

Corrigendum-02Amendments 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

Sl. No.	Tender Reference	As per tender	Amended as
1	Volume 1 Clause 1.4.1 (c) Eligibility Criteria	<p>Turnover: Average annual financial turnover should be 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 not for Group Company or subsidiary company etc. ITRs for the last three years to be submitted.</p> <p>The multiplication factor of 7% per annum simple interest is applicable on the Annual financial turnover figures.</p> <p>Duly filled Form T-1 certified by CA to be submitted. Turnover shall be duly audited &amp; certified by a Chartered Accountant with his seal / signatures and registration number with UDIN.</p>	<p><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.</p> <p>The multiplication factor of 7% per annum simple interest is not applicable on the Annual financial turnover figures.</p> <p>Duly filled Form T-1 certified by CA to be submitted. Turnover shall be duly audited &amp; certified by a Chartered Accountant with his seal / signatures and registration number with UDIN.</p>

Sl. No.	Tender Reference	As per tender	Amended as
2	Volume-6 : Tender Drawings	Tender Drawings	<p>Following Revised (R1) Drawings are attached:</p> <p>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</p> <p>Bidders are requested to follow the above revised drawings. All other tender drawings provided in tender documents shall remain unchanged.</p>
3	Volume 1 NIT	Last Date & time of Submission of Bids online (Bid due date) :01.04.2024at 3.00 PM	Last Date & time of Submission of Bids online (Bid due date) : <b><u>15.04.2024 at 3.00 PM</u></b>
		Date & time of opening of Technical Bids through e-tender portal: 02.04.2024at 3.00 PM	Date & time of opening of Technical Bids through e-tender portal: <b><u>16.04.2024at 3.00 PM</u></b>

<b>Sl. No.</b>	<b>Tender Reference</b>	<b>Query by bidder</b>	<b>Reply / Clarification</b>
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.	<p>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.</p> <p>Required assistance will be provided by Client / HITES in obtaining statutory approvals.</p> <p>Environmental Clearance is in the scope of contractor.</p>
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	<p>The bidder shall have at-least one completed work of BSL-3 Laboratory certified by Department of Bio-Technology (DBT).</p> <p>It is necessary to have similar works certified by DBT?</p>	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	<p>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.</p> <p>Of the mentioned makes, only Hitech is an Indian Manufacturer.</p> <p>We request you to kindly include other Indian makes for the Fan Coil Units.</p>	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.

<b>Sl. No.</b>	<b>Tender Reference</b>	<b>Query by bidder</b>	<b>Reply / Clarification</b>
12	<p>Volume 5 - Technical Specification</p> <p>Section VII - List of Proposed and Preferred Makes / Manufactures</p> <p>C. HVAC &amp; Associated Equipments , sl. no.7</p>	<p>The AHU Unit performance, coil performance and Mechanical characteristics shall be “EUROVENT Certified.”</p> <p>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”.</p> <p>To conclude, we request you to review the tender clauses and provide fair opportunities to all approved &amp; eligible manufactures to participate in the project and we request to make required in the tender documents, wherever applicable.</p>	<p>AHRI or equivalent Certification are acceptable subject to meeting other requirements as per tender conditions.</p>
13	<p>Volume 5 - Technical Specification</p> <p>Section III - Technical Specification for HVAC &amp; Associated Works</p>	<p>HVAC Design - Please confirm false ceiling heights to be considered</p>	<p>Refer revised Drawing No. HITES/IDD/GOK/BSL3/TNKL/2022-23/A-05 issued with this Corrgendum-02</p>
14	<p>Volume 5 - Technical Specification</p> <p>Section III - Technical Specification for HVAC &amp; Associated Works</p>	<p>HVAC Design - Please provide scientific equipment electrical load details or room wise equipment list.</p> <p>Please confirm whether supply of CO2, Compressed Air, Power, etc. for scientific equipment is in Bidders scope of works.</p>	<p>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.</p> <p>Yes, supply of CO2, Compressed Air, Power, etc. for scientific equipment is in Bidders scope of works.</p>

<b>Sl. No.</b>	<b>Tender Reference</b>	<b>Query by bidder</b>	<b>Reply / Clarification</b>
15	Volume 6 – Tender Drawings	Please provide door and window schedule along with location for Bio Safety Doors.	<p>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:</p> <p>D - 1000x2100 mm  D1- 1200x2100 mm  D2- 750x2100 mm  D3- 1500x2100 mm  BD1- 1200x2100 mm  BD2- 750x2100 mm</p> <p>Being an EPC contract, further detailing of works shall be done by the contractor and is in the scope of the contractor.</p>
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: <ul style="list-style-type: none"> <li>● Clean Room Wall Panels</li> <li>● Garment cubicles, Cross over benches.</li> <li>● Wet &amp; Chemical showers</li> <li>● Air handling units</li> <li>● Return air risers.</li> <li>● Doors &amp; View glass</li> <li>● Windows</li> </ul>	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.	Tender Reference	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.

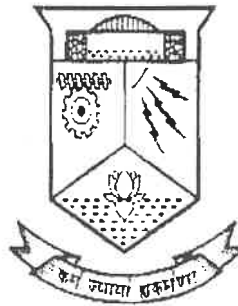
**For HITES  
s/d  
DGM (ID)**

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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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**Table 1: Details of rock strata, core recovery & RQD**

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**Annexure - I Borehole log sheets**

## **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 17.50m. Below this, brown & light grey silty fine & medium sand was obtained up to 19.0m. Below this, brown weathered rock material (silty sand) was obtained up to 20.50m. 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	Pile depth from existing ground level, m	Safe vertical load, t					Safe lateral load, t				
		Pile diameter, m					Pile diameter, m				
		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				
		Pile diameter, m				
		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  $20t/m^2$ , 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.

  
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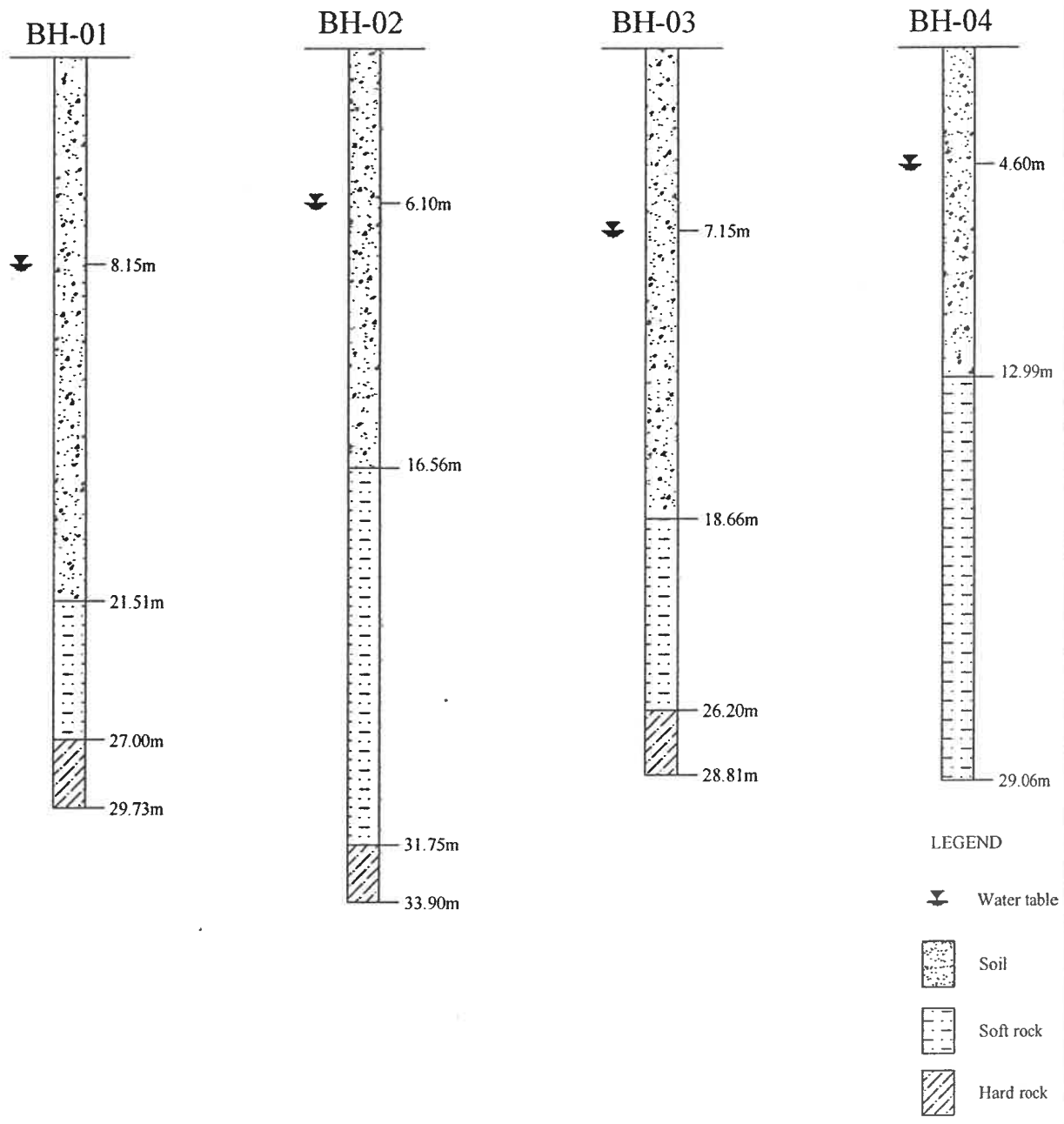


Fig. 2a. Sub-soil Profile along BH-01 to BH-04  
(Three storey Biotech Lab building)

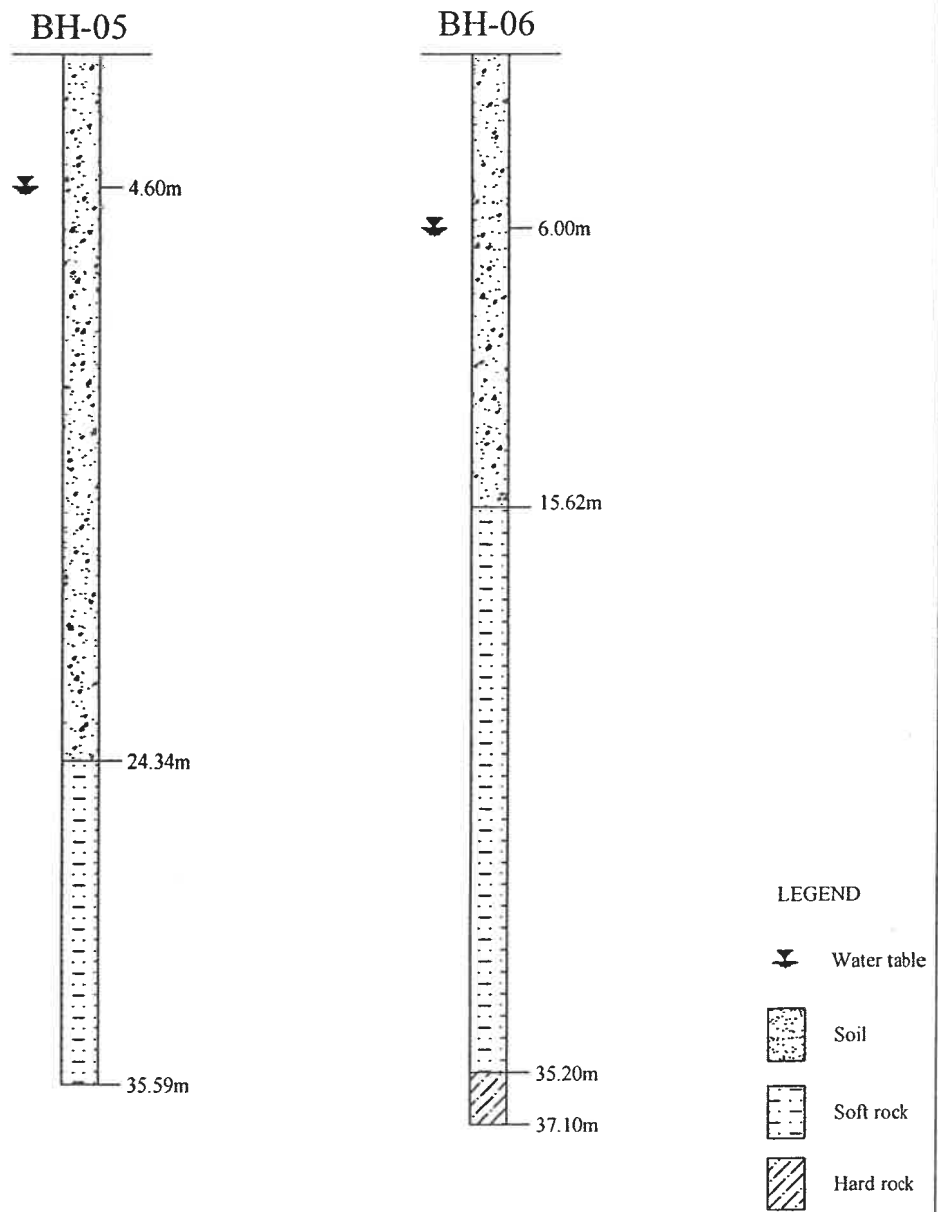


Fig. 2b. Sub-soil Profile along BH-05 & BH-06  
(Two storey office building)

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

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

Site Location No.	Borehole No:	Maximum depth of boring, m	Depth to weathered rock stratum, m	Depth to hard rock stratum, m	Water table level, from existing ground level, m	Rock coring details										IS classification based on RQD IS:13365(I)-1998
						Depth		Depth of rock, cm	Total core length obtained, cm	Total time of drilling, minutes	core lengths (smaller lengths not written here), cm	Core recovery, %	RQD, %			
						From	To									
Fig. 1	BH-01	29.73	21.51	27.00	8.15	21.51	23.21	170.0	16.0	13.0	16.0	9.4	9.4	very poor		
						23.21	25.00	179.0	130.0	23.0	6, 8, 11, 9, 9, ++, 18, 9, 14, 9, 12, 7, 4	72.6	30.7	poor		
						25.00	26.54	154.0	29.0	40.0	8, 5, 10, ++	18.8	6.5	very poor		
						26.54	28.34	180.0	141.0	50.0	8, 27, 4, 6, ++, 21, 19, 11, 11, 13, 6, 10	78.3	62.2	fair		
						28.34	29.73	139.0	83.0	40.0	6, ++, 9, 9, 5, 15, ++, 13	59.7	20.1	very poor		
						16.56	17.97	141.0	98.0	20.0	++, 4, 8, 2, 8, 6, 12, 8, 4, 5, 4, 12, 8	69.5	17.0	very poor		
						17.97	19.37	140.0	38.0	35.0	6, 6, 6, ++, 8, 4	27.1	0.0	very poor		
	BH-02	33.90	16.56	31.75	6.10	19.37	20.77	140.0	52.0	18.0	11, 10, 10, 7, 14	37.1	32.1	poor		
						20.77	22.56	179.0	20.0	20.0	++ (all small)	11.2	0.0	very poor		
						22.56	24.23	167.0	58.0	15.0	++, 8, 8, 6, 9, 7, 8, ++	34.7	0.0	very poor		
						24.23	25.86	163.0	130.0	20.0	10, 7, 21, 16, 18, 8, 28, 20	79.8	69.3	fair		
						25.86	27.56	170.0	77.0	25.0	6, 8, 11, 10, 7, 18, 13	45.3	30.6	poor		
						27.56	29.30	174.0	34.0	25.0	10, 4, ++, 8, 7	19.5	5.7	very poor		
						29.30	30.55	125.0	66.0	18.0	7, 16, 14, 11, 5, 7, 3	52.8	32.8	poor		
30.55	32.09	154.0	95.0	35.0	++, 5, 5, 9, 20, 16, 3, 16, 9	61.7	33.8	poor								
32.09	33.90	181.0	160.0	33.0	10, ++, 14, 4, 10, 6, 14, 7, 6, 9, 4, 7, 6, 7, 9, 7, 35	88.4	45.9	poor								







**Table 2: Laboratory test results on rock samples**

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

Location	Borehole No	Maximum depth of boring from GL, m	Rock sample details				Uniaxial compressive strength, kg/cm <sup>2</sup>	Mass density, gm/cc	
			Depth of rock tested, m	Diameter, cm	Height, cm	Weight, gm			Failure load, tonnes
Fig. 1	BH-01	29.73	27.20	5.40	14.00	796.0	2.50	109.2	2.484
			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	0.80	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)**

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

Borehole No.	Pile tip level from 'EGL', m	Assuming water table level rises up to depth from the EGL, m	Diameter of pile, m	$\gamma$	Design SPT value	$\Phi$	Nr	Nq	Calculation of Pd, kN/m <sup>2</sup>			shear criteria			settlement criteria		Recommended, Qsafe, tonnes.
									( $15 \times d$ )	Pd-depth	Pd-value	Qu(end), t	Factor of safety	Qsafe, t	Factor of safety	Qsafe, t	
BH-01 to BH-04	27.00	0.5	0.60	8	100	40.0	109.4	105	9.00	9.0	72.0	221.1	3	73.7	2.5	92.2	75.0
	27.00	0.5	0.70	8	100	40.0	109.4	105	10.50	10.5	84.0	351.0	3	117.0	2.5	125.5	115.0
	27.00	0.5	0.80	8	100	40.0	109.4	105	12.00	12.0	96.0	524.0	3	174.7	2.5	163.9	165.0
	27.00	0.5	0.90	8	100	40.0	109.4	105	13.50	13.5	108.0	746.1	3	248.7	2.5	207.4	210.0
	27.00	0.5	1.00	8	100	40.0	109.4	105	15.00	15.0	120.0	1023.5	3	341.2	2.5	256.1	275.0

\* 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, Thiruvananthapuram for M/s. HLL Lifecare Ltd, Tvpmm-12

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

E =5000 x  $f_{ck}$  = 25000.0 N/sq.mm

K1 = 1.245 kg/cu.cm = 0.01245 N/cu.mm

Location	Borehole No.	Pile depth level from EGL, m.	Length of the pile (L), m.	Water table level measured from existing GL, m	Assuming water table level from the formation GL, m	Characteristic length of soil-pile system, T metres			Type of pile (Long or Short)			Safe Lateral load capacity of pile, tonnes		
						0.60	0.80	1.00	0.60	0.80	1.00	0.60	0.80	1.00
Fig. 1	BH-01 to BH-04	25.0m to 27.0m	25.0m to 27.0m	4.6	0.50	1.664	2.095	2.504	Long	Long	Long	9.1	17.1	27.9

\* 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, Thiruvananthapuram for M/s. HLL Lifecare Ltd, Tvpm-12

Location	Pile tip level from existing Ground level, m	Pile length, from EGL, m	Assuming water table level rises up to depth from LFL, m	Diameter of pile, m	γ	Lengths of pile in friction, m		SPT value	Φ	Nr	Nq	Calculation of Pd, N/m <sup>2</sup>			Friction length, m	ρ	Surface area of pile	Qsafe (skin) tonnes	Submerged weight of pile tonnes	Safe uplift capacity load tonnes
						L1 to L2	L2					(15 x d)	Pd-depth	Pd-value						
BH-01	27.0	27.00	0.5	0.60	8	20.0	27.00	50.0	40.0	109.0	105.0	9.00	9.00	72.0	7.0	26.7	13.2	11.9	11.6	23.5
	27.0	27.00	0.5	0.70	8	20.0	27.00	50.0	40.0	109.0	105.0	10.50	10.50	84.0	7.0	26.7	15.4	16.2	15.8	32.0
	27.0	27.00	0.5	0.80	8	20.0	27.00	50.0	40.0	109.0	105.0	12.00	12.00	96.0	7.0	26.7	17.6	21.2	20.6	41.8
	27.0	27.00	0.5	0.90	8	20.0	27.00	50.0	40.0	109.0	105.0	13.50	13.50	108.0	7.0	26.7	19.8	26.8	26.1	52.9
	27.0	27.00	0.5	1.00	8	20.0	27.00	50.0	40.0	109.0	105.0	15.00	15.00	120.0	7.0	26.7	22.0	33.1	32.2	65.3
BH-02	27.0	27.00	0.5	0.60	8	15.0	27.00	50.0	40.0	109.0	105.0	9.00	9.00	72.0	12.0	26.7	22.6	20.4	11.6	32.0
	27.0	27.00	0.5	0.70	8	15.0	27.00	50.0	40.0	109.0	105.0	10.50	10.50	84.0	12.0	26.7	26.4	27.8	15.8	43.6
	27.0	27.00	0.5	0.80	8	15.0	27.00	50.0	40.0	109.0	105.0	12.00	12.00	96.0	12.0	26.7	30.1	36.3	20.6	56.9
	27.0	27.00	0.5	0.90	8	15.0	27.00	50.0	40.0	109.0	105.0	13.50	13.50	108.0	12.0	26.7	33.9	46.0	26.1	72.0
	27.0	27.00	0.5	1.00	8	15.0	27.00	50.0	40.0	109.0	105.0	15.00	15.00	120.0	12.0	26.7	37.7	56.7	32.2	88.9
BH-03	25.0	25.00	0.5	0.60	8	18.0	25.00	50.0	40.0	109.0	105.0	9.00	9.00	72.0	7.0	26.7	13.2	11.9	10.7	22.7
	25.0	25.00	0.5	0.70	8	18.0	25.00	50.0	40.0	109.0	105.0	10.50	10.50	84.0	7.0	26.7	15.4	16.2	14.6	30.8
	25.0	25.00	0.5	0.80	8	18.0	25.00	50.0	40.0	109.0	105.0	12.00	12.00	96.0	7.0	26.7	17.6	21.2	19.1	40.3
	25.0	25.00	0.5	0.90	8	18.0	25.00	50.0	40.0	109.0	105.0	13.50	13.50	108.0	7.0	26.7	19.8	26.8	24.2	51.0
	25.0	25.00	0.5	1.00	8	18.0	25.00	50.0	40.0	109.0	105.0	15.00	15.00	120.0	7.0	26.7	22.0	33.1	29.8	62.9
BH-04	25.0	25.00	0.5	0.60	8	15.0	25.00	50.0	40.0	109.0	105.0	9.00	9.00	72.0	10.0	26.7	18.8	17.0	10.7	27.8
	25.0	25.00	0.5	0.70	8	15.0	25.00	50.0	40.0	109.0	105.0	10.50	10.50	84.0	10.0	26.7	22.0	23.2	14.6	37.8
	25.0	25.00	0.5	0.80	8	15.0	25.00	50.0	40.0	109.0	105.0	12.00	12.00	96.0	10.0	26.7	25.1	30.3	19.1	49.4
	25.0	25.00	0.5	0.90	8	15.0	25.00	50.0	40.0	109.0	105.0	13.50	13.50	108.0	10.0	26.7	28.3	38.3	24.2	62.5
	25.0	25.00	0.5	1.00	8	15.0	25.00	50.0	40.0	109.0	105.0	15.00	15.00	120.0	10.0	26.7	31.4	47.3	29.8	77.1

**ANNEXURE - I**  
**BOREHOLE LOG SHEETS**



# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram

LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram

BOREHOLE NO: 01 (BH-01)

WATER TABLE (from GL): 8.15m

Date of start: 08/09/2017

Date of finish: 12/09/2017

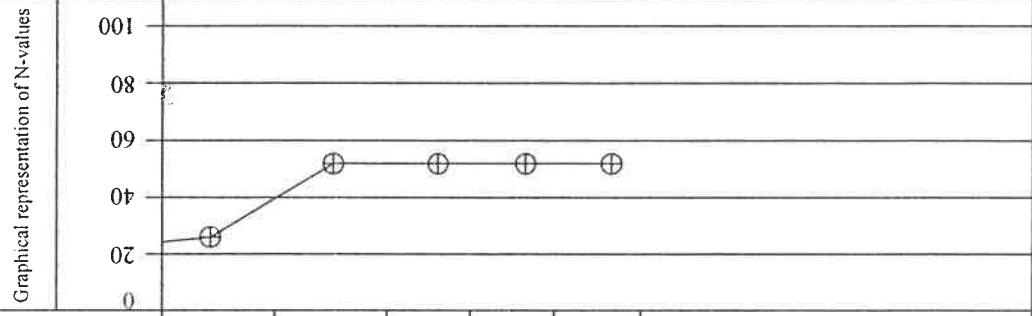
Type of Boring: Rotary boring

Borehole diameter: 100mm

Total depth: 29.73m

Purpose: Three storey Biotech Lab building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Liquid limit %	Plastic limit, %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion KN/m <sup>2</sup>	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value									
13.50m		SPT		14.35m	6	11	15	26	Brown silty sand (coarse, medium & fine sand)			0	76	24	22.1		
15.50m		SPT		16.54m	30	-	-	> 50	Brown & light grey silty sand (coarse, medium & fine sand)			0	80	20	14.0		40
17.50m		SPT		18.42m	20	25 & rebound	-	> 50	Brown & light grey silty fine & medium sand (coarse, medium & fine sand)			0	81	19	17.2		
19.00m		SPT		19.99m	10 & rebound	-	-	> 50	Brown weathered rock material; silty sand (medium & fine sand)			0	83	17	12.2		
20.50m		SPT		21.51m	16	10 & rebound	-	> 50	Dark greenish grey weathered rock material; silty sand (coarse, medium & fine sand)			0	86	14	18.6		40
21.51m		SPT							Weathered/soft rock stratum								17.1









# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram

LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram

BOREHOLE NO: 02 (BH-02)

WATER TABLE (from GL): 6.10m

Date of start: 13/09/2017


Date of finish: 15/09/2017

Type of Boring: Rotary boring

Borehole diameter: 100mm

Total depth: 33.90m

Purpose: Three storey Biotech Lab building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Graphical representation of N-values		Liquid limit %	Plastic limit %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion KN/m <sup>2</sup>	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value		0	100								
0.00m																			
2.50m		SPT		1.48m	3	8	15	23	Brownish red laterite; sandy gravel with silt & clay (coarse, medium & fine sand)	23				48	29	23	17.8		
4.00m		SPT		3.33m	5	16	21	37	Reddish brown & grey laterite; silty clay with sand (medium & fine sand)	37				0	38	62	24.2		
5.40m		SPT		4.48m	6	11	14	25	Reddish brown & grey laterite; gravelly sand with silt & clay (coarse, medium & fine sand)	25				10	38	52	28.1		
7.50m		SPT		6.13m	8	12	13	25	Brownish red & grey laterite; clayey silt with sand (medium & fine sand)	25				0	40	60	31.2		
9.50m		SPT		8.32m	4	8	9	17	Yellow silty sand (coarse, medium & fine sand)	17				0	62	38	27.3		
12.00m		SPT		10.42m	8	27	10 & rebound (balance=12.5cm)	> 50	Brown silty sand (coarse, medium & fine sand)	> 50				0	79	21	19.2		
14.00m		SPT		12.74m	7	19	22	41	Brown silty fine & medium sand (coarse, medium & fine sand)	41				0	75	25	16.9		

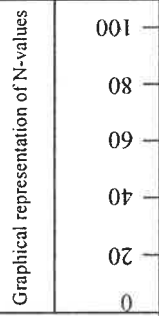
# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 02 (BH-02)  
 WATER TABLE (from GL): 6.10m

Date of start: 13/09/2017  
 Date of finish: 15/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 33.90m  
 Purpose: Three storey Biotech Lab building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Liquid limit %	Plastic limit %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion KN/m <sup>2</sup>	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value									
14.00m																	
15.50m		SPT		15.07m	25 & rebound	-	-	-	> 50	Grey weathered rock material; silty sand (coarse, medium & fine sand)	.	0	85	15	09.5	.	.
16.56m		SPT		16.56m	20 & rebound	-	-	-	> 50	Greenish grey weathered rock material; silty sand (coarse, medium & fine sand)	.	0	85	15	13.8	0	17.1
										Weathered/soft rock stratum							



# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram

LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram

BOREHOLE NO: 02 (BH-02)

WATER TABLE (from GL): 6.10m

Date of start: 13/09/2017

Date of finish: 15/09/2017

Type of Boring: Rotary boring

Borehole diameter: 100mm

Total depth: 33.90m

Purpose: Three storey Biotech Lab building

Depth from GL, m	LITHOLOGY	Size of core pieces				DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm,NX,BX,AX	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS
		<10mm size	10 to 25mm size	25 to 75mm size	>75 to 150mm size								TEST SECTION	Pressure (kg/sq.cm)	Loss (l/m)	Depth of water level	
16.56m	Dark brownish grey soft rock					40	20	NX									
17.97m	Dark brownish grey soft rock					20	30	NX									Core Recovery = 98/141 = 69.5% RQD = 24/141 = 17.0% Total no. of pieces = 12++
19.37m	Light greyish brown soft rock					40	30	NX									Core Recovery = 38/140 = 27.1% RQD = 0/140 = zero Total no. of pieces = 5++
20.77m	Light greyish brown soft rock & some jointed medium hard rock					10	30	NX									Core Recovery = 52/140 = 37.1% RQD = 45/140 = 32.1% Total no. of pieces = 5
22.56m																	Core Recovery = 20/179 = 11.2% RQD = 0/179 = zero Total no. of pieces = ++ (all small)





**Borehole Log Details**

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 03 (BH-03)  
 WATER TABLE (from GL): 7.15m

Date of start: 18/09/2017  
 Date of finish: 19/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 28.81m  
 Purpose: Three storey Biotech Lab building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Graphical representation of N-values		Liquid limit %	Plastic limit %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion KN/m <sup>2</sup>	φ	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value		0	100									
0.00m																				
2.50m		SPT		1.58m	7	17	32	49	Reddish brown laterite; silty sand (coarse, medium & fine sand)	48				0	74	26	14.7	-	-	-
4.00m		SPT		3.24m	5	6	11	17	Light grey & brown laterite; silty clay with fine sand (medium & fine sand)	18				0	22	78	20.4	-	-	-
5.50m		SPT		4.69m	3	8	9	17	Grey & some brown silty clay with fine sand (medium & fine sand)	18				0	20	80	23.5	-	-	-
8.00m		SPT		6.66m	5	11	24	35	Brownish red & light grey laterite; silty sand with some clay (coarse, medium & fine sand)	35				0	70	30	16.9	-	-	-
10.00m		SPT		8.74m	7	13	16	29	Dark reddish brown & white laterite silty sand with some clay (coarse, medium & fine sand)	28				0	69	31	23.3	-	-	-
12.50m		SPT		10.98m	4	10	35	45	Brownish red silty sand (coarse, medium & fine sand)	45				0	73	27	25.7	-	-	-
14.00m		SPT		13.30m	9	27	25 & rebound (balance=8.5cm)	> 50	Brown silty sand (medium & fine sand)	> 50				0	70	30	14.7	-	-	-





# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 03 (BH-03)  
 WATER TABLE (from GL): 7.15m

Date of start: 18/09/2017  
 Date of finish: 19/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 28.81m  
 Purpose: Three storey Biotech Lab building

Depth from GL, m	LOG	LITHOLOGY		DESCRIPTION	CORE RECOVERY PERCENT	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm NX BX AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS
		DESCRIPTION	STRUCTURAL CONDITIONS									TEST SECTION	Pressure (kg/sq cm)	Loss (l/m)	Depth of water level	
18.66m				Brown soft rock	20	20	NX									Core Recovery = 37/158 = 23.4% RQD = 35/158 = 22.2% Total no. of pieces = 2+
20.24m				Grey soft rock (grain size: silty medium sand)	20	20	NX									Core Recovery = 0/178 = zero RQD = 0/178 = zero Total no. of pieces = ++ (all small) (SPT at 21.87m; N=30 & rebound, -, - = > 50; water content = 10.2%)
22.02m				Brown & grey soft rock	20	20	NX									Core Recovery = 24/178 = 13.5% RQD = 15/178 = 8.4% Total no. of pieces = 2++
23.80m				Grey soft rock	40	20	NX									Core Recovery = 49/156 = 31.4% RQD = 22/156 = 14.1% Total no. of pieces = 7
25.36m																Permeability Not Conducted

# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 03 (BH-03)  
 WATER TABLE (from GL): 7.15m

Date of start: 18/09/2017  
 Date of finish: 19/09/2017  
 Type of Boring: Rotary boring  
 Borehole diameter: 100mm  
 Total depth: 28.81m  
 Purpose: Three storey Biotech Lab building

Depth from GL, m	LITHOLOGY	Size of core pieces					PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm NX BX AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS
		DESCRIPTION	Structural Conditions	TEST SECTION	By Applied Pressure Method Pressure (kg/sq.cm)	Loss (l/m)								Depth of water level	By Falling Head Method Time Interval	Permeability		
25.36m	Grey soft rock	<10mm size					40	20									Core Recovery = 80/158 = 50.6% RQD = 18/158 = 11.4% Total no. of pieces = 9	
26.20m	Grey jointed medium hard rock	10 to 25mm size					20	20										
26.94m	Light greyish brown jointed hard rock	25 to 75mm size					40	20									Core Recovery = 77/187 = 41.2% RQD = 24/187 = 12.8% Total no. of pieces = 10	
28.81m		75 to 150mm size					20	20										
		>150mm size															Not Conducted	

END OF BOREHOLE



# Borehole Log Details

**PROJECT:** KSIDC Non Technical Buildings, Thiruvananthapuram  
**LOCATION:** Life Science Park, Thonnakkal, Thiruvananthapuram  
**BOREHOLE NO:** 04 (BH-04)  
**WATER TABLE (from GL):** 4.60m

**Date of start:** 21/09/2017  
**Date of finish:** 22/09/2017  
**Type of Boring:** Rotary boring

**Borehole diameter:** 100mm  
**Total depth:** 29.06m  
**Purpose:** Three storey Biotech Lab building

LOG	LITHOLOGY	Size of core pieces Structural Conditions	DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm, NX, BX, AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS			
											TEST SECTION	Pressure (kg/sq. cm)	Loss (l/m)	Depth of water level		By Applied Pressure Method	By Falling Head Method	Time Interval
12.99m	Brown soft rock	<10mm size 10 to 25mm size 25 to 75mm size 75 to 150mm size >150mm size		45%	45%	NX												
14.63m	Light brown soft rock			20%	20%											Core Recovery = 84/164 = 51.2% RQD = 77/164 = 47% Total no. of pieces = 6		
16.32m	Light greyish brown soft rock (grain size: silty medium sand)			20%	20%											Core Recovery = 24/169 = 14.2% RQD = 0/169 = zero Total no. of pieces = 4		
18.18m	Light yellowish grey soft rock			45%	45%											Core Recovery = 0/186 = zero RQD = 0/186 = zero Total no. of pieces = ++ (all small) (SPT at 18.155m; N=10 & rebound, -, - = > 50; water content = 8.4%)		
19.70m																Core Recovery = 40/152 = 26.3% RQD = 22/152 = 14.5% Total no. of pieces = 7++		
											Not Conducted				Permeability		Not Conducted	

# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 04 (BH-04)  
 WATER TABLE (from GL): 4.60m

Date of start: 21/09/2017  
 Date of finish: 22/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 29.06m  
 Purpose: Three storey Biotech Lab building

Depth from GL, m	LITHOLOGY		DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm NX BX AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS	
	LOG	DESCRIPTION									TEST SECTION	By Applied Pressure Method (kg/sq.cm)	Loss (l/m)	By Falling Head Method Depth of water level		Time Interval
19.70m																
21.36m			Light yellowish grey soft rock	25	20	NX										Core Recovery = 42/166 = 25.3% RQD = 27/166 = 16.3% Total no. of pieces = 4
22.92m			Light yellowish grey soft rock	25	20	NX										Core Recovery = 8/156 = 5.1% RQD = 0/156 = zero Total no. of pieces = 1+
24.34m			Light yellowish grey soft rock	55	20	NX										Core Recovery = 72/142 = 50.7% RQD = 11/142 = 7.7% Total no. of pieces = 10
25.93m			Light brownish yellow & grey soft rock	40	20	NX										Core Recovery = 58/159 = 36.5% RQD = 12/159 = 7.5% Total no. of pieces = 8
																Permeability Not Conducted

# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 04 (BH-04)  
 WATER TABLE (from GL): 4.60m

Date of start: 21/09/2017  
 Date of finish: 22/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 29.06m  
 Purpose: Three storey Biotech Lab building

Depth from GL, m	LITHOLOGY	Structural Conditions	Size of core pieces	DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING	Depth of water level, m	Water Loss	PERCOLATION TEST				REMARKS
												TEST SECTION	Pressure (kg/sq cm)	Loss (l/m)	Depth of water level	
25.93m	Light brownish yellow & grey soft rock		<10mm size 10 to 25mm size 25 to 75mm size 75 to 150mm size >150mm size		20	20	NX		Other sizes mm, NX, BX, AX	100 80 60 40 20 =	No Partial Complete	Not Conducted	Not Conducted	Not Conducted	Core Recovery = 23/159 = 14.5% RQD = 0/159 = zero Total no. of pieces = 3++	
27.52m	Light brownish yellow & grey soft rock		<10mm size 10 to 25mm size 25 to 75mm size 75 to 150mm size >150mm size		35	15	NX		Other sizes mm, NX, BX, AX	100 80 60 40 20 =	No Partial Complete	Not Conducted	Not Conducted	Not Conducted	Core Recovery = 44/154 = 28.6% RQD = 15/154 = 9.7% Total no. of pieces = 2++	

END OF BOREHOLE

# Borehole Log Details

Sheet 1 of 4

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram

LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram

BOREHOLE NO: 05 (BH-05)

WATER TABLE (from GL): 4.60m

Date of start: 25/09/2017

Date of finish: 28/09/2017

Type of Boring: Rotary boring

Borehole diameter: 100mm

Total depth: 35.59m

Purpose: Two storey Office Building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Graphical representation of N-values		Liquid limit %	Plastic limit %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion KN/m <sup>2</sup>	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value		0	100								
0.00m																			
2.00m		SPT		1.57m	4	9	12	21	Brown & light grey laterite; silty sand with clay (coarse, medium & fine sand)	20				0	72	28	18.2		
3.50m		SPT		3.00m	7	20	29	49	Reddish pink laterite; silty clay	50				0	0	100	32.3		
5.50m		SPT		4.50m	6	15	25	40	Light reddish pink laterite; silty sand with clay (medium & fine sand)	40				0	72	28	27.7		
7.50m		SPT		6.15m	8	20	10 & rebound (balance=5cm)	> 50	Brown silty sand (medium & fine sand)	50				0	78	22	28.2		
9.50m		SPT		8.26m	6	13	17	30	Red & light grey laterite; silty sand with two cobble sized stones (coarse, medium & fine sand)	30				0	75	25	14.9		
11.50m		SPT		10.37m	11	17	24	41	Dark brown laterite; sandy gravel with silt & clay (coarse, medium & fine sand)	41				47	28	25	12.3		
13.00m		SPT		12.52m	10	21	25 & rebound (balance=5cm)	> 50	Light pinkish brown silty fine & medium sand (coarse, medium & fine sand)	50				0	79	21	27.8		
14.50m		SPT		13.99m	3	6	19	25	Brown & light grey laterite; silty sand (coarse, medium & fine sand)	25				0	73	27	25.0		



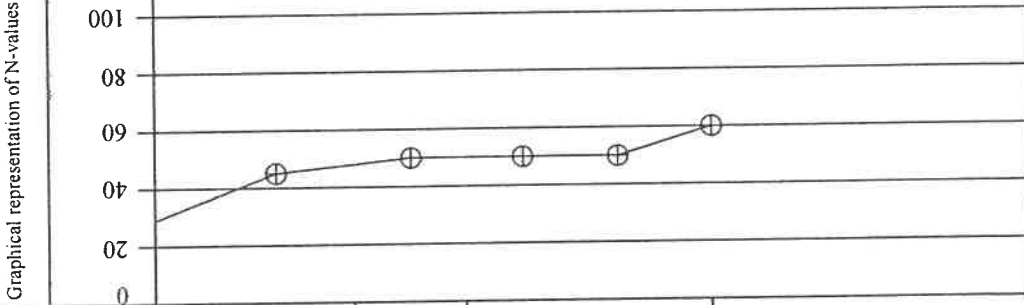
# Borehole Log Details

Sheet 2 of 4

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 05 (BH-05)  
 WATER TABLE (from GL): 4.60m

Date of start: 25/09/2017      Borehole diameter: 100mm  
 Date of finish: 28/09/2017      Total depth: 35.59m  
 Type of Boring: Rotary boring      Purpose: Two storey Office Building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Liquid limit %	Plastic limit, %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion $kN/m^2$	$\phi$	Dry unit weight $kN/m^3$
				Depth, m	1.5cm	30cm	45cm	N Value										
14.50m																		
16.63m		SPT		8	19	26	45	Grey silty sand with some clay (medium & fine sand)										
18.00m				12	15 rebound (balance=26cm)	-	> 50	White weathered rock material; silty sand (medium & fine sand)										
20.00m				31 & rebound (balance=30cm)	-	-	> 50	Light grey weathered rock material; silty sand (medium & fine sand)										
22.69m		SPT		20 & rebound (balance=30cm)	-	-	> 50											
24.34m		SPT		4	30 & rebound (balance=15cm)	-	> 50	Weathered/soft rock stratum										



# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 05 (BH-05)  
 WATER TABLE (from GL): 4.60m

Date of start: 25/09/2017  
 Date of finish: 28/09/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 35.59m  
 Purpose: Two storey Office Building

Depth from GL, m	LITHOLOGY		DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes min NX, BX, AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS	
	LOG	DESCRIPTION									TEST SECTION	Pressure (kg/sq cm)	Loss (l/m)	Depth of Water Level		By Falling Head Method
24.34m																
25.95m			Grey soft rock	45	40	NX										Core Recovery = 82/161 = 50.9% RQD = 62/161 = 38.5% Total no. of pieces = 6
27.60m			Grey soft rock	35	30	NX										Core Recovery = 32/165 = 19.4% RQD = 17/165 = 10.3% Total no. of pieces = 3
29.28m			Grey soft rock	40	35	NX										Core Recovery = 53/168 = 31.5% RQD = 45/168 = 26.8% Total no. of pieces = 5
30.83m			Grey soft rock	0	0	NX										Core Recovery = 0/155 = nil RQD = 0/155 = zero Total no. of pieces = ++ (all small)
																Permeability Not Conducted



# Borehole Log Details

Sheet 1 of 6

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram

LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram

BOREHOLE NO: 06 (BH-06)

WATER TABLE (from GL): 5.00m

Date of start: 29/09/2017


Date of finish: 02/10/2017

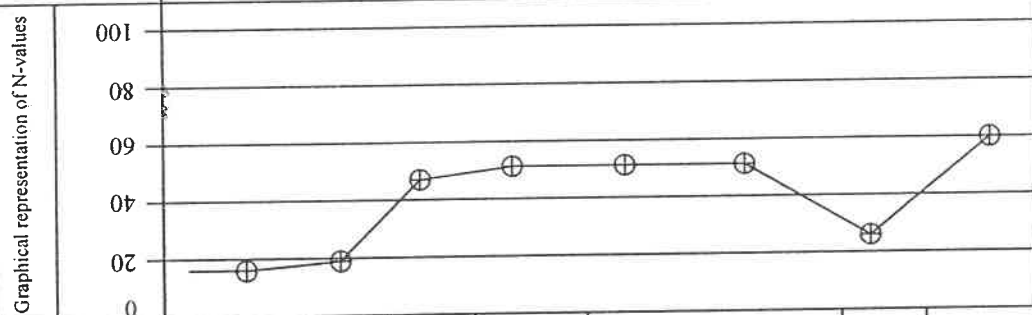
Type of Boring: Rotary boring

Borehole diameter: 100mm

Total depth: 37.10m

Purpose: Two storey Office Building

Depth from existing GL, m	Soil Profile	Nature of sampling	Level of water table	SPT - FIELD TEST					Description of the soil	Liquid limit %	Plastic limit %	Gravel, %	Sand, %	Silt & clay, %	moisture content, %	cohesion $\phi$ KN/m <sup>2</sup>	Dry unit weight KN/m <sup>3</sup>
				Depth, m	15cm	30cm	45cm	N Value									
0.00m																	
2.50m		SPT		1.43m	5	8	8	16	Reddish brown & light grey laterite; gravelly sand with silt & clay (coarse, medium & fine sand)			18	55	27	17.1		
4.00m		SPT		3.11m	4	8	11	19	White & light grey silty medium sand (medium & fine sand)			0	68	32	19.1		
5.00m		SPT		4.54m	9	17	30	47	Light brownish pink silty fine & medium sand with clay (coarse, medium & fine sand)			0	77	23	21.0		
7.50m		SPT		6.18m	6	18	33	51	Light brownish yellow silty fine & medium sand with clay (medium & fine sand)			0	75	25	27.2		
		SPT		8.18m	6	20	20 & rebound (balance=8.5cm)	> 50	Light brown silty sand (medium & fine sand)			0	79	21	21.6		
		SPT		10.28m	10	22	37	59									
12.00m		SPT		12.52m	3	10	16	26	Dark brown & dark grey silty sand with clay (coarse, medium & fine sand)			0	73	27	24.6		
13.50m																	





# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 06 (BH-06)  
 WATER TABLE (from GL): 5.00m

Date of start: 29/09/2017  
 Date of finish: 02/10/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 37.10m  
 Purpose: Two storey Office Building

Depth from GL, m	LITHOLOGY	Size of core pieces				DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	CASING	Depth of water level, m	Water Loss	PERCOLATION TEST				REMARKS
		<10mm size	10 to 25mm size	25 to 75mm size	>75 to 150mm size								Pressure (kg/sq cm)	Loss (l/m)	Depth of water level	By Falling Head Method	
-1.62m																	
17.41m	Light grey soft rock							NX									Core Recovery = 28/179 = 15.6% RQD = 12/179 = 6.7% Total no. of pieces = 3++
18.99m	Light grey soft rock																Core Recovery = 78/158 = 49.4% RQD = 57/158 = 36.1% Total no. of pieces = 6
20.81m	Grey soft rock																Core Recovery = 125/182 = 68.7% RQD = 99/182 = 54.4% Total no. of pieces = 9
22.40m	Grey soft rock																Core Recovery = 35/159 = 22.0% RQD = 28/159 = 17.6% Total no. of pieces = 3

# Borehole Log Details

PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 06 (BH-06)  
 WATER TABLE (from GL): 5.00m

Date of start: 29/09/2017  
 Date of finish: 02/10/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 37.10m  
 Purpose: Two storey Office Building

Depth from GL, m	LITHOLOGY		Size of core pieces Structural Conditions	DESCRIPTION	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING Other sizes mm NX BX AX	Depth of water level, m	Water Loss No Partial Complete	PERCOLATION TEST				REMARKS	
	LOG	DESCRIPTION										TEST SECTION	Pressure (kg/sq cm)	Loss (l/m)	By Applied Pressure Method		By Falling Head Method
22.40m			<10mm size 10 to 25mm size 25 to 75mm size 75 to 150mm size >150mm size														
23.95m		Brown & light grey soft rock					NX										Core Recovery = 83/155 = 53.5% RQD = 79/155 = 51% Total no. of pieces = 7
25.75m		Grey soft rock					NX										Core Recovery = 11/180 = 6.1% RQD = 0/180 = zero Total no. of pieces = 2
27.52m		Grey & light grey soft rock					NX										Core Recovery = 110/177 = 62.1% RQD = 110/177 = 62.1% Total no. of pieces = 6
29.09m		Light grey soft rock					NX										Core Recovery = 0/157 = zero RQD = 0/157 = zero Total no. of pieces = ++ (all small) (SPT at 29.05m; N=10 & rebound, -, - > 50)





# Borehole Log Details

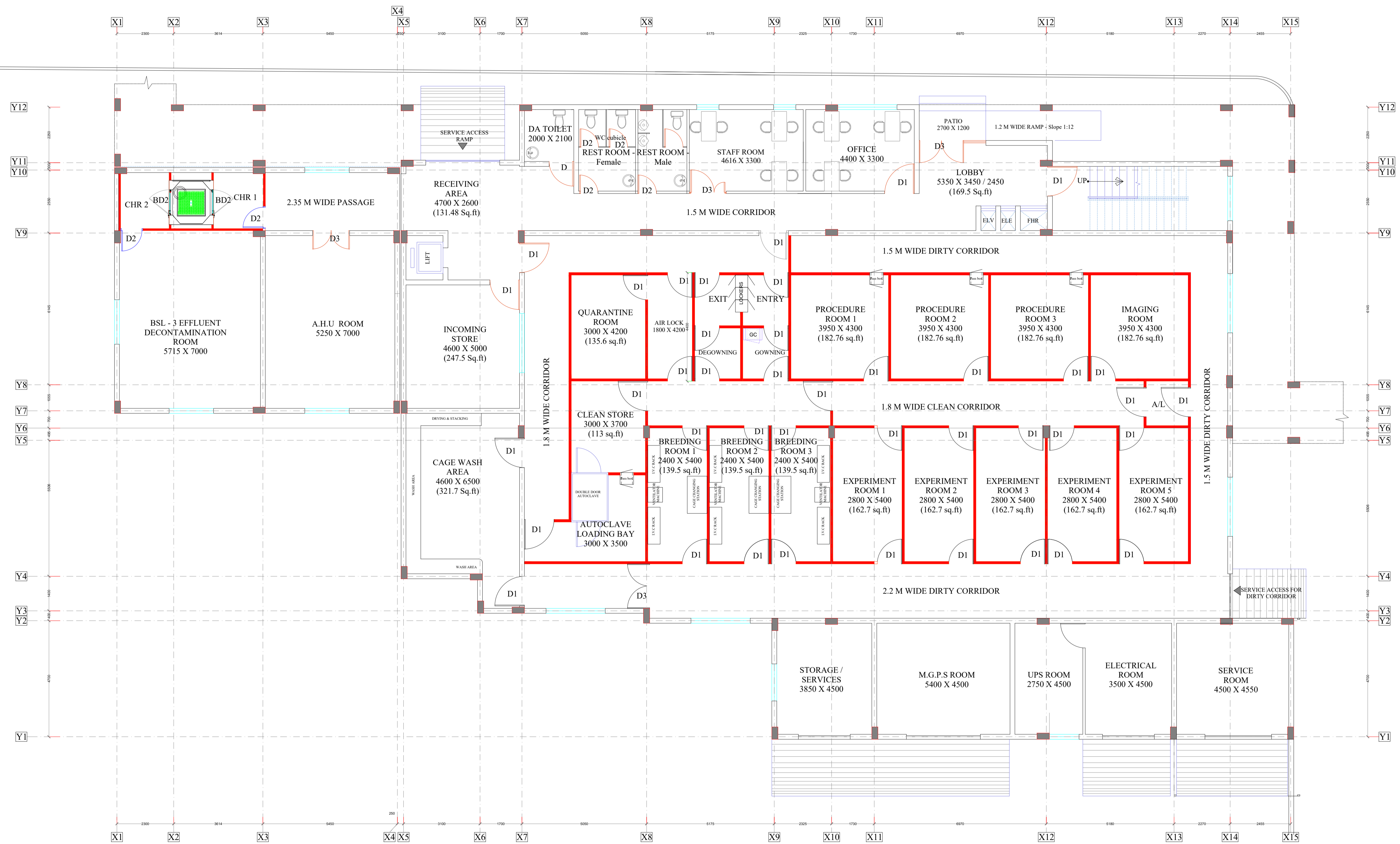
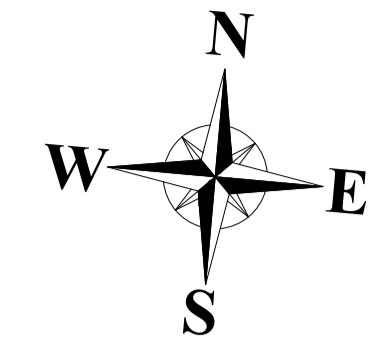
PROJECT: KSIDC Non Technical Buildings, Thiruvananthapuram  
 LOCATION: Life Science Park, Thonnakkal, Thiruvananthapuram  
 BOREHOLE NO: 06 (BH-06)  
 WATER TABLE (from GL): 5.00m

Date of start: 29/09/2017  
 Date of finish: 02/10/2017  
 Type of Boring: Rotary boring

Borehole diameter: 100mm  
 Total depth: 37.10m  
 Purpose: Two storey Office Building

Depth from GL, m	LITHOLOGY		Size of core pieces	Structural Conditions	PERCENT CORE RECOVERY	RQD	SIZE OF HOLE	GROUT	CASING	Depth of water level, m	Water Loss	PERCOLATION TEST				REMARKS	
	DESCRIPTION	LOG										TEST SECTION	Pressure (kg/sq cm)	Loss (l/m)	Depth of water level		By Falling Head Method
35.59m	Grey highly jointed hard rock		<10mm size		20	0	NX		mm NX BX AX		No	Not Conducted					Core Recovery = 28/151 = 18.5% RQD = 0/151 = zero Total no. of pieces = 4++
37.10m			10 to 25mm size		20	0			Other sizes		Partial	Not Conducted					
			25 to 75mm size		20	0					Partial	Not Conducted					
			75 to 150mm size		20	0					Partial	Not Conducted					
			>150mm size		20	0					Complete	Not Conducted					

END OF BOREHOLE



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

SNo	FLOOR	Built up area in Sqm
1	GROUND FLOOR	856.70
2	FIRST FLOOR	814.64
3	TERRACE FLOOR	22.50
<b>TOTAL</b>		<b>1693.84 (18,232.34 S.ft)</b>
<b>CONNECTING CORRIDOR (RCC)</b>		<b>137.9</b>
<b>CONNECTING CORRIDOR (STEEL)</b>		<b>40.26</b>
<b>GRAND TOTAL</b>		<b>1872.00 (20,150.04 S.ft)</b>

**REVISIONS**

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

NAME OF CLIENT / OWNER  
**INSTITUTE OF ADVANCED VIROLOGY**  
**BIO 360 LIFE SCIENCE PARK**  
**THONNAKKAL, TRIVANDRUM**

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

A & E DESIGN & PMC

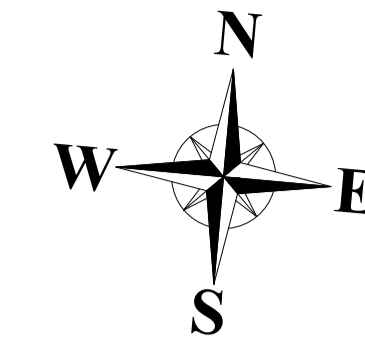
**HITES**  
 HLL INFRA TECH SERVICES LTD  
 (A fully owned subsidiary of HLL Lifecare Ltd.)  
 (A Government of India Enterprise)  
 THIRUVANANTHAPURAM-12  
 Tel: +91 471 2775500 web : www.hllhites.com

PROJECT TITLE :  
**PROPOSED BSL 3 LAB BUILDING**

DRAWING TITLE : ARCHITECTURAL DRAWING  
**GROUND FLOOR PLAN**  
**TENDER DRAWING - R1**

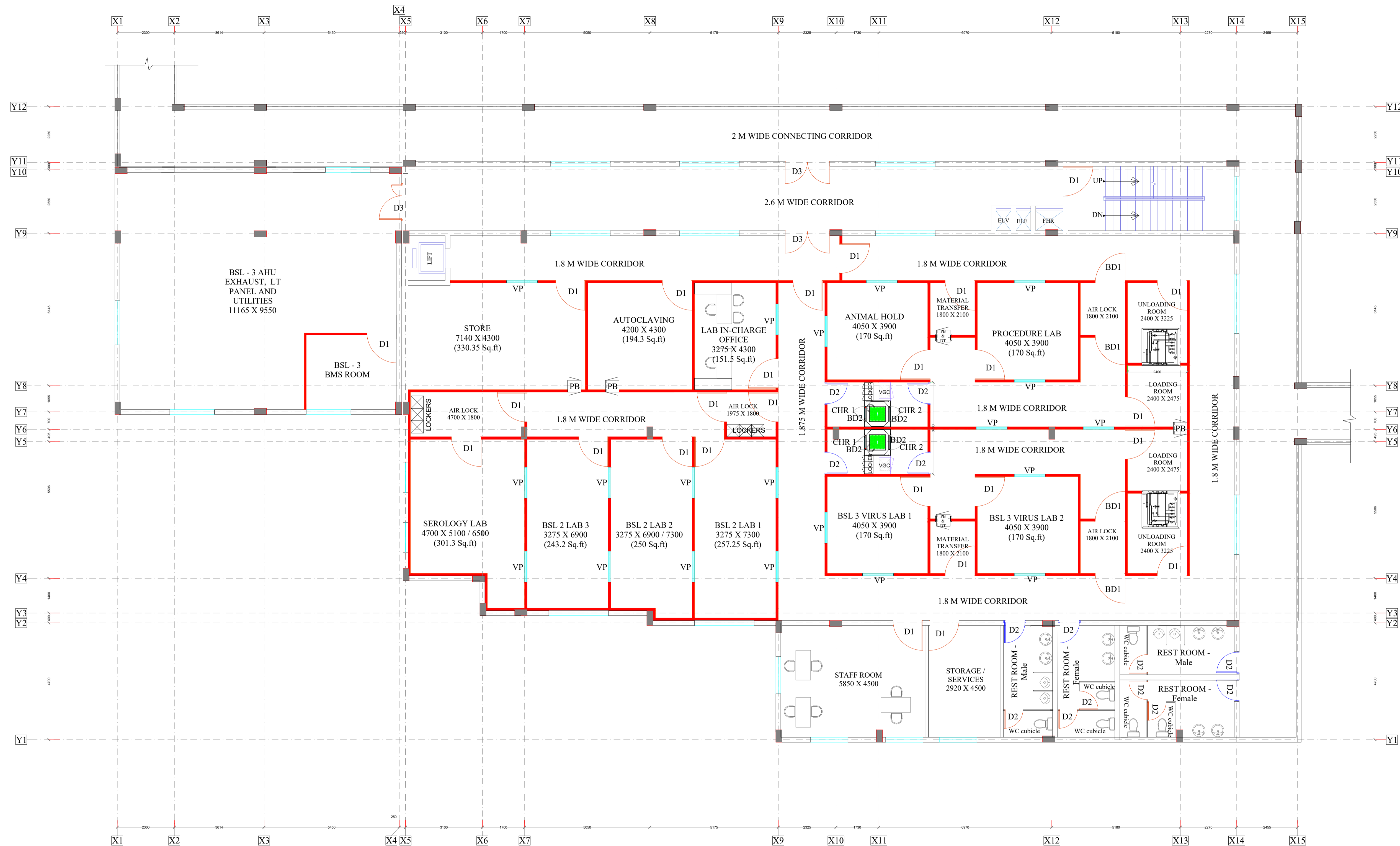
DWG NO :  
**HITES/IDD/GOK/BSL 3/TNKL/2022-23/A-03**

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



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 2. DO NOT SCALE THE DRAWING  
 3. ALL LEVELS ARE IN CM  
 4. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.



**FIRST FLOOR PLAN**

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

SNo	FLOOR	Built up area in Sqm
1	GROUND FLOOR	856.70
2	FIRST FLOOR	814.64
3	TERRACE FLOOR	22.50
<b>TOTAL</b>		<b>1693.84 (18,232.34 S.ft)</b>
CONNECTING CORRIDOR (RCC)		137.9
CONNECTING CORRIDOR (STEEL)		40.26
<b>GRAND TOTAL</b>		<b>1872.00 (20,150.04 S.ft)</b>

**REVISIONS**

NO.	DATE	DESCRIPTION	DWN	CKD	APD
1.	18.03.24	LABORATORY VIEW PANESL			

NAME OF CLIENT/ OWNER  
**INSTITUTE OF ADVANCED VIROLOGY  
 BIO 360 LIFE SCIENCE PARK  
 THONNAKKAL, TRIVANDRUM**

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

A & E DESIGN & PMC

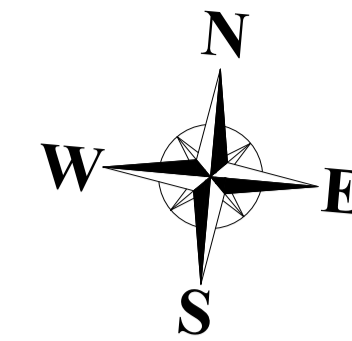
**HITES**  
 HLL INFRA TECH SERVICES LTD  
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 THIRUVANANTHAPURAM-12  
 Tel: +91 471 2775500 web : www.hllhites.com

PROJECT TITLE :  
**PROPOSED BSL 3 LAB BUILDING**

DRAWING TITLE : ARCHITECTURAL DRAWING  
**FIRST FLOOR PLAN**  
 TENDER DRAWING - R1

DWG NO :  
**HITES/IDD/GOK/BSL 3/TNKL/2022-23/A-04**

STATUS : FOR TENDER PURPOSE	SIGN	DATE
DESIGNED BY		09-02-2024
CHECKED BY		
APPROVED BY		



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**NOTE / LEGEND**

1. ALL DIMENSIONS ARE IN CENTIMETRES
2. DO NOT SCALE THE DRAWING
3. ALL LEVELS ARE IN CM
4. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.

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

SNo	FLOOR	Built up area in Sqm
1	GROUND FLOOR	856.70
2	FIRST FLOOR	814.64
3	TERRACE FLOOR	22.50
<b>TOTAL</b>		<b>1693.84 (18,232.34 S.ft)</b>
CONNECTING CORRIDOR (RCC)		137.9
CONNECTING CORRIDOR (STEEL)		40.26
<b>GRAND TOTAL</b>		<b>1872.00 (20,150.04 S.ft)</b>

**REVISIONS**

NO.	DATE	DESCRIPTION	DWN	CKD	APD
1.	18.03.24	PRE-FAB CEILING HEIGHT			

**NAME OF CLIENT/ OWNER**

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

**CONSULTANT**

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

**A & E DESIGN & PMC**

**PROJECT TITLE :**

PROPOSED BSL 3 LAB BUILDING

**DRAWING TITLE :** ARCHITECTURAL DRAWING

ELEVATIONS AND SECTIONS

TENDER DRAWING - R1

**DWG NO :**

HITES/IDD/GOK/BSL 3/TNKL/2022-23/A-05

**STATUS :** FOR TENDER PURPOSE

SCALE : 1:100

	SIGN	DATE
DESIGNED BY		09-02-2024
CHECKED BY		
APPROVED BY		



**ELEVATION**



**SECTION AA**