty sand) was obtained and in this layer 'refusal' was encountered at 24.34m. Hence for the further boring drill bits were used.

The grey soft rock was obtained up to 33.92m. Below this, yellowish brown & light grey soft rock was obtained up to 35.59m. The boring was stopped at this depth.

#### Borehole: BH-06 (two storey office building)

The soil near the existing ground level is reddish brown & light grey laterite (grain size: gravelly sand with silt & clay) was obtained up to 2.50m. Below this, white & light grey silty medium sand was obtained up to 4.0m. Below this, light brownish pink silty fine & medium sand with clay was obtained up to 5.50m. Below this, light brownish yellow silty fine & medium sand with clay was obtained up to 7.50m. Below this, light brown silty sand was obtained up to 12.0m. Below this, dark brown & dark grey silty sand with clay was obtained up to 13.5m. Below this, light reddish brown silty sand was obtained up to 15m. Below this, light brown & light grey silty fine sand was obtained and in this layer 'refusal' was encountered at 15.62m. Hence for the further boring drill bits were used. The light grey or grey or brown soft rock was obtained up to 35.2m. Below this, grey

highly jointed hard rock was obtained up to 37.1m. The boring was stopped at this depth.

The Table 1 shows the details of rock coring and Table 2 gives the details of the rock core tested.

#### 7. DESIGN CONSIDERATIONS AND RECOMMENDATIONS

The site investigation was carried out at the six locations of the proposed two non-technical buildings (Three storey Biotech lab building and two storey office building) at Life Science Park, Thonnakkal, Thiruvananthapuram. The locations of boreholes are shown in Fig. 1. The existing ground level (October 2017) of the proposed building area is almost level and is obtained after removing the soil cover over a height of about 5.0m to 8.0m.

#### 7.1 Three Storey building (BH-01 to BH-04 locations)

The column loads are not assessed by the structural designers so far, but it is assumed that the maximum column loads will be in the order of 175t (this has to be confirmed by structural designers).

The sub soil profile details are given in Fig. 2 & Annexure I. From the soil profile, it can be seen that the soil at shallow depths have some low SPT 'N' values and then increases with depth. Therefore two types of foundations are recommended and suitable choice can be made based on economical point of view.

The first alternative is spread foundation and the second alternative is deep foundation (piles) (at BH-01 to BH-04 locations) are recommended and the details are given below:

#### Spread foundation

For the proposed three storey building, it is recommended to adopt spread footing or combined footing, over the dense silty sand stratum at 1.5m, from the existing ground level. The allowable bearing pressure for this depth for a 1.5m to 3.0m wide footing can be taken as  $20t/m^2$ , for design. The individual footing may be provided for the outer columns and combined footing each for the two columns near the corridor. One part of this building is three storied and other part is two storied and therefore footing shall be kept away from the cutting or suitably increase the depth of footing at such locations.

#### Pile foundations

If the column loads are higher, this alternative may be economically viable. The soft/weathered rock and hard rock strata occur at different levels at different borehole points (refer Fig .2). Two options for piles are:-

- (i) Piles on soft/weathered (weak) rock and
- (ii) Piles on hard rock.



It is recommended that either option (i) or option (ii) should be adopted for the entire structure. That is: all the piles should be anchored either in the soft rock stratum or in the hard rock stratum.

As the core recovery in the soft rock stratum is very poor and the soft rock stratum is easily penetrable, pile resting on medium hard rock is recommended. Also, the higher carrying capacity of piles can be achieved on hard rock. Therefore alternative (ii) is preferred for adoption. It is recommended to install pile on medium hard at depths of 27.0m in BH-01 & BH-02 and 25.0m in BH-03 & BH-04, from the existing ground level.

It is recommended that rotary drilling method (to ensure the recommended depth of piles) using with or without DMC method may be adopted to install the piles. This will have only very negligible impact (noise/vibration) in the environment. The recommended depth shall be ensured and hence required machinery shall be used.

The carrying capacity of piles is calculated on the basis of IS: 2911-2010 (Code of Practice for Design and Construction of pile foundation), as the rock core obtained has poor RQD values. The bored and cast-in-situ piles (installed by rotary boring method) should be socketed into the medium hard rock stratum as given below, to develop necessary lateral and uplift capacities.

Borehole No	depth from ing ground evel, m	Safe vertical load, t							Safe lateral load, t						
	Pile dept existing level		Pile	diamete	er, m		Pile diameter, m								
Ш		0.60	0.70	0.80	0.90	1.00	0.60	0.70	0.80	0.90	1.00				
BH-01	27.0	75	120	165	210	275	9.1	12.7	17.1	22.1	27.9				
BH-02	27.0	75	120	165	210	275	9.1	12.7	17.1	22.1	27.9				
BH-03	25.0	75	120	165	210	275	9.1	12.7	17.1	22.1	27.9				
BH-04	25.0	75	120	165	210	275	9.1	12.7	17.1	22.1	27.9				

Borehole No	Pile depth from existing ground level, m	Safe lateral load, t										
Bore	Pile dept existing level	Pile diameter, m										
	G 5	0.60	0.70	0.80	0.90	1.00						
BH-01	27.0	23.5	32.0	41.8	52.9	65.3						
BH-02	27.0	32.0	43.6	56.9	72.0	88.9						
BH-03	25.0	22.7	30.8	40.3	51.0	62.9						
BH-04	25.0	27.8	37.8	49.4	62.5	77.1						



All calculations details are given in **Table 3**, **Table 4** and **Table 5**. All the salient provisions & specifications of IS: 2911-2010 (Code of Practice for Design and Construction of pile\_foundation) and IS: 14593-1998 (Design & construction of bored cast-in-situ piles founded on rocks-Guidelines) shall be closely adhered to. The allowable pile capacities realized in the field recommended in the Table above should be ensured by conducting full scale initial pile load tests (as mandated in the IS code: 2911-2010-part IV) before adopting them for design.

Group of piles (at least, two) is generally preferable to a single pile for any column. Structural capacity of the pile shall be adequate.

Density of bentonite during the pile construction shall be as per IS code of practice.

If the pile tip is terminated before the recommended depths, pile capacities will be much lower.

# 7.2 Two Storey Office building (BH-05 & BH-06 locations)

The column loads are not assessed by the structural designers so far, but it is assumed that the maximum column loads will be in the order of 70t (this has to be confirmed by structural designers).

The sub soil profile details are given in Fig. 2 & Annexure I. From the soil profile, it can be seen that the soil at shallow depths have some SPT 'N' values and then increases with depth.

Spread foundation: For the proposed two storey office building, it is recommended to adopt spread footing or combined footing, over the dense silty sand stratum at 1.5m, from the existing ground level. The allowable bearing pressure for this depth for a 1.5m to 2.50m wide footing can be taken as 20t/m<sup>2</sup>, for design.

General Notes: (1). The various SPT N-values & soil properties are given in Annexure I.

(2). The recommendations given above are based on the soil data as revealed in the boreholes actually taken at the borehole points. Any variation at other points should be closely monitored during execution and modification in design should be made if

necessary.

Dr. Arvee Sujil Johnson

Professor in Civil Engineering, Department of Civil Engineering, College of Engineering Trivandrum, Thiruvananthapuram 695016.

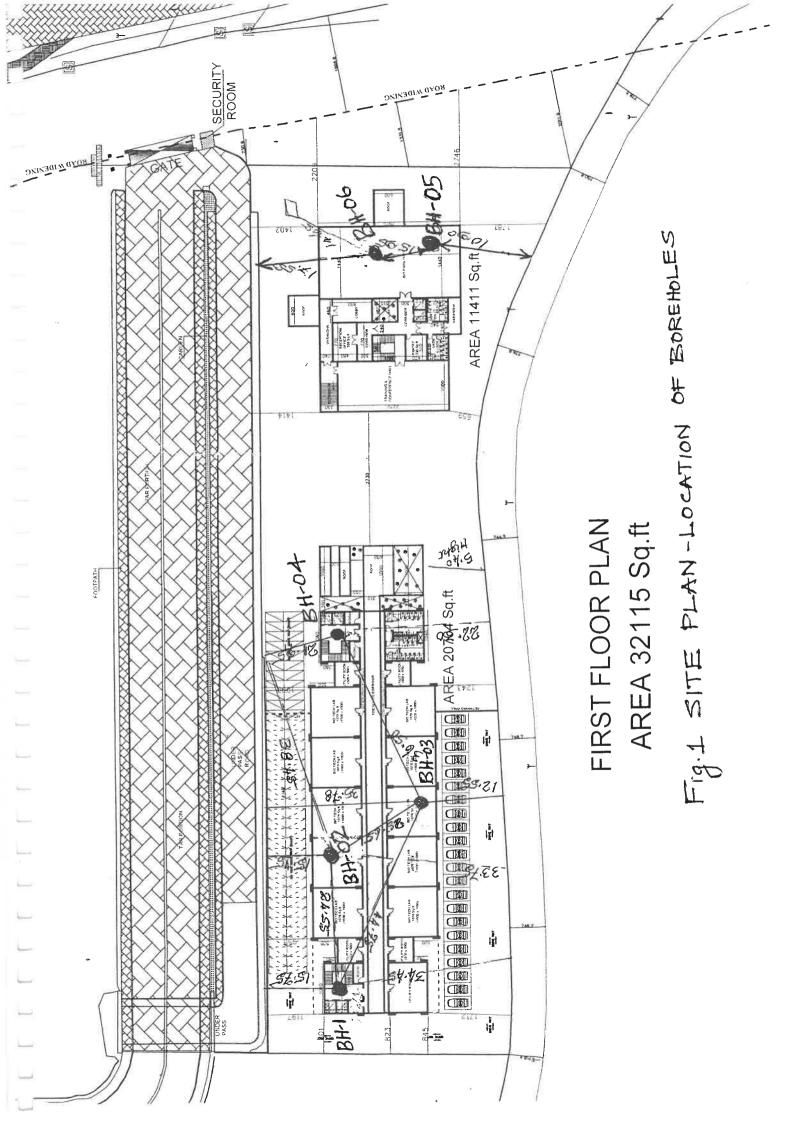
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Dr. ARVEE SUJIL JOHNSON
Professor in Civil Engineering
College of Engineering Trivandrum
Thiruvananthapuram-695016

Countersigned

Faculty in charge
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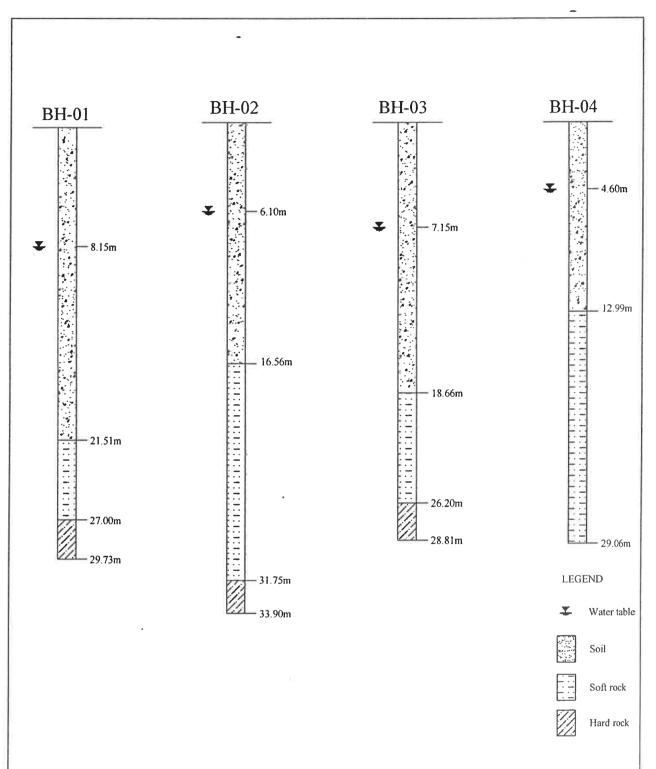


Fig. 2a. Sub-soil Profile along BH-01 to BH-04 (Three storey Biotech Lab building)

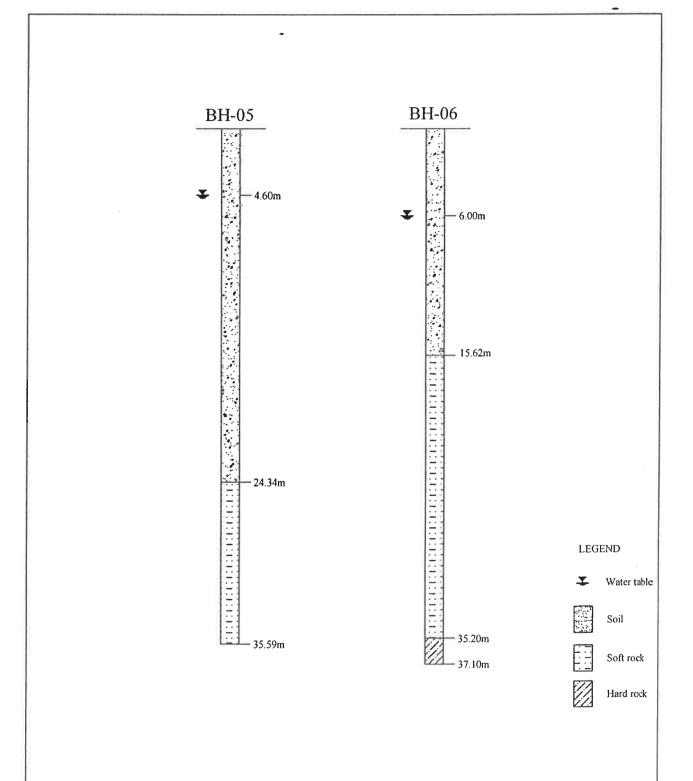


Fig. 2b. Sub-soil Profile along BH-05 & BH-06 (Two storey office building)

Table 1: Details of the rock strata, core recovery and RQD

		IS classification based on RQD		very poor	poor	very poor	fair	very poor	very poor	very poor	poor	very poor	very poor	fair	poor	very poor	poor	poor	poor
		8	MGD, %	9.4	30.7	6.5	62.2	20.1	17.0	0.0	32.1	0.0	0.0	69.3	30.6	5.7	32.8	33.8	45.9
		Core	recovery, %	9.4	72.6	18.8	78.3	59.7	69.5	27.1	37.1	11.2	34.7	79.8	45.3	19.5	52.8	61.7	88.4
niruvanathapuram for M/s. HLL Lifecare Ltd, Tvpm-12	Rock coring details		core lengths (smaller lengths not written nere), cm	16.0	6, 8, 11, 9, 9, ++, 18, 9, 14, 9, 12, 7, 4	8, 5, 10, ++	8, 27, 4, 6, ++, 21, 19, 11, 11, 13, 6, 10	6, ++, 9, 9, 5, 15, ++, 13	++, 4, 8, 2, 8, 6, 12, 8, 4, 5, 4, 12, 8	6, 6, 6, ++, 8, 4	11, 10, 10, 7, 14	++ (all small)	++, 8, 8, 6, 9, 7, 8, ++	10, 7, 21, 16, 18, 8, 28, 20	6, 8, 11, 10, 7, 18, 13	10, 4, ++, 8, 7	7, 16, 14, 11, 5, 7, 3	++, 5, 5, 9, 20, 16, 3, 16, 9	10, ++, 14, 4, 10, 6, 14, 7, 6, 9, 4, 7, 6, 7, 9, 7, 35
thapuram		Total time of drilling, minutes		13.0	23.0	40.0	50.0	40.0	20.0	35.0	18.0	20.0	15.0	20.0	25.0	25.0	18.0	35.0	33.0
I, Thiruvana		Total core Tength o		16.0	130.0	29.0	141.0	83.0	0.86	38.0	52.0	20.0	58.0	130.0	77.0	34.0	0.99	95.0	160.0
Life Science Park, Thonnakkal, Tł		Depth of	rock, cm	170.0	179.0	154.0	0.081	139.0	141.0	140.0	140.0	179.0	167.0	163.0	170.0	174.0	125.0	154.0	0.181
e Park, 1		th.	٦ 1	23.21	25.00	26.54	28.34	29.73	17.97	19.37	20.77	22.56	24.23	25.86	27.56	29.30	30.55	32.09	33.90
e Scienc		Depth	From	21.51	23.21	25.00	26.54	28.34	16.56	17.97	19.37	20.77	22.56	24.23	25.86	27.56	29.30	30.55	32.09
at			Water tab existing			8.15								6.10					
cal Build	эск	o hard ro stum, m				27.00								31.75					
Project: KSIDC Non-Technical Building		o weathe itratum, i				21.51								16.56					
SIDC Not	ło	ım depth m ,gnir				29.73								33.90					
ject: K		hole No:				10-H8	1							20-H8	1				
Pro	Site Location No.								∫ .gi										

very poor	very poor	very poor	very poor	very poor	very poor	poor	very poor	very poor	very poor	very poor	very poor	very poor	very poor	very poor	very poor
22.2	0.0	8.4	14,1	11.4	12.8	47.0	0.0	0.0	14.5	16.3	0.0	7.7	7.5	0.0	9.7
23.4	0.0	13.5	31.4	50.6	41.2	51.2	14.2	0.0	26.3	25.3	5.1	50.7	36.5	14.5	28.6
20, +, 15	++ (all small)	8, 15, ++	11, 7, 6, 4, 4, 4, 11	9, 6, 6, 8, 7, 8, 7, 18, 7	4, 4, 14, 10, 7, 7, 7, 8, 6, 6	8, 18, 17, 13, 17, 12	8, 4, 4, 7	++ (all small)	11, 5, 5, ++, 2, +, 5, 11, 5	4, 13, 6, 14	6, +	5, 5, 9, 4, 11, 8, 6, 6, 8, 5	5, 5, 12, 7, 9, 5, 8, 5	+, 3, 5, ++, 9	+, 9, 15, ++
15.0	13.0	24.0	30.0	32.0	47.0	10.0	13.0	15.0	15.0	20.0	25.0	25.0	25.0	28.0	28.0
37.0	0.0	24.0	49.0	80.0	77.0	84.0	24.0	0.0	40.0	42.0	8.0	72.0	58.0	23.0	44.0
158.0	178.0	178.0	156.0	158.0	187.0	164.0	0.691	0'981	152.0	166.0	156.0	142.0	159.0	159.0	154.0
20.24	22.02	23.80	25.36	26.94	28.81	14.63	16.32	18.18	19.70	21.36	22.92	24.34	25.93	27.52	29.06
18.66	20.24	22.02	23.80	25,36	26.94	12.99	14.63	16.32	18.18	19.70	21.36	22.92	24.34	25.93	27.52
			CI./							9	4.00				
		6	07.97								ı				
	18.66									9	66.71				
	28.81					29.06									
		£0-	ВН					6.		<b>†</b> 0-	BH				
					(4)			pi∃							

poor	very poor	poor	very poor	very poor	very poor	poor	very poor	poor	fair	very poor	fair	very poor	fair	very poor	very poor	very poor	very poor	very poor	very poor
38.5	10.3	26.8	0.0	0.0	0.0	29.3	6,7	36.1	54.4	17,6	51.0	0.0	62.1	0.0	0.0	0.0	0.0	0.0	0.0
50.9	19.4	31.5	0.0	0.0	5.5	32.9	15.6	49.4	68.7	22.0	53.5	6.1	62.1	0.0	0.0	0.0	0.0	18.3	18.5
12, 9, 9, 19, 17, 14	7, 7, 17	15, 10, 10, 7	++ (all small)	++ (all small)	6, ++	++, 15, 17, 17	12, ++, 6, 6	13, 9, 8, 13, 21, 10	26, 16, 20, 11, 9, 7, 10, 7, 16	12, 6, 16	18, 6, 14, 15, 11, 11, 10	7,3	15, 20, 18, 17, 17, 23	++ (all small)	++ (all small)	++ (all small)	++ (all small)	4, 5, 7, 4, 5	5, 7, ++, 5, ++, 5
28.0	20.0	20.0	15.0	35.0	25.0	30.0	20.0	30.0	20.0	22.0	12.0	20.0	18.0	28.0	43.0	25.0	22.0	40.0	25.0
82.0	32.0	53.0	0.0	0.0	9.0	55.0	28.0	78.0	125.0	35.0	83.0	11.0	110.0	0.0	0.0	0.0	0.0	31.0	28.0
161.0	165.0	168.0	155.0	144.0	165.0	0.791	0.671	158.0	182.0	159.0	155.0	180.0	177.0	157.0	143.0	170.0	168.0	0.691	151.0
25.95	27.60	29.28	30.83	32.27	33.92	35.59	17.41	18.99	20.81	22.40	23.95	25.75	27.52	29.09	30.52	32.22	33.90	35.59	37.10
24.34	25.95	27.60	29.28	30.83	32.27	33.92	15.62	17.41	18.99	20.81	22.40	23.95	25.75	27.52	29.09	30.52	32.22	33.90	35.59
			4.60										6.00						
													35.20						
			24.34										15.62						
	35.59						37.10												
			SO-H8	ľ			Fig. 1 8H-06												
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Table 2: Laboratory test results on rock samples

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		Maximum		Rock	Rock sample details	etails		Uniaxial	: -
Location	Sorenole No	deptn of boring from GL, m	Depth of rock Diameter, tested, m	Diameter, cm	Height, cm	Weight, gm	Failure load, tonnes	compressive Failure load, strength, kg/cm2 tonnes	Mass density, gm/cc
	Ö	20 43	27.20	5.40	14.00	796.0	2.50	109.2	2.484
Fig. 1		53:53	29.00	5.28	11.80	653.0	1.80	82.2	2.529
	BH-03	28.81	25.50	5.22	15.30	819.0	08'0	37.4	2.503

Note: rock core samples obtained from BH-02, BH-04, BH-05 & BH-06 are not suitable for unconfined compressive strength testing.

Table 3: Pile vertical capacity of piles, from the LFL (as per IS:2911)

	nded, Qsafe, nnes.		75.0	115.0	165.0	210.0	275.0		
m-12	settlement criteria	Qsafe, t	92.2	125.5	163.9	207.4	256.1		
Ltd, Tvp	settle	Factor of safety	2.5	2.5	2.5	2.5	2.5		
_ifecare	æ	Qsafe, t	73.7	117.0	174.7	248.7	341.2		
/s. HLL I	shear criteria	Factor of safety	က	<i>с</i>	က	3	က		
ence Park, Thonnakkal, Thiruvanathapuram for M/s. HLL Lifecare Ltd, Tvpm-12	sh	Qu(end), t	221.1	351.0	524.0	746.1	1023.5		
nathapu	of Pd,	Pd-value	72.0	84.0	96.0	108.0	15.0 120.0		
iruvar	Calculation of Pd, kN/m2	Pd-depth	9.0	10.5	12.0	13.5	15.0		
kal, Th	Calcu	(p x G!)	9.00	10.50	12.00	13.50	15.00		
onnak	δ	m des)	105	105	105	105	105		
ark, Th	ž	(From IS Codes)	109.4	109.4	109.4	109.4	109.4		
ience P	Φ	degree	40.0	40.0	40.0	40.0	40.0		
t Life Sc	Design SPT value	N-value	100	100	100	100	100		
ding a	٨	kN/m3	ω	ω	ω	8	∞		
nical Buil	Diameter of m ,eile,	ס	09.0	0.70	0.80	06.0	1.00		
Project: KSIDC Non-Technical Building at Life Sci	water table up to depth EGL, m	sesin level	0.5	0.5	0.5	0.5	0.5		
ct: KSIDC	evel from m , *-	1	27.00	27.00	27.00	27.00	27.00		
Proje	ole No.	Boreh	PH-01 to BH-04						

\* pile depth from EGL is 27.0m at BH-01, 27.0m at BH-02, 25.0m at BH-03 & 25.0m at BH-04 locations

Table 4: Lateral load carrying capacity of piles (as per IS:2911)

Project: KSIDC Non-Technical Building at Life Science Park, Thonnakkal, Thiruvanathapuram for M/s. HLL Lifecare Ltd, Tvpm-12

Grade of concrete=M25 = 25.0 N/sq.mm.

E =5000 × fck = K1 =

25000.9 N/sq.mm .cm = 0.01245 N/cu.mm 1.245 kg/cu.cm =

load	m	1.00	27.9					
Safe Lateral load capacity of pile, tonnes	Pile diameter, m	08.0	17.1					
Safe capacity	Pile	09.0	2.					
e ort)	£	1.00	Long					
Type of pile (Long or Short)	Pile diameter, m	08.0	Long					
Ty (Lor	Pile	09.0	Long					
ngth of m, T	E	1.00	2.504					
Characteristic length of soil-pile system, T metres	Pile diameter, m	08.0	1.664 2.095 2.504					
Charact soil-p	Pile	09.0	1.664					
Assuming water table level from the	formation GL, m		0.50					
Water table level measured from	exsiting GL, m		9.4					
Length of the	pile (L), m.		25.0m to 27.0m					
Pile depth	level from EGL, m.		25.0m to 27.0m					
le No.	oteho	8	BH-01 to BH-04					
noit	Гося		Fig. 1					

\* pile depth from EGL is 27.0m at BH-01, 27.0m at BH-02, 25.0m at BH-03 & 25.0m at BH-04 locations

Table 5: Uplift carrying capacity of piles at borehole locations
Project: KSIDC Non-Technical Building at Life Science Park, Thonnakkal, Thiruvanathapuram for M/s. HLL Lifecare Ltd, Tvpm-12

Location

FO-H8

Safe uplift capacity load	səuuot	23.5	32.0	41.8	52.9	65.3	32.0	43.6	6.95	72.0	88.9	22.7	30.8	40.3	51.0	62.9		27.8	37.8	49.4	62.5	77.1
Submerged slip to file	səuuoţ	11.6	15.8	50.6	26.1	32.2	9.11	15.8	20.6	26.1	32.2	10.7	14.6	1.61	24.2	29.8		10.7	14.6	1.61	24.2	8.62
Qsafe (skin)	səuuoj	11.9	16.2	21.2	26.8	33.1	20.4	27.8	36.3	46.0	56.7	6.11	16.2	21.2	26.8	33.1		17.0	23.2	30.3	38,3	47.3
Surface area of pile	Asi	13.2	15.4	17.6	19.8	22.0	22.6	26.4	30.1	33.9	37.7	13.2	15.4	17.6	19.8	22.0		18.8	22.0	25.1	28.3	31.4
ю	(2xФ/3)	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7		26.7	26.7	26.7	26.7	26.7
Friction m ,dtgnəl	ب	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	12.0	7.0	7.0	7.0	7.0	7.0		10.0	10.0	10.0	0.01	10.0
Pd,	Pd- value	72.0	84.0	0.96	0.801	120.0	72.0	84.0	0.96	108.0	120.0	72.0	84.0	0.96	0.801	120.0		72.0	84.0	0.96	0.801	120.0
Calculation of Pd, N/m2	Pd- depth	9.00	10.50	12.00	13.50	15.00	00.6	10.50	12.00	13.50	15.00	9.00	10.50	12.00	13.50	15.00		00.6	10.50	12.00	13.50	15.00
Calcu	(15 x d)	00.6	10.50	12.00	13.50	15.00	00.6	10.50	12.00	13.50	15.00	00.6	10.50	12.00	13.50	15.00		00.6	10.50	12.00	13.50	15.00
Š	SS)	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0		105.0	105.0	105.0	105.0	105.0
ż	(see ISS)	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0'601	0.601	0.601	109.0	0.601		0.601	0.601	0'601	0.601	0.601
Ө	qeduee	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0
of pile SPT Φ Nr Nq Calculation of Pd, n, m value	N- value	50.0	50.0	50.0	50.0	50.0	\$0.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0
of pile on, m	7	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	25.00	25.00	25.00	25.00	25.00		25.00	25.00	25.00	25.00	25.00
Lengths of p	L1 to	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0	18.0	18.0	0.81	18.0	0.81		15.0	15.0	15.0	15.0	15.0
٨	kN/m3	∞	00	00	∞	8	∞	8	∞	<b>«</b>	<b>«</b>	8	∞	8	8	8	İ	∞	∞	∞	80	∞
Diameter of pile, m	ס	09.0	0.70	0.80	06.0	1.00	09'0	0.70	08.0	06.0	1,00	09.0	0.70	08.0	06.0	1.00	Ì	09:0	0.70	08.0	06'0	1.00
ng water table es up to depth m LFL, m	an level	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
gth, from EGL, m	Pile len	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	25.00	25.00	25.00	25.00	25.00		25.00	25.00	25.00	25.00	25.00
ip level from Ground level, m.		27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	25,0	25.0	25.0

BH-05

BH-03

BH-0¢

# ANNEXURE - I

**BOREHOLE LOG SHEETS** 

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of	ling	thoisy	SC writing vol			<u> </u>	<del></del>			,		
Sheet 1 of	) Juild		KN/III <sub>2</sub>	,	-			(7)				
Sh	ab b	0/	concent,	·		•	<u>.</u>	•		1	,	
	ch L	70	moisture content,	16.9	24.9	24.7	29.6	32.0	24.9	24.6	27.5	
	Borehole diameter: 100mm Total depth: 29.73m Purpose: Three storey Biotech Lab building	% 's	Silt & cla	26	23	31	32	42	36	24	25	
	100 n rey ]		% 'pues.	52	52	55	89	28	64	64	75	
115	eter: 73r		Gravel, %	22	25	4	0	0	0	12	0	
ta	iame : 29 hree	% ,tir	Plastic lin		2.	21	•	1		,	•	
Borehole Log Details	Borehole diameter: 100mm Total depth: 29.73m Purpose: Three storey Biote	% iir	nil biupiJ	ı		*	•					
	oreho otal c	alues	001									
0	Bc Tc Pu	2-N J	08 -									
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le		Graphical representation of N-values			0.4500					-BL		
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or or	/201 //20 ary	S.	0						1 -1			
	am Date of start: 08/09/2017 Date of finish: 12/09/2017 Type of Boring: Rotary boring		Description of the soil	Dark brown gravelly sand with silt & some clay (coarse, medium & fine sand)	Brownish red & light grey laterite; silty sand with gravel & clay (coarse, medium & fine sand)	Brownish red & light grey laterite; silty sand (c, medium & fine sand)	Brownish red & light grey laterite: silty sand with clay (medium & fine sand)	Light brown & light grey silty sand (medium & fine sand)	Brownish red & light grey laterite; gravelly sand with silt & clay (coarse, medium & fine sand)	Light brown silty fine sand (medium & fine sand)	Light brownish yellow silty sand (coarse, medium & fine sand)	
anthapuram	ıthapuı			Dar & se (co	Bro silty (cor	Bro	Bro silty (me	Lig] (me	Bro grav (co:	Lig (me	Lig (cos	
vanar	vanan		N Value	32	39	21	<u>~</u>	15	34	46	22	
Thiru	Thiru	TEST	45cm	21	23	11	12	<b>∞</b>	28	32	=	
ings,	kkal, '	SPT - FIELD TEST	30cm	Ξ	91	7	9	7	9	4	Ξ	
Build	onna n	T - F	15cm	Ŋ	6	æ	Ξ	8	4	9	æ	
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PROJECT	PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 01 (BH-01) WATER TABLE (from GL): 8.15m		Depth f		2.20m		5.00m	TIOC O	8.00m m 05.0		11.50m	13.50m

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il neter 9.73 e ste	-	Plastic lim Gravel, %	0	0	0	0	0	
ets dian th: 2 Thre	Borehole diameter: 100mm  Total depth: 29.73m  Purpose: Three storey Biotech Lab building Avalues % % % % % % % % % % % % % % % % % % %		,	•	*		,	
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Borehole Log Details //09/2017 Borehole diameter: 2/09/2017 Total depth: 29.73m Rotary boring Purpose: Three store	Graphical representation of N-values	09 -			Salari Salari	7923		
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anthapuram anthapuram		Ď	Brown silty sand (coarse, medium & fine sand)	Brown & light grey silty sand (coarse, medium & fine sand)	Brown & light grey silty fine & medium sand (coarse, medium & fine sand)	Brown weathered rock material; silty sand (medium & fine sand)	Dark greenish grey weathered rock material; silty sand (coarse, medium & fine sand)	Weathered/soft rock stratum
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nical k, Tl ) 3.15r	S	ur 'mdo.ca	14.35m	16,54m	18,42m	19.99m	(t)	
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on T lence (BF m G		Level of						
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 01 (BH-01) WATER TABLE (from GL): 8.15m		guildmes	SPT	SPT	SPT	SPT	SPT	
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4 8 8	
Sheet 3 of 100mm  Sy Biotech Lab building  REMARKS  RECOVERY = 16/170 = 9.4%  Ino. of pieces = 1  Recovery = 130/179 = 72.(  Recovery = 29/154 = 18.8'	RQD = 112/180 = 62.2% Total no. of pieces = 11++
Borehole diameter: 1  Borehole diameter: 29.73m  Purpose: Three store of water of wa	RQL Tota
Mot Conducted Permeability A. S.	
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Water Loss Co. 08/09/2/09/2/09/2/09/2/09/2/09/2/09/2/09	
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DESCRIPTION Street, and the st	
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Cechnical   Cech	
Non Scient Scient Scient Scient From From From From From From From From	grey jointed medium hard rock
PROJE LOCA BORE WATE WATE 23.21m 23.21m 23.21m	28.34m

ilS Sheet 4 of 4	Borehole diameter: 100mm Total depth: 29.73m Purpose: Three storey Biotech Lab building	REMARKS	Core Recovery = 83/139 = 59.7% RQD = 28/139 = 20.1% Total no. of pieces = 7++	
ta	diame h: 29, Three	Permeability	Not Conducted	
	ole deptl deptl se: T	ë smiT Ø lsvrein		
ω [ğ	Borehole diameter: 1 Total depth: 29.73m Purpose: Three store	H G Falli		
Z		NO myl		
Borehole Log Details		COLA A App essure ethod	)	
sho	Date of start: 08/09/2017 Date of finish: 12/09/2017 Type of Boring: Rotary boring	TEST SECTION	Not Conducted	
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	ırt: 0 ıish: əring	Depth of water level, m	777777	
	of sta of fin of Bo			
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apura	apura	SIZE OF HOLE	XN	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 01 (BH-01) WATER TABLE (from GL): 8.15m	08- 09- 07- 07-		
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Jings, 7	ıkkal, 1	* 60 COKE KECONEKA * 40 bEKCENL * 50		
Builc	honna m	DESCRIPTION Conditions on the conditions of the		OLE
hnical	ark, T 1) : 8.15	S   S   S   S   S   S   S   S   S   S		ЕНС
n Tecl	nce P (BH-0)	S   S   S   S   S   S   S   S   S   S	<del>\</del>	END OF BOREHOLE
Č No	e Scie 7: 01 ( (fron	A G NOI	Light brownish grey jointed medium hard rock	O OF
KSID	I: Lif E NO ABLE	LITHOLOGY DESCRIPTION	Light brownish grey jointed medium hard ro	
CT:1	TION HOLI R TA		Lig grey mec	
ROJE	LOCATION: Life Science Park, The BOREHOLE NO: 01 (BH-01) WATER TABLE (from GL): 8.15m	Depth from GL, m	-28.34m	
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heet	buil	n	KN/m <sub>5</sub>				7	1	,	•	
S	ıLab	%	moisture content,	17.8	24.2	28.1	31.2	27.3	19.2	16.9	
	Borehole diameter: 100mm Total depth: 33.90m Purpose: Three storey Biotech Lab building		Silt & cla				09	88	21	25	
	100n ey B		% 'purs	53	38	38	40	62	- 62	75	
IS	ter: 90m store	,	Gravel, %	84	0	0	0	0	0	0	
[ <u>a</u>	amet 33.9	% ,Jir	Plastic lin	1			•	•		1	
Borehole Log Details	Borehole diameter: 100mm Total depth: 33.90m Purpose: Three storey Biote	% iir	nil biupiJ		,	ř	•	,	,		
	rehol al de pose	lues	001								
O O	Bon Tot Pur	Graphical representation of N-values	08 -								
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2	gu	l repre	017 —			\	Φ.	/	/	1	
(c)	7 17 borit	phica	07	B		<b>D</b>	-	₩			
9	/201 //20 ary	Gre	0					T T			
	Date of start: 13 Date of finish: 1 Type of Boring:		Description of the soil	Brownish red laterite; sandy gravel with silt & clay (coarse, medium & fine sand)	Reddish brown & grey laterite; silty clay with sand (medium & fine sand)	Reddish brown & grey laterite; gravelly sand with silt & clay (coarse, medium & fine sand)	Brownish red & grey laterite; clayey silt with sand (medium & fine sand)	Yellow silty sand (coarse, medium & fine sand)	Brown silty sand (coarse, medium & fine sand)	Brown silty fine & medium sand (coarse, medium & fine sand)	
apura	apura		D	Brown with s (coars	Reddi silty c (medi	Reddi grave (coars	Brow clayer (medi	Yello (coar:		Brow (coar	
ananth	ananth		N Value	23	37	25	25	17	> 50 =12.5cm	14	
hiruva	hiruva	EST	45cm	15	21	4	5	6	10 & > 50 rebound (balance=12.5cm	22	
ngs, T	ckal, T	SPT - FIELD TEST	30cm	∞	91	=	12	œ	27	61	
Buildi	ionnal 1	T - FI	15cm	E)	S	9	∞	4	<b>«</b>	7	
nical	rk, Th ) 6.10m	SP	Depth, m	1.48m	3.33m	4.48m	6.13m	8.32m	10.42m	12.74m	
echı	e Pai 1-02 iL):	)ic	water tab	i	m'	4.		∞			
On T	ience (BF om G		Tevel of				<b>H</b>				
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PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m	mori	Depth f existing f m, JĐ		2.50m	4,00m	- Indiana	7.50m		12.00m —	14.00m

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PROJECT: KSIDC Non Technical E LOCATION: Life Science Park, The BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m	moń	Depth 1 Jepsth 1 Jepsth 1 Jepsth 2 Jeps	200.71	15.50m –	-
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SIDC N Life Sc VO: 02 LE (fre	J	O ature O gnildmes	SPT	SPT	
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echnica Park, '-02)		Беріћ, т	15.07m	16.56m	
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ldings, akkal,	FIELD	30cm		(balanc	
, Thir , Thir	- FIELD TEST	1 45cm	25 &	rebound (balance=33cm) 20 & rebound (balance=38.5cm	
ıvanan ıvanan	   t.	N Value	> 50	n > 50	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m					Weathered
Boreho Date of start: 13/09/2017 Date of finish: 15/09/2017 Type of Boring: Rotary boring		Description of the soil	Grey weathered rock material; silty sand (coarse, medium & fine sand)	Greenish grey weathered rock material; silty sand (coarse, medium & fine sand)	Weathered/soft rock stratum
Borehole Log Details //09/2017 S/09/2017 Rotary boring Purpose: Three store	Graphical representation of N-values	0 - 50			
ole	presentat	09 - 0t -	-		
Loginaria Residual de la Constantia de l	ion of N-v	08 -			
9g Details Sheet 2 of Borehole diameter: 100mm Total depth: 33.90m Purpose: Three storey Biotech Lab building	_	001 -		•	
eta diam oth: 33 Three		mil biupiJ Mil oitsaff	•	1	
ils eter: .90m	_	Gravel, %	0	0	
100m ey Bic	% 7	Sand, % Silt & clay	85 15	85 15	
m otech l		moisture content, 9	6 09.5	13.8	
She	0,	content, 9	10	0	
Sheet 2 of		- Q°		40	
f &	ıdgiə	Dry unit w	э.	17.1	

Borehole Log Details Sheet 3 of 5	Borehole diameter: 100mm Total depth: 33.90m Purpose: Three storey Biotech Lab building		REMARKS	Core Recovery = 98/141 = 69.5% RQD = 24/141 = 17.0% Total no. of pieces = 12++	Core Recovery = 38/140 = 27.1% RQD = 0/140 = zero Total no. of pieces = 5++	Core Recovery = 52/140 = 37.1% RQD = 45/140 = 32.1% Total no. of pieces = 5	Core Recovery = $20/179 = 11.2\%$ RQD = $0/179 = zero$ Total no. of pieces = ++ (all small)	*
ta	iam : 33 hrec	λ	Permeabilit		)t Conducted	οN		
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(e)	Date of start: 13/09/2017 Date of finish: 15/09/2017 Type of Boring: Rotary boring		TEST SECTION		of Conducted	οM		
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	Date of start: 13/09/2017 Date of finish: 15/09/2017 Type of Boring: Rotary bo		oN 02-	77777	111111	111111	1111111	
	tart Inis Bori	ա 'լә.	Depth of water lev					
	of s of f of l	NG	X,AX					
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_		-	GROUT					
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PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m	Structural Conditions	DESCRIPTION					
ical	k, T	ses	asis mm0&l of &f asis mm0&l<	min	111111		mm	
chn	Pari -02) .): 6	Size of core pieces	osis mmčt ot 01 25 to 75 mm 5 ot 25			111111		
l Te	BH.	Siz	ssis mm01>	111111	777777	777777	1111111	
No.	LOCATION: Life Science Park, The BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m				۳. ۲.	ूं ठु	Light greyish brown soft rock & some jointed medium hard rock	
2	fe S 0: 0 E (fi	βď	TION	Dark brownish grey soft rock	Dark brownish grey soft rock	Light greyish brown soft rock	Light greyish brown soft rock some jointed medium hard ro	
SIL	: Li NC BL	OLC	DESCRIPTION	bro	bro	t gre n so	t gre n so joir um l	
;;	ON CLE TAI	LITHOLOGY	DES(	)ark ;rey	)ark ;rey	light	Light greyish brown soft rc some jointed medium hard	
EC.	ATI EHC ER		FOG	II (31)	<u>⊢</u>	- 1	- 1 v E	
000	OC/ ORI	w '7	Depth from G	-16.56m-	m/5 6 9	20.77m-	22 S6m	
	Ţ ŭ ≱			-16	6	50	22	

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S			<b>\</b>	8%	%	%
Og DetailsSheet 4 ofBorehole diameter: 100mmTotal depth: 33.90mPurpose: Three storey Biotech Lab building		REMARKS	Core Recovery = 58/167 = 34.7% RQD = 0/167 = zero Total no. of pieces = 6++	Core Recovery = 130/163 = 79,8% RQD = 113/163 = 69,3% Total no. of pieces = 7	Core Recovery = 77/170 = 45.3% RQD = 52/170 = 30.6% Total no. of pieces = 7	Core Recovery = 34/174 = 19.5% RQD = 10/174 = 5.7% Total no. of pieces = 4++
Borehole Log Details /09/2017 S/09/2017 Rotary boring Purpose: Three store	\	Permeabilit	0%1	Not Conducted		0 8 1
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<u> 1</u> e	PERCOLATION TEST	kg/sq.cm) ethod				
Boreho Date of start: 13/09/2017 Date of finish: 15/09/2017 Type of Boring: Rotary boring	PER	TEST SECTION		Not Conducted		
Bore Date of start: 13/09/2017 Date of finish: 15/09/2017 Type of Boring: Rotary bo	_	Complete		hetauhno') told		
B()/09/2	Water	lsins¶ 04-				
BOY6  Date of start: 13/09/2017  Date of finish: 15/09/2017  Type of Boring: Rotary b		oN 02-	777777		777777	XIIIII
start finis Bori	uı 'jə.	Depth of water lev				
e of e of	CASING	M Other sizes				
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am am		GROUT				
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Thir	EKY	- 80 - 60 CORE RECOVE				
ngs, kal,	, rus	- 40 PERCENT - 20	mm			
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m	Structural Conditions	DESCRIPTION				
ical k, Ti	Ses Ses	ssis mm0č1 ot č7 ssis mm0č1<				
echn Parl -02)	Size of core pieces	10 to 25mm size				
n GI	Si	ssiz mm01>	1111111	1111111	7111111	1111111
C Nc Scie 02 (fror	ا ج	NO	Light greyish brown soft rock	Light greyish brown soft rock	Light yellowish brown soft rock	Light yellowish brown soft rock
SIDA Life NO:	)LOG	RIPTK	grey 1 soft	grey 1 soft	yello 1 soft	yellc 1 soft
C. K.	LITHOLOGY	DESCRIPTION	Light greyish brown soft ro	Light greyish brown soft ro	ight	ight
MECTATICE	7	FOC			-	
PROJECT: KSIDC Non Technical E LOCATION: Life Science Park, The BOREHOLE NO: 02 (BH-02) WATER TABLE (from GL): 6.10m	ա 'շ	Depth from G	-2256m -2456m	25 86m	77 56m	29.30m
			22		7.	53

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Core Recovery = 160/181 = 88.4% Core Recovery = 66/125 = 52.8%Core Recovery = 95/154 = 61.7%Sheet 5 of Purpose: Three storey Biotech Lab building RQD = 83/181 = 45.9% Total no. of pieces = 16++ RQD = 52/154 = 33.8% Total no. of pieces = 8++ RQD = 41/125 = 32.8%Total no. of pieces = 6 REMARKS Borehole diameter: 100mm **Jetails** Total depth: 33.90m Permeability Not Conducted By Falling Head Method Borehole Log 1 Depth of water level PERCOLATION TEST (m/l) sso기 By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring TEST SECTION Not Conducted Date of finish: 15/09/2017 Date of start: 13/09/2017 80 Complete Water Loss Partial 01 οN Depth of water level, m CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram SIZE OF HOLE XN 08-RQD 09-01 07 08 09 -CORE RECOVERY 40 PERCENT 07 DESCRIPTION END OF BOREHOLE WATER TABLE (from GL): 6.10m Size of core pieces əzis mm0ç1< 75 to 150mm size BOREHOLE NO: 02 (BH-02) asis mmč7 ot č2 osis mmč2 ot 01 Light brownish gres medium hard rock jointed hard rock Light yellowish brown soft rock Light brownish Brown highly grey soft rock LITHOLOGY DESCRIPTION roe 32.09m 30.55m 33.90m 31.75m Depth from GL, m

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Sheet I of 4	ildin		P	1	_1	1	W.	1742	Ÿ		
Shee	nq q	ι	KN/m <sub>5</sub>	1	ŀ	ı		1	1		
	h La	0/	moisture content,	14.7	20.4	23.5	16.9	23.3	25.7	14.7	
	Borehole diameter: 100mm Total depth: 28.81m Purpose: Three storey Biotech Lab building		Silt & clay	56	78	08	30	<u></u>	27	30	
ro	: 10( m rey		% 'pueS	74	22	20	70	69	73	70	
	eter 3.81 <sub>1</sub> e sto		Gravel, %	0	0	0	0	0	0	0	
13	liam h: 28 Three		Plastic lim			,					_
	Borehole diameter: Total depth: 28.81m Purpose: Three store		nil biupid			,	(1) (1)		*	1	
5	oreh otal otal	alues	100								
Borehole Log Details	A L d	Graphical representation of N-values	08 -								
		tation	09								
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le.	17 )17 'bor	raphic	07 -		<b>D</b>	0				=======================================	
0	9/20 19/2( tary	Ö	0		Т	4		5		T	
М	Date of start: 18/09/2017 Date of finish: 19/09/2017 Type of Boring: Rotary boring		Description of the soil	Reddish brown laterite; silty sand (coarse, medium & fine sand)	Light grey & brown laterite; silty clay with fine sand (medium & fine sand)	Grey & some brown silty clay with fine sand (medium & fine sand)	Brownish red & light grey laterite; silty sand with some clay (coarse, medium & fine sand)	Dark reddish brown & white laterite silty sand with some clay (coarse, medium & fine sand)	Brownish red silty sand (coarse, medium & fine sand)	Brown silty sand (medium & fine sand)	
uram	uram		Desc	ddish l	ght gre ty clay edium	ey & s	ownish ty sand oarse, r	irk rede ty sand barse, r	ownish	own si	
thap	thapi	r			Si Lig	Ş E	Br sili (cc	Sill Sill	Br (c 0		
vanant	vanant		Value	49	17	17	35	53	45	25 & > 50 rebound (balance=8.5cm)	
Thiru	Thiru	TEST	45cm	32		6	24	91	35	25 & rebound (balance	
dings,	akkal,	- FIELD TEST	30cm	17	9	∞	Ξ	3	01	27	
Build	Thonna m	SPT - F	15cm	7	S	m	'n	7	4	6	
hnica	ark, T 13) 1: 7.15	S	Dерth, m	1.58m	3.24m	4.69m	6.66m	8.74m	10.98т	13.30ш	
Tec	ice F 3H-( GL)		water tal				<b>&gt;</b> #				
Non	icien 13 (E rom		Tevel of	<del></del>			10:				
SIDC	Life S NO: 0 LE (f		Nature o	SPT	SPT	SPT	SPT	TAS	SPT	SPT	
T: KS	ION: OLE	भृग	ord lio2								
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 03 (BH-03) WATER TABLE (from GL): 7.15m	топ	Depth S existing GL, m		2.50m —	\$ 50m		8.00m		12.50m —	

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of 4	25	hgiəv	Dry unit v	,		17.1	
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Shee	nq q	u	KN/m <sub>5</sub>		,	0	
01	sh La	%	moisture,	12.2	15.1	16.9	
	Borehole diameter: 100mm Total depth: 28.81m Purpose: Three storey Biotech Lab building	%'ʎ	Silt & cla	22	18	20	
70	: 100 m rey		% 'purs	78	82	80	
<b>:</b>	eter 8.81 <sub>1</sub> e sto		Gravel, %	0	0	0	
ta	liam h: 28 Three		Plastic lin		,	1	
Borehole Log Details	Borehole diameter: 1 Total depth: 28.81m Purpose: Three store		nil biupid	8		,	
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le		resent	0.5	-			
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0	9/20 9/20 tary	Ö	0		20		
	uram Date of start: 18/09/2017 Date of finish: 19/09/2017 Type of Boring: Rotary boring		Description of the soil	Reddish brown silty sand (coarse, medium & fine sand)	Grey weathered rock material; silty sand (coarse, medium & fine sand)	Brown weathered rock material; silty medium sand (coarse, medium & fine sand)	Weathered/soft rock stratum
nanthap	nanthap		N Value			> 50 si	8
	ruvaı	F.		20 & > 50 rebound	= = =		
Thii	, Thi	TES	1 45cm	20 rebot	(bala	ze=35c 	
lings	ıkkal	TELL	30cm	32	• •	(baland	
Builc	honné n	SPT - FIELD TEST	15cm	10	(balanc	rebound (balance=35cm) 15 & rebound (balance=36cm)	
ınical	irk, Tl 3) 7.15i	S	т, грери,	15.28m	17.06m	18.66m	
Teck	nce Pa BH-0; GL):		water tab	<u></u>		=======================================	
Non	Scier 33 (I from		sampling To level of	<u> </u>			
31DC	Life NO: 1 LE (	J	Nature o	SPT	SPT	SPT	
T: KS	ON: JLE 1 TAB	આ	Torf lio2				
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 03 (BH-03) WATER TABLE (from GL): 7.15m	moń	Pepth f		E00.01	17.50m — 18.66m —	-

Fotal no. of pieces = ++ (all small) (SPT at 21.87m; N=30 & rebound. -, - = > 50; water content = 10.2%) Core Recovery = 49/156 = 31.4%Core Recovery = 24/178 = 13.5%Core Recovery = 37/158 = 23.4%Sheet 3 of Purpose: Three storey Biotech Lab building Core Recovery = 0/178 = 2ero RQD = 15/178 = 8.4%Total no. of pieces = 2++RQD = 22/156 = 14.1%RQD = 35/158 = 22.2%REMARKS Fotal no. of pieces = 2+ Total no. of pieces = 7 RQD = 0/178 = zeroBorehole diameter: 100mm Total depth: 28.81m )etails Not Conducted Permeability By Falling Head Borehole Log Method Depth of water level PERCOLATION TEST (m/l) By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring **TEST SECTION** Not Conducted Date of finish: 19/09/2017 Date of start: 18/09/2017 So Complete Water Loss bartial 04 50 οN Depth of water level, m CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SIZE OF HOLE 08-RQD 09= 01 07 08 CORE RECOVERY PERCENT 97 DESCRIPTION WATER TABLE (from GL): 7.15m Size of core pieces osis mm021 of 27 BOREHOLE NO: 03 (BH-03) or is mmcs of 01 axis mmcs of cs (grain size: silty medium sand) Brown soft rock Grey soft rock Grey soft rock Brown & grey DESCRIPTION LITHOLOGY soft rock roe 23.80m-22.02m 25.36m 20.24m Depth from GL, m

Sheet 4 of 4  Sheet 4 of 4  Borehole diameter: \$100mm  Total depth: 28.81m	Purpose: Three storey Biotech Lab building		REMARKS	Core Recovery = 80/158 = 50.6% RQD = 18/158 = 11.4% Total no. of pieces = 9	Core Recovery = 77/187 = 41.2% RQD = 24/187 = 12.8% Total no. of pieces = 10	
Borehole Log Details ,/09/2017 Borehole diameter: 1	ee stor		_	Co Tol		
e dia	ᅽ	Λ3 	Permeabili		Not Conducted	
D sport	ose		Time SamiT			
Og Bore Tota	Purp	TEST	Depth Method Method level Time Time			
H	1	TION	(mg)			
ole	50	PERCOLATION TEST	Pressure Applied (kg/sq.cm) lethod do Loss			
eho	Type of Boring: Rotary boring	PE	TEST SECTION		Not Conducted	
Or 1201	tary	b	-80 Complete			
<b>W</b> 808	; Ro	Water Loss	oV os- leitreq os-		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Bore  Date of start: 18/09/2017  Date of finish: 19/09/2017	oring	ա 'լә	Depth of water lev	111111	*********	
of fin	of B					
Date Date	Туре	CASING	Sezie rether sizes	111111	XIIIIII	
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anantha anantha			RQD -20 -40 -40 -80			
Thiruvana Thiruvana			001		VIIIIII	
s, T		ЕКА	- 60 CORE RECOV - 40 PERCENT	m	VIIIII	
ding akka			0 - 20	7/////	WIIIII	
Buil Thonn	Ε	Structural Conditions	DESCRIPTION			OLE
nnical urk, T	7.15	Size of core pieces	axis mm27 of 25 axis mm021 of 27 axis mm021<		MIIII	ф ж
Tech ce Pa	GL):	Size (	<10mm size size   50mm size		MIIIII	B OF
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram ROREHOLE NO: 03 (BH-03)	WATER TABLE (from GL): 7.15m	Ϋ́	NO.	Grey soft rock Grey jointed medium hard rock	Light greyish brown jointed hard rock	END OF BOREHOLE
SID	BLE	LITHOLOGY	DESCRIPTION	Grey soft rock Grey jointed medium hard 1	Light greyish brown jointed hard r	Z
H. T. C. S. H. C. S.	TAI	LITH	DES	Grey Grey medi	Light g brown jointed	
JEC ATI	TER	_	FOC	u u	E	
PRO LOC	WA'	u '	Depth from GL	-25.36m	26.94m	28.81 11.

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of	mg	yeight	5 V timi vi()	1						40	
Sheet 1 of	uild		D		OV	·		•			
She	ab b	u	KN/m <sub>5</sub>		,	1	1			0	
	i L	%	moisture content,	20.5	21.6	6.61	23.5	24.2	20.1	19.6	
	Borehole diameter: 100mm Total depth: 29.06m Purpose: Three storey Biotech Lab building	% 'si	Silt & cla	28	22	28	76	23	21	<u>∞</u>	
	Borehole diameter: 100mm Total depth: 29.06m Purpose: Three storey Biote		% 'pueS	72	78	72	74	77	79	82	
S	er: 1 6m store	0	Gravel, %	0	0	0	0	0	0	0	
a:	met 29.0		Plastic lin			,		,	ı	•	
Borehole Log Details	Borehole diameter: 1 Total depth: 29.06m Purpose: Three stor	% JIE	nil biupiJ			,		,			
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<u>P</u>	ing	cal re					9				
6	Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary boring	raphic	07								
0	9/20 9/20 tary	O	0				1	Ι . Ι		pu	
m	Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary bo				pu a	Light reddish brown laterite; silty sand (coarse, medium & fine sand)	Reddish brown laterite; silty sand (coarse, medium & fine sand)	Brown laterite; silty medium sand (coarse, medium & fine sand)	Light yellowish grey silty medium sand (coarse, medium & fine sand)	Yellowish brown silty medium sand (medium & fine sand) Weathered/soft rock stratum	
	t: 2 sh: 2		lioi	l sand)	ty sa sand	rite; fine	silty	lium	y me fine	nediu Itum	
	star fini Bor		the s	sand fine	e; sil	ı late m &	ite; s	med	y silt m &	lty m (d) c stra	
-	of of of		Joτ	silty n & n	terite n &	cown	later n &	silty n &	gre, ediu	rock	
	Date Date Type		Description of the soil	rite;	ed la	sh bi e, m	own diur	rite;	wish e, m	brow fine /soft	
_			scri	later , me	ish re	eddi	h bro 3, me	late	ello oars	vish im & ered	
Iran	ıran		Ď	Brown laterite; silty sand (coarse, medium & fine sand)	Brownish red laterite; silty sand (coarse, medium & fine sand)	ght r	Reddish brown laterite; silty s (coarse, medium & fine sand)	Brown laterite; silty medium s (coarse, medium & fine sand)	ght y	Yellowish brown silty medir (medium & fine sand) Weathered/soft rock stratum	
lapı	napu			Br (co	1	Lig Sar	8 3		Sa	× =   ≥	
nantl	nantl		N Value	28	10 & > 50 rebound balance=13.5cm	44	39	> 50 3.5cm)	> 50	> 50	
uvai	uvaı				\$ 12 pc	_		S & md Ind = %			
Thin	Thir	TES	45cm	4	10 & rebound (balanc	31	27	26 & > 50 rebound (balance=8.5cm)	10 & - rebound (balance=29cm)		
gs,	(al,	19	30cm	4	25	13	2	24	10 & rebound	- =42.5cm)	
Idin	nakk	FIE							ret (ba	nd red=4.	
Bui	honi m	SPT - FIELD TEST	15cm	10	5	7	9	10	21	5 & rebound (balance	
nical	rk, T	S	Depth, m	1.47m	3.04m	4.62m	6.58m	8,86m	10.91m	12.99ш	
ech	e Pa I-04 iL):	91	water tab		<u> </u>		9	∞			
On T	ienca (BH) im G		To level of			<b>&gt;</b>					
Z O	Sci 04 (fro		guilqmss	SPT	SPT	SPT	SPT	SPT	SPT	SPT	
SID	Life NO 3LE	]	Nature of	<i>S</i> 3	- J	<i>V</i>	7	1 1	<b>V.</b>	1 1	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m	əli	for lio2								
EC	ATI EHC ER		GL, m		-		_	E 5		E E	
1 S	OC, ORI	INO	Depth fi gristing	<u>=</u>	2.50m		6.00m	8.00m	3	12.00m	
P	J B ≽	l ulos	Atrea C								

PROJE LOCA	PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram	Technical Build ce Park, Thonna	lings, Thiruvan Ikkal, Thiruvan	Thiruvananthapuram Thiruvananthapuram		BOY6	B0 21/09/20	orel	Borehole Log Details  Moy/2017  Borehole diameter:	Log	D D	eta	g Details Sheet 2 of Borehole diameter: 100mm	of 4
BOREI	BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m	H-04) GL): 4.60m				Date of finish: 22/09/2017 Type of Boring: Rotary boring	h: 22/09/2 ng: Rotar	2017 y bori	ing	Få	Total depth: 29.06m Purpose: Three store	th: 29 Three	Total depth: 29.06m Purpose: Three storey Biotech Lab building	gu
w "	ГІТНОГОДУ	Size of Sinctural Conditions	ЕКА			CASING m	Water Loss		PERCOLATION TEST	ION TES	_	ťy		
LD mort the	DESCRIPTION	SCRIPTION  25mm size  150mm size  mm size	CORE RECOVI	E OF HOLE	TUO	Other sizes	oN lsirisq	Complete T: SECTION	Appl essure ethod	1	By Falling Head Method age:	ilidsəmrə	REMARKS	
ЭU		951< 951 951 951 91 91 91	07— 08— 09— 01— 05—	001 08— 09— 04—		nm'nx Bx ax Det	09 — 07 — 07 — 08 — 08 — 08 — 08 — 08 — 08		-	Loss (I/m Dep of w		ı		
-12.99m	Brown soft rock												Core Recovery = 84/164 = 51,2% RQD = 77/164 = 47% Total no. of pieces = 6	21.2%
14.63m	Light brown soft rock			NX I		NIIIII	XIIIIX	Not Conducted				Not Conducted	Core Recovery = 24/169 = 14.2% RQD = 0/169 = zero Total no. of pieces = 4	14.2%
16.32m	Light greyish brown soft rock (grain size: silty medium sand)		9			XIIIII	XIIIIII						Core Recovery = $0/186$ = zero RQD = $0/186$ = zero Total no. of pieces = ++ (all small) (SPT at 18.155m; N=10 & rebound,	ero I small) ebound, 3.4%)
18.18m	Light yellowish grey soft rock					VIIII	XIIII						Core Recovery = 40/152 = 26.3% RQD = 22/152 = 14.5% Total no. of pieces = 7++	26.3%
19.70m														

								, 0	
IS Sheet 3 of 4	Borehole diameter: 100mm Total depth: 29.06m Purpose: Three storey Biotech Lab building	-	REMARKS		Core Recovery = $42/166 = 25.3\%$ RQD = $27/166 = 16.3\%$ Total no. of pieces = $4$	Core Recovery = 8/156 = 5.1% RQD = 0/156 = zero Total no. of pieces = 1+	Core Recovery = 72/142 \$\right	Core Recovery = 58/159 = 36.5% RQD = 12/159 = 7.5% Total no. of pieces = 8	
Borehole Log Details	Borehole diameter: I Total depth: 29.06m Purpose: Three store	ιλ	ilidsə	Perm		Not Conducted			
$\frac{1}{6}$	ole d lepth se: T			Time Interval					
	oreho otal c		By Falling Head Method	[evel					
Q	A T T	I TEST	M. H. B.	Depth of water					
		VIOIT	olied e	Loss		,			
<u>o</u>	<b>5</b> 0	PERCOLATION TEST	By Applied Pressure Method	Pressure (kg/sq.cm)					
eh	Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary boring	PE		TEST SEC		Not Conducted			
OT	2017/201 //201 ary b	<u>.</u>	ətəle	—80 Comp					]
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	rt: 2 ish: 2 ring	510		oN oz	1111111	XIIIII	(())	V//////	
	f star f fin of Bo	_	zet lev	Depth of					
	Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary bo	CASING	er sizes	odio Odio	111111	XIIII	WILLIA	MIIII	
_		0		TUOAĐ <u>ş</u>					
uran	uran		HOFE	SISE OI		XN			
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m		RQD	09 09					
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L L	구	EKA	E BECOME				77777	<del>}                                    </del>	
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Buile	honnan	Structural Conditions	NOIL	DESCRIE					
ical	k, T	ces	əzis u	nm021 o1 27 sis mm021<	111111	<b>V</b>	TITTE	XIIIIX	
echr	Par 1-04)	Size of core pieces	əzis	> 10 to 25mm   10 to 25mm   25 to 25mm			XIIII		
lon T	ience (BH om G	0, 0			n's	ys :	rsh	sh y	
	LOCATION: Life Science Park, The BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m	750		NOIT	Light yellowish grey soft rock	Light yellowish grey soft rock	Light yellowish grey soft rock	Light brownish yellow & grey soft rock	
KSII	E NC ABL	LITHOLOGY		DESCRIPTION	ght ye	ght ye	ght ye	Light broyellow & soft rock	
5	LION HOL R T	5			Lig	Lig	Bre Bre	Li.	-
OIE	CA' NREI	111 %		Depth f	——————————————————————————————————————	21.36m—	22.92m-	24.34m	25.93m.L
PR	M ⊗ W	Lui Lui	15 moi	Dometr 4	. 61	21	55	24.	25.

Sheet 4 of 4  Borehole diameter: 100mm  Total depth: 29.06m  Purpose: Three storey Biotech Lab building		REMARKS	Core Recovery = 23/159 = 14.5% RQD = 0/159 = zero Total no. of pieces = 3++	Core Recovery = 44/154 = 28.6% RQD = 15/154 = 9.7% Total no. of pieces = 2++	
Borehole Log Details //09/2017  Rotary boring  Borehole diameter: Total depth: 29.06m Purpose: Three store	<u>δ</u> 1	Permeabili	OEF	Not Conducted	•
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ehol al de pose		Time SmiT			
Bor Tot	EST	Depth Aced Aced Aced Aced Aced Aced Aced Aced			
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<u>e</u>	OLAT	Pressure Method Loss Loss (I/m)			
10 ing	PERC	Pressure Z P W			
Boreh( Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary boring		TEST SECTION		Not Conducted	
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urt: 2 nish: oring	בו' זוו	Depth of water lev	111111	X	
of sta of fir of Bo	_				
Bore Date of start: 21/09/2017 Date of finish: 22/09/2017 Type of Boring: Rotary bo	CASING	Paris Tarker sizes	111111	IIIIIX	
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ings		- 70 PERCENT	777777	MILLIN	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m	Structural Conditions	DESCRIPTION			ĒĒ
ical k, Tl 1.60r	Se	axis mm0čl ot čf axis mm0čl<	111111	MILLIN	OH
echr Par -04) L): 4	Size of core pieces	sis mm01> sis mm25 of 01 sis mm75 of 25		X//////	ORE
on T ence (BH m G	ν 2	svis mm01>		-	F B
C N Sei Sci 104 (fro	34	NO.	Light brownish yellow & grey soft rock	Light brownish yellow & grey soft rock	END OF BOREHOLE
SID Life NO BLE	OTO	DESCRIPTION	t bro w & ock	t bro	<del>Z</del>
T: K ON: CLE TAI	гітногосу	DESC	Light brownisl yellow & grey soft rock	Light brownisl yellow & grey soft rock	
JEC ATI EHC		F00			
PROJECT: KSIDC Non Technical E LOCATION: Life Science Park, Th BOREHOLE NO: 04 (BH-04) WATER TABLE (from GL): 4.60m	w "	Depth from GI	25.93m	27.52m	1100
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Sheet 1 of	ing	ι	KN/m <sup>2</sup>	,		Rick	1	4			•
03	00mm Office Building	9/	moisture content,	18.2	32.3	27.7	28.2	14.9	12.3	27.8	25.0
	nm fice I	% ' A	Silt & day	28	001	28	22	25	25	21	27
	>		% 'purg	72	0	72	78	75	28	79	73
11S	ster: 59m tore		Gravel, %	0	0	0	0	0	47	0	0
ta	iame i: 35 wo s	% '1!	Plastic lim	,			•	1	•	1	1
Borehole Log Details	Borehole diameter: 100mm Total depth: 35.59m Purpose: Two storey Office		mil biupiJ	,		F	•	3.	t .	,	1
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õ	M T d	Graphical representation of N-values	08 -								
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)re	2017 2017 ry bo	Grapl	0								
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram Date of start: 25/09/2017  BOREHOLE NO: 05 (BH-05)  WATER TABLE (from GL): 4.60m		Description of the soil	Brown & light grey laterite; silty sand with clay (coarse, medium & fine sand)	Reddish pink laterite; silty clay	Light reddish pink laterite; silty sand with clay (medium & fine sand)	Brown silty sand (medium & fine sand)	Red & light grey laterite; silty sand with two cobble sized stones (coarse, medium & fine sand)	Dark brown laterite; sandy gravel with silt & clay (coarse, medium & fine sand)	Light pinkish brown silty fine & medium sand (coarse, medium & fine sand) Brown & light grey laterite:	silty sand (coarse, medium & fine sand)
nanth	ananth		N Value	21	49	40	> 50 =5cm)	30	14	> 50 > 50 = 5cm	
hiruva	hiruv	TEST	45cm	12	29	25	10 & > 50 rebound (balance=5cm)	17	24	25 & rebound	19
ings, T	ckal, T	- FIELD 1	30cm	6	20	15	20	13	1.1	21	9
Buildi	nonnal n	- T	15cm	4	7	9	00	9	=	01	m
ınical	irk, Tł 5) 4.60n	SF	Періћ, т	1.57m	3.00m	4.50m	6.15m	8.26m	10.37m	12.52m	13.99m
Tech	DCE Pa BH-0; GL):	9	Level of			<b>&gt;</b>					
C Nor	LOCATION: Life Science Park, The BOREHOLE NO: 05 (BH-05) WATER TABLE (from GL): 4.60m		guilqmes	SPT	SPT	SPT	SPT	SPT	SPT	SPT	SPT
KSID	N: Life E NO ABLE		Soil Profil Nature of								
ECT:	ATION SHOL ER TA	9	GL, m				-	-		# #	H.
PROJI	LOCA BORE WATI	wo	Depth fro existing	0.00	moo:2	3.50m	5.50m	7.50m	9.50m	11.50m	14.50m

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t 2 o			-0°	•	40	•		40	
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<b>V</b>	3uild	%	moisture content,	17.8	14.8	13.6	13.2	10.1	
	Borehole diameter: 100mm Total depth: 35.59m Purpose: Two storey Office Building		ટાંક & લે	22	13		2	01	
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	ster: .59n tore	9/	Gravel, 9	0	0	,	0	0	
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Borehole Log Details	Borehole diameter: 100mm Total depth: 35.59m Purpose: Two storey Office	% iin	ril biupiJ	ı	*				
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le		resent	04	0	_	Φ-	<b>⊕</b>		
h0	ing	al rep							
re	Date of start: 25/09/2017 Date of finish: 28/09/2017 Type of Boring: Rotary boring	Graphical representation of N-values	07 -						
00	Date of start: 25/09/2017 Date of finish: 28/09/2017 Type of Boring: Rotary bo		0			- <u>-</u>	<u>.</u>		
111	25/0 28/0 3: Ro			lay	rial; and)	Jone born heart	Light grey weathered fock mark silty sand (medium & fine sand)		
	ırt: 'ish: iish: oring		soil	ше с	mater ine s	-200	fine s	ratur	
	f sta f fin of Bo		f the	th so and)	rock n & 1	70	2 L	ock st	
	te o te o pe c		Description of the soil	id wi	ered	the state of	ediur	oft re	
	Da Ty		cripti	y san	cathe		d (iii	red/s	
mg.	am		Des	Grey silty sand with some clay (medium & fine sand)	White weathered rock material; silty sand (medium & fine sand)		y san	Weathered/soft rock stratum	
apur	apur			Gre (me	Wh		silt.	×	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 05 (BH-05) WATER TABLE (from GL): 4.60m		N Value	45	> 50	> 50	> 50	> 50	
hiruva	hiruva	EST	45cm	56	:26cm)	•	ı	- -15cm)	
ıgs, T	çal, T	LD T	30cm	61	15 & - rebound (balance=26cm)	, ,	30cm)	30 & - rebound (balancd=15cm)	
Suildir	onnak	SPT - FIELD TEST	15cm	∞	27	31 & rebound	(balance=30cm) 20 & - rebound (balance=30cm)	4	
cal E	t, Th	SP		3m	19.02m	21.00m	22.69m re (b)	24.34m	
chni	Park -05) .): 4.		Depth, m	16.63m	19.0	21.5	22.6	24	
n Te	in GL	[e	Level of water tab						
N N	Scie 05 (fron		guildmes	SPT	SPT	SPT	SPT	SPT	
- SIDC	Life NO:	3	Nature of	ν ν	, s	S		-, -	
T: K	LOCATION: Life Science Park, The BOREHOLE NO: 05 (BH-05) WATER TABLE (from GL): 4.60m	elle	nord lio2						
JEC	CATI EEHO TER		existing m ,JO	- 14.50m	— <b>m</b> 00	1		24.34m —	
- SRO	LOC BOR WA	uo.	Depth fi	4.	18.00m			24	

Total no. of pieces = ++ (all small) Core Recovery = 32/165 = 19.4%Core Recovery = 82/161 = 50.9%Core Recovery = 53/168 = 31.5%4 Sheet 3 of Core Recovery = 0/155 = nil RQD = 45/168 = 26.8% RQD = 62/161 = 38.5%Total no. of pieces =6 RQD = 17/165 = 10.3%REMARKS Total no. of pieces = 5 Purpose: Two storey Office Building Total no. of pieces = 3RQD = 0/155 = zeroBorehole diameter: 100mm Total depth: 35.59m Borehole Log Details Not Conducted Permeability Time Interval By Falling Head Depth of water level PERCOLATION TEST (m/l) Loss By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring Not Conducted **LEST SECTION** Date of finish: 28/09/2017 Date of start: 25/09/2017 80 Complete Water Loss lsinsq 05 οN 07 Depth of water level, m NX BX AX CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SIZE OF HOLE 08-RQD 09 01 οz 001 09 COKE RECOVERY 04 РЕКСЕИТ oz DESCRIPTION WATER TABLE (from GL): 4.60m Size of core pieces azis mm081< 35 to 150mm size axis mm01> axis mm25 of 01 axis mm27 of 25 BOREHOLE NO: 05 (BH-05) Grey soft rock Grey soft rock Grey soft rock Grey soft rock DESCRIPTION LITHOLOGY FOG 30.83m 29.28m 25.95m -24.34m 27.60m Depth from GL, m

Fotal no. of pieces = ++ (all small) Core Recovery = 55/167 = 32.9%4 Sheet 4 of Core Recovery = 0/144 = zero Core Recovery = 9/165 = 5.5%RQD = 49/167 = 29.3%Total no. of pieces = 3++Total no. of pieces = 1++ REMARKS Purpose: Two storey Office Building RQD = 0/144 = zeroRQD = 0/165 = zeroBorehole diameter: 100mm Total depth: 35.59m **Uetails** Permeability Not Conducted Time Interval By Falling Head Borehole Log 1 Depth of water level PERCOLATION TEST (ш/J) sso-7 By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring TEST SECTION Not Conducted Date of finish: 28/09/2017 Date of start: 25/09/2017 80 Complete Water Loss 09 leithe¶ o ON 07 Depth of water level, m NX BX AX CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SISE OF HOLE 08-RQD 09-010 07 100 09 CORE RECOVERY 01 РЕВСЕИТ 07 END OF BOREHOLE DESCRIPTION WATER TABLE (from GL): 4.60m Size of core pieces asis mm0&1 of &7 BOREHOLE NO: 05 (BH-05) as is mmc S of 01 of 25 of 01 of 25 of 01 of 25 of 01 of 25 of 01 of 25 of 01 of 25 of 01 Yellowish brown Brown soft rock Brown soft rock & light grey soft rock DESCRIPTION LITHOLOGY FOG 33.92m-35.59m-32.27m -30.83m Depth from GL, m

Dry unit weight Sheet 1 of moisture content, % KV/m² Purpose: Two storey Office Building 24.6 21.6 22.8 19.1 21.0 27.2 17.1 Borehole diameter: 100mm 27 24 25 21 23 Sift & clay, % 27 32 73 6/ 9/ 75 11 55 89 % 'pues Total depth: 37.10m Borehole Log Details 0 8 0 0 0 0 Gravel, % 0 , , ï Plastic limit, % % imil biupid , Graphical representation of N-values 100 08 09 0 0 1 0t Date of finish: 02/10/2017 Type of Boring: Rotary boring 50 Date of start: 29/09/2017 0 Reddish brown & light grey laterite; gravelly sand with silt & clay (coarse, medium & fine sand) Light brownish yellow silty fine & White & light grey silty medium sand (medium & fine sand) Light brownish pink silty fine & silty sand with clay (coarse, medium & fine sand) (coarse, medium & fine sand) Description of the soil Dark brown & dark grey medium sand with clay (medium & fine sand) medium sand with clay Light brown silty sand (medium & fine sand) LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram (balancd=8.5cm) > 50 56 59 91 6 47 5 Z 20 & rebound 45cm 33 SPT - FIELD TEST = 30 91 37 00 30cm 01 8 20 22 17 00 00 15cm 9 3 9 9 6 4 WATER TABLE (from GL): 5.00m 10.28m 12.52m 8.18m 3.11m 4.54m 6.18m 1.43m Depth, m BOREHOLE NO: 06 (BH-06) water table Level of SPT SPT SPT SPTSPT SPT Buildmes SPTNature of Soil Profile GL, m 12.00m 13.50m 5.50m 7.50m 4.00m 2.50m gnitsixə Depth from

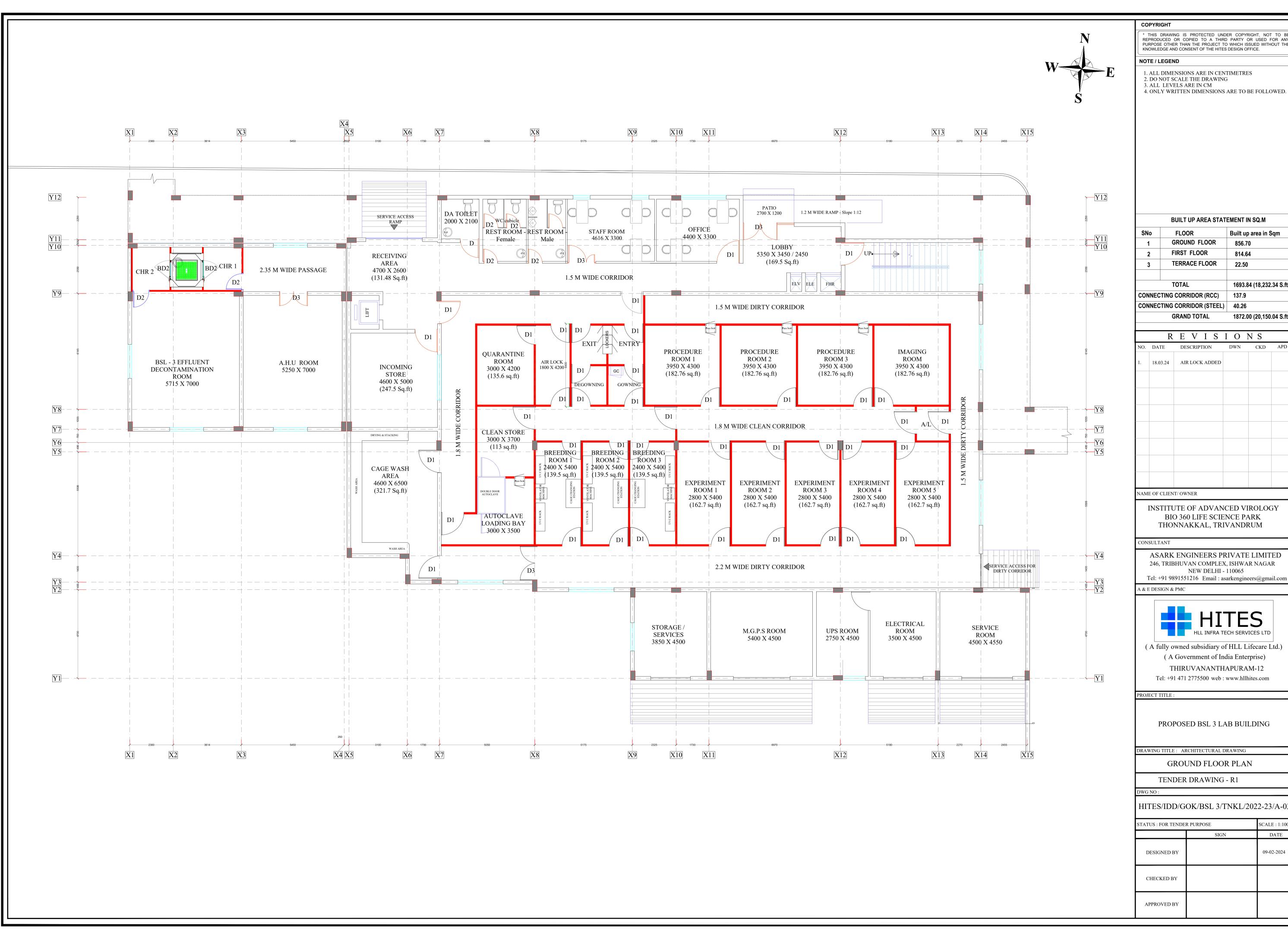
9		Meight	Dry unit	17.1	17.1					
2 01			°A	40	04					
Sheet 2 of	ng	U	content,	0	0			9		
S	ibliu	%	content,	15.5	0.61					
	Borehole diameter: 100mm Total depth: 37.10m Purpose: Two storey Office Building		शाह रह वा	22	81					
	Borehole diameter: 100mm Total depth: 37.10m Purpose: Two storey Office		% 'pueS	78	82					
ils	ter: .10n		Gravel, %	0	0					
ta	iame n: 37 wo s		Plastic lir	3	,					
$\mathcal{S}_{\mathbf{e}}$	Borehole diameter: Total depth: 37.10m Purpose: Two storey	% 1in	ril biupid	•						
DO To	oreho otal c	'alues	001						-	
Ő	A T	^-N Jo	08 -				 			
		tation	09 -		-					
le		resen	07 -							
hc	ring	cal rep								
Borehole Log Details	2017 2017 ry bol	Graphical representation of N-values	02 -							
	Date of start: 29 Date of finish: 0 Type of Boring:		Description of the soil	Light reddish brown silty sand (medium & fine sand)	Light brown & light grey silty fine sand (medium & fine sand)	Weathered/soft rock stratum				
anant	ananth		N Value	> 50						
hiruv	hiruv	EST	45cm		38.5cm 41cm)					
ngs, T	kal, T	ELD T	30cm	,	alance					
3uildii	onnak	SPT - FIELD TEST	15cm	15 &	rebound (balance=38.5cm 10 & - rebound (balance=41cm)					
nical I	k, Th	SP	Depth, m	Ē	15.62m					
Techi	ce Pai 3H-06 GL):	əl	water tab	41	113					
Non	Scien 36 (E from	-	sampling Level of	-	· <u>F</u>					
SIDC	Life NO: 0		Nature of	TdS	SPT	-	 			
T: K	TON: OLE	16	for lio2	_						
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, The BOREHOLE NO: 06 (BH-06) WATER TABLE (from GL): 5.00m	wo	Depth fr existing GL, m	—13.50m	15.00m –					

Core Recovery = 125/182 = 68.7%Core Recovery = 35/159 = 22.0%Core Recovery = 78/158 = 49.4%Core Recovery = 28/179 = 15.6%9 Sheet 3 of RQD = 12/179 = 6.7%Total no. of pieces = 3++RQD = 28/159 = 17.6%Total no. of pieces = 3RQD = 99/182 = 54.4%Total no. of pieces = 9REMARKS RQD = 57/158 = 36.1% Purpose: Two storey Office Building Total no. of pieces = 6 Borehole diameter: 100mm Total depth: 37.10m Borehole Log Details Permeability Not Conducted Time Interval By Falling Head Method Depth of water level PERCOLATION TEST (l/m) Loss By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring Not Conducted **TEST SECTION** Date of finish: 02/10/2017 Date of start: 29/09/2017 80 Complete Water Loss lairial opοN Depth of water level, m CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SISE OF HOLE 08-RQD 09 01 07 081 08 09 COKE RECOVERY 01 PERCENT 07 DESCRIPTION WATER TABLE (from GL): 5.00m Size of core pieces asis mm081 of 87 BOREHOLE NO: 06 (BH-06) ssis mm01> ssis mm25 of 01 ssis mm25 of 25 Grey soft rock Grey soft rock LITHOLOGY DESCRIPTION Light grey soft rock Light grey soft rock roe 20.81m 18.99m 22.40m 17.41m Depth from GL, m

Total no, of pieces = ++ (all small) Core Recovery = 110/177 = 62.1%(SPT at 29.05m; N=10 & rebound, -, - = > 50) 9 Core Recovery = 83/155 = 53.5%Core Recovery = 11/180 = 6.1%Core Recovery = 0/157 = zero Sheet 4 of RQD = 110/177 = 62.1%Total no. of pieces = 6 REMARKS Purpose: Two storey Office Building Total no. of pieces = 2 RQD = 79/155 = 51%Total no. of pieces = 7 RQD = 0/157 = zeroRQD = 0/180 = zeroBorehole diameter: 100mm Total depth: 37.10m Borehole Log Details Not Conducted Permeability By Falling Head Method Depth of water level PERCOLATION TEST (I/II) Soas By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring **TEST SECTION** Not Conducted Date of finish: 02/10/2017 Date of start: 29/09/2017 80 Complete Water Loss 09 01 Partial oN Depth of water level, in CASING Other sizes СКОИТ LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SIZE OF HOLE 08 RQD 09 0t 07 001 08 СОВЕ ВЕСОЛЕВА PERCENT DESCRIPTION WATER TABLE (from GL): 5.00m Size of core pieces əsis mm0č1< asis mm021 or 27 <10mm size</p>
10 to 25mm size
25 to 75mm size BOREHOLE NO: 06 (BH-06) Brown & light Grey soft rock grey soft rock grey soft rock Grey & light DESCRIPTION LITHOLOGY Light grey soft rock FOC 27.52m-23.95m-25.75m 29.09m Depth from GL, m

(SPT at 32.058m; N=23, 10 & rebound; -=> 50; water content=18.6%) Total no. of pieces = ++ (all small) Total no. of pieces = ++ (all small) Total no. of pieces = ++ (all small) Core Recovery = 31/169 = 18.3%SPT at 33.885m; N=5 & rebound, SPT at 30.508m; N=5 & rebound, | - = > 50; water content = 8.7% -, - = > 50; water content = 5.1%) Sheet 5 of Core Recovery = 0/170 = zero Core Recovery = 0/168 = zero Core Recovery = 0/143 = zero REMARKS Total no. of pieces = 5 Purpose: Two storey Office Building RQD = 0/168 = zeroRQD = 0/169 = zeroRQD = 0/143 = zeroRQD = 0/170 = zeroBorehole diameter: 100mm Fotal depth: 37.10m Borehole Log Details Not Conducted Permeability Time Interval By Falling Head Method Depth of water level PERCOLATION TEST (m/l) sso.J By Applied Pressure Method (kg/sq.cm) Pressure Type of Boring: Rotary boring Not Conducted **TEST SECTION** Date of finish: 02/10/2017 Date of start: 29/09/2017 80 Complete Water Loss 09 0t Partial ÒΝ Depth of water level, m CASING Other sizes GROUT LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram XN SISE OF HOLE 08 RQD 09-01 07 001 08 09 COKE KECONEKA 01 PERCENT 50 DESCRIPTION WATER TABLE (from GL): 5.00m Size of core pieces osis mm0&1 of &7 osis mm0&1< sxis mm01> axis mm25 of 01 axis mm25 of 25 BOREHOLE NO: 06 (BH-06) jointed hard rock Brown soft rock Dark greenish grey soft rock Grey soft rock Grey highly DESCRIPTION LITHOLOGY Light grey soft rock roe 30.52m-33.90m 35.20m 35.59m 32.22m -29.0911 Depth from GL, m

ails Sheet 6 of 6	Borehole diameter: 100mm Total depth: 37.10m Purpose: Two storey Office Building	REMARKS	Core Recovery = 28/151 = 18.5% RQD = 0/151 = zero Total no. of pieces = 4++	_	
ete	dian th: 3 Two	Permeability	Not Conducted		
Borehole Log Details	Borehole diameter: 1 Total depth: 37.10m Purpose: Two storey	PERCOLATION TEST By Applied Pressure Loss Loss C(J(m) Depth Of water level Time			
Boreho	Date of start: 29/09/2017 Date of finish: 02/10/2017 Type of Boring: Rotary boring	No Complete Secrete Se			
		GROUT  Other sizes  Other sizes  A  Depth of water level, m		-	
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram	LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram BOREHOLE NO: 06 (BH-06) WATER TABLE (from GL): 5.00m	2ISE OF HOLE  -60 -70 -70 -80 -1(14) -80 -80	XI		
Buildings, Th	onnakkal, Th	CORE RECOVERY  On the control of the		10000000000000000000000000000000000000	
n Technical	ence Park, Th (BH-06) n GL): 5.00n	S	*	END OF BOREHOLE	
ECT. KSIDC No	LOCATION: Life Science Park, The BOREHOLE NO: 06 (BH-06) WATER TABLE (from GL): 5.00m	LITHOLOGY LOG DESCRIPTION	Grey highly jointed hard rock		
PROT	LOC, BORI WAT	Depth from GL, m	-35.59m-	37,10m-	



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NOTE / LEGEND

1. ALL DIMENSIONS ARE IN CENTIMETRES 2. DO NOT SCALE THE DRAWING

**BUILT UP AREA STATEMENT IN SQ.M** 

No	FLOOR	Built up area in Sqm
1	GROUND FLOOR	856.70
2	FIRST FLOOR	814.64
3	TERRACE FLOOR	22.50

TOTAL 1693.84 (18,232.34 S.ft)

CONNECTING CORRIDOR (STEEL) 40.26

1872.00 (20,150.04 S.ft)

NO.	DATE	DESCRIPTION	DWN	CKD	API
1.	18.03.24	AIR LOCK ADDED			

NAME OF CLIENT/ OWNER

INSTITUTE OF ADVANCED VIROLOGY BIO 360 LIFE SCIENCE PARK THONNAKKAL, TRIVANDRUM

ASARK ENGINEERS PRIVATE LIMITED 246, TRIBHUVAN COMPLEX, ISHWAR NAGAR NEW DELHI - 110065 Tel: +91 9891551216 Email: asarkengineers@gmail.com

A & E DESIGN & PMC



( A fully owned subsidiary of HLL Lifecare Ltd.) ( A Government of India Enterprise) THIRUVANANTHAPURAM-12 Tel: +91 471 2775500 web: www.hllhites.com

PROJECT TITLE:

PROPOSED BSL 3 LAB BUILDING

DRAWING TITLE: ARCHITECTURAL DRAWING

GROUND FLOOR PLAN TENDER DRAWING - R1

HITES/IDD/GOK/BSL 3/TNKL/2022-23/A-03

STATUS : FOR TENDE	SCALE: 1:100	
	SIGN	DATE
DESIGNED BY		09-02-2024
CHECKED BY		
APPROVED BY		

