MINUTES OF THE PRE-BID MEETING FOR INTEGRATED SEWERAGE SYSTEM FOR IMPHAL CITY PHASE-II (SH: Imphal sewerage Project Phase II for Imphal city zone 1, zone 6 and left out portion of Imphal Sewerage Phase-I, Package: ISP P-I(W)), (SH: Imphal sewerage Project Phase II for Imphal city zone 2 &3, Package: ISP P- II(W)), (SH: Imphal sewerage Project Phase II for Imphal city zone 4, Package: ISP P- III(W)) and (SH: Imphal sewerage Project Phase II for Imphal city zone 5, Package: ISP P-IV(W)) WITH NDB HELD ON 08-07-2022

Ref. No. (i) CE/PHE/3-94/NDB(S-W)/P-I/2022/**1070**, dated : 28/06/2022
(ii) CE/PHE/3-94/NDB(S-W)/P-II/2022/**1071**, dated : 28/06/2022
(iii)CE/PHE/3-94/NDB(S-W)/P-III/2022/**1072**, dated : 28/06/2022
(iv) CE/PHE/3-94/NDB(S-W)/P-IV/2022/**1073**, dated : 28/06/2022

The pre-bid meeting for INTEGRATED SEWERAGE SYSTEM FOR IMPHAL CITY PHASE-II (SH: Imphal sewerage Project Phase II for Imphal city zone 1, zone 6 and left out portion of Imphal Sewerage Phase-I, Package: ISP P-I(W)), (SH: Imphal sewerage Project Phase II for Imphal city zone 2 &3, Package: ISP P- II(W)), (SH: Imphal sewerage Project Phase II for Imphal city zone 4, Package: ISP P- III(W)) and (SH: Imphal sewerage Project Phase II for Imphal city zone 5, Package: ISP P-IV(W)) was chaired by Chief Engineer, PHED and assisted by Superintending Engineer (Urban), PHED, Superintending Engineer, (Plg. & Monitoring), PHED, Executive Engineer, Drainage and Sewerage Division, PHED, and Executive Engineer, (W/S Maintenance Division-II), PHED . Representative at **Sl. No. 1, 4, 10 and Eco-Protection Engineers Pvt.Ltd.** were present in the said meeting. But the following firms have submitted their queries through e-mail:-

1. Aquatech
2. East India UDYOG Limited
3. Dineshchandra R. Agrawal Infracon Pvt. Ltd.
4. Sudhakara Infratech Pvt.Ltd.
5. Enviro Infra engineers Pvt. Ltd. Delhi
6. Jalyan Construction.
7. M/s Badri Rai & Co.
8. Toshiba water solution.
9. Hoover Infracon Pvt. Ltd.
10. Keystone Infra Pvt. Ltd.
11. Mahmood Associates

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	Reference	Description as Per Tender/ IFB	Queries/ Clarification of the bidder	Remarks
1	Section No. III Evaluation and Qualification Page No. 13 A1 Para No/ Clause No. 07	If a single bidder applies in all the five packages viz ISP PI (W), ISP P-II(W), ISP PIII (W), ISP P-IV(W) & ISP P-V(W), the qualification requirement will be sum total of average annual turnover required in individual tenders taken together. Similar formula will apply in case single bidder bids for multiple packages. Accordingly, only the number of packages in sequence corresponding to the total turnover calculated as above will be consider and the remaining package(s) will not be considered both for Technical and Financial Bid.	We request you to kindly relax this Clause and Consider Bidder's Available Bid-capacity instead of considering sum of average annual turnovers required in individual Tenders, which will allow Eligible bidders to bid for Multiple Packages at once. Kindly provide the formula for Calculating Bid capacity.	Clarified as:- No change in NIT
2	Section No. II, Page No. 6 Para No./Clause No. A4	A Bidder may be a reputed firm/contractor, registered in Central/State Government / Semi Government works in appropriate class upto the date of issue of this procurement/NIT and from any of the member countries of NDB. No Consortium/Joint bids shall be accepted.	We request you to kindly accept Joint bids i.e. from a Consortium/Joint Venture involving maximum of 2 parties.	Clarified as:- No change in NIT
3	General		The Tender Document does not mention any Average Ground Level or Finished Ground Level. We therefore request you to kindly provide details regarding the Topography of land and STP Premises along with HFL.	Clarified as:- Attached as Annexure I and Annexure-II

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4	General		We request you to kindly provide details regarding the Safe Bearing Capacity of the soil/Plot of the STP.	Clarified as:- Attached as Annexure III
5	General		We request you to accept Bid securing declaration as a form of EMD and kindly publish the format for the same.	Clarified as: No change in NIT
6	Electrical		We understand that as principal owner of the project, PHED Imphal will bear the charges for Power connection at STP and IPS as applicable. Further, we understand that charges for establishing power feeder into the incomer panels at respective sites will be borne by the Department. Please confirm.	Clarified as:- All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder.
7	General		We understand that the charges for Power consumption during the 7 years of O&M shall be paid by the Employer. Please confirm	Clarified as:- All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder.
8	Section No.IV Appendix-9 of package III Page No. 29-32 of package III Para No./Clause No. 4 of Package III	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per	Raw sewage design parameters are not given in the tender document; in absence of the same bidder may consider different parameters for the	Clarified as:- Attached as Annexure-IV

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		specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items:	design of the STP and it would be difficult to evaluate the bid at par during evaluation. Therefore, kindly allow the bidder to consider raw sewage parameters as per CPHEEO Manual, the same was accepted during the earlier "Integrated Sewerage system for Imphal City Phase II. (SH: Imphal Sewerage Project Phase II for Imphal city zone 2, 3, 4 &5 Package: ISP PV (W))" i.e. 16 MLD STP in Annexure-II attached with the minutes of the Pre-bid meeting held on 05-05-2022. The raw sewage parameters as per Annexure-II are as follows for reference: pH: 5.5-9.0 BOD: 250mg/l COD: 425mg/l TSS: 375mg/l TKN: 45 mg/l TP: 7mg/l Kindly confirm.	
9	Section No.IV, Appendix-9 Page No. 29-32 Para No./Clause No.4 of package III	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: …	Peak factor for the proposed 27 MLD STP project is not traceable in the tender document. We request you to kindly provide the same or allow to take as per the CPHEEO manual (i.e. 2.25) to keep all bidders at par	Clarified as:- As per CPHEEO manual

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10	Section No. 3 Page No. 12-13 Para No/ Clause No. 3	Evaluation and Qualification Criteria The Agency shall have a tie-up with a technology provider for Designing, Providing Key Equipments and Performance Guarantee for SBR technology and submit the affidavit to the Department regarding the tie-up with the technology provider. The technology provider must have provided technology for at least one Sewage Treatment Plant of min. 15.00 MLD Capacity based on SBR technology during the last seven years in India or Abroad and are working satisfactorily for at least three years as on date of calling of tenders and achieving the outlet parameters as per the tender requirement.	We understand outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as per the latest NGT guideline, as this is a Tender requirement. The outlet parameters are as follows : BOD M 10 mg/l COD M 50 mg/l TSS M 10 mg/l TN M 10 mg/l TP M 1 mg/l Kindly confirm.	Clarified as:- Yes, outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as per latest NGT guidelines
11	Section No. IV Page No. 29-32 Para No/ Clause No. 4 of Package III	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: (i) Design, Drawing, Construction… (ii) Design, Drawing, Construction… (iii) Design, Drawing, Construction…	We presume that all required process units shall be designed in accordance with the latest CPHEEO manual 2013. Kindly Confirm	Clarified as:- The required process units to be provided shall be designed by the bidder as per the NITs requirements and CPHEEO manual.
12	Section No. IV Appendix-9 Page No. 27-33 of package III Para No/ Clause No.	Invert level of incoming sewer, Average Ground level, Finished Ground Level	We request you to please provide the Average Ground Level, Finished Ground Level, of IPS/MPS & STP site And Invert level of incoming sewer for receiving chamber	Clarified as:- Attached as Annexure-I and Annexure-II. The treated effluent will be discharged at

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			design of MPS. Also provide HFL / Disposal level of treated sewage at final disposal location. Distance of final disposal point from STP boundary. Kindly Confirm.	the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
13	Section No. VII ANNEXURE-I Page No. 74-76 of package III Para No/ Clause No.	Typical Drawing	We request you to kindly provide AutoCAD drawing of proposed plot for STP and MPS.	Clarified as:- Lat-long of the proposed plot for STP and MPS are attached as Annexure-V. Design and drawing of the proposed plot for STP and MPS are under bidder's scope.
14	Section No. IV Appendix-9 Page No. 38-41 Para No/ Clause No. 6 of package-I	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items:	Raw sewage design parameters are not given in the tender document; in absence of the same bidder may consider different parameters for the design of the STP and it would be difficult to evaluate the bid at par during evaluation. Therefore, kindly allow the bidder to consider raw sewage parameters as per CPHEEO Manual, the same was accepted during the	Clarified as:- Attached as Annexure-IV

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			earlier "Integrated Sewerage system for Imphal City Phase II. (SH: Imphal Sewerage Project Phase II for Imphal city zone 2, 3, 4 &5 Package: ISP PV (W))" i.e. 16 MLD STP in Annexure-II attached with the minutes of the Pre-bid meeting held on 05-05-2022. The raw sewage parameters as per Annexure-II are as follows for reference: pH: 5.5-9.0 BOD: 250mg/l COD: 425mg/l TSS: 375mg/l TKN: 45`mg/l TP: 7mg/l Kindly confirm.	
15	Section No. IV, Appendix-9 Page No. 38-41 Para No/ Clause No. 6 of package-I	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: …	Peak factor for the proposed 6 MLD STP project is not traceable in the tender document. We request you to kindly provide the same or allow to take as per the CPHEEO manual (i.e. 2.25) to keep all bidders at par	Clarified as:- As per CPHEEO manual.
16	Section No. III Page No. 12-13 Para No/ Clause No. 3 of Package- I	Evaluation and Qualification Criteria The Agency shall have a tie-up with a technology provider for Designing, Providing Key Equipments and Performance Guarantee for SBR technology and submit	We understand outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as per the latest NGT guideline, as this is a Tender requirement. The outlet	Clarified as:- Yes, outlet parameters achieved and mentioned in Technology Provider's experience

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		the affidavit to the Department regarding the tie-up with the technology provider. The technology provider must have provided technology for at least one Sewage Treatment Plant of min. 15.00 MLD Capacity based on SBR technology during the last seven years in India or Abroad and are working satisfactorily for at least three years as on date of calling of tenders and achieving the outlet parameters as per the tender requirement.	parameters are as follows : BOD M 10 mg/l COD M 50 mg/l TSS M 10 mg/l TN M 10 mg/l TP M 1 mg/l Kindly confirm.	certificate shall be as per latest NGT guidelines
17	Section No. IV Appendix 9 Page No. 26-41 Para No/ Clause No. 6 of Package-I	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: (i) Design, Drawing, Construction… (ii) Design, Drawing, Construction… (iii) Design, Drawing, Construction…	Process design Guidelines/Criteria for various units including SBR is not given in the tender document. We presume that all required process units shall be designed in accordance with the latest CPHEEO manual 2013. Kindly Confirm.	Clarified as:- The required process units to be provided shall be designed by the bidder as per the NITs requirements and CPHEEO manual.
18	Section No. IV, Appendix-9 Page No. 26-41 of package-I Para No/ Clause No.	Invert level of incoming sewer, Average Ground level, Finished Ground Level	We request you to please provide the Average Ground Level, Finished Ground Level, of IPS/MPS & STP site and Invert level of incoming sewer for receiving chamber design of MPS. Also provide HFL /Disposal level of treated sewage at final disposal location. Distance of final disposal pointfrom STP boundary. Kindly Confirm.	Clarified as:- Attached as Annexure-I and Annexure-II. The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.

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19	Section No. II Page No. 9 Para No/ Clause No. A4.1	No consortium/Joint bids shall be accepted	Bid may be submitted by Joint Ventures/Consortium. Please allow	Clarified as:- No change in NIT
20	Section No. Page No. Para No/ Clause No.	A.1 – Technical Criteria (2) (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) Sewerage Treatment Plant (STP) with capacity 15 MLD or above in member countries of NDB during the last five years from 2017-18 to 2021-22	<u>To be deleted.</u> Sewerage treatment plant is not under the scope of above NIT so for healthy competition it would be feasible and in the interest of Department to delete the said clause. Or Basic and detailed engineering including Procurement, construction of minimum 1 (one) Sewerage Treatment Plant (STP) with capacity 05 MLD or above in member countries of NDB during the last five years from 2017-18 to 2021-22	Clarified as: No change in NIT.
21	Section No. 1 Page No. 8 Para No/ Clause No. I.1	Last Date & Time for receipt of original copy of the Tender Fee 12:00 hours of 01/08/2022	Should be same as Last Date & Time of uploading: 12:00 Hours of 29/07/2022	Clarified as: No change in NIT.
22	Section No. IV, Appendix-9 Page No. 38-41 Para No/ Clause No. 6	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items:	Raw sewage design parameters are not given in the tender document; in absence of the same bidder may consider different parameters for the design of the STP and it would be difficult to evaluate the bid at par during evaluation. Therefore,	Clarified as: Attached as Annexure-IV

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			kindly allow the bidder to consider raw sewage parameters as per CPHEEO Manual, the same was accepted during the earlier "Integrated Sewerage system for Imphal City Phase II. (SH: Imphal Sewerage Project Phase II for Imphal city zone 2,3, 4 &5 Package: ISP P-V(W))" i.e. 16 MLD STP in Annexure-II attached with the minutes of the Pre-bid meeting held on 05-05-2022. The raw sewage parameters as per Annexure-II are as follows for reference: pH: 5.5-9.0 BOD: 250mg/l COD: 425mg/l TSS: 375mg/l TKN: 45`mg/l TP: 7mg/l Kindly confirm	
23	Section No. IV Appendix 9 Page No. – 38-41 Cl. No. 6	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items:…	Peak factor for the proposed 6 MLD STP project is not traceable in the tender document. We request you to kindly provide the same or allow to take as per the CPHEEO manual (i.e. 2.25) to keep all bidders at par.	Clarified as: As per CPHEEO manual
24	Section No. – III	Evaluation and Qualification Criteria	We understand outlet parameters	

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	Page No. 12-13 Cl. No. 3	The Agency shall have a tie-up with a technology provider for Designing, Providing Key Equipments and Performance Guarantee for SBR technology and submit the affidavit to the Department regarding the tie-up with the technology provider. The technology provider must have provided technology for at least one Sewage Treatment Plant of min. 15.00 MLD Capacity based on SBR technology during the last seven years in India or Abroad and are working satisfactorily for at least three years as on date of calling of tenders and achieving the outlet parameters as per the tender requirement.	achieved and mentioned in Technology Provider's experience certificate shall be as per the latest NGT guideline, as this is a Tender requirement. The outlet parameters are as follows : BOD $\leq$ 10 mg/l COD $\leq$ 50 mg/l TSS $\leq$ 10 mg/l TN $\leq$ 10 mg/l TP $\leq$ 1 mg/l Kindly confirm.	Clarified as:- Yes, outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as per latest NGT guidelines
25	Section No. – IV Appendix 9 Page No. – 26 - 41 Cl. No. 6	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 6 MLD (including Civil, Mechanical, Electrical) at Lamphelpat as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: (i) Design, Drawing, Construction… (ii) Design, Drawing, Construction… (iii) Design, Drawing, Construction…	Process design Guidelines/Criteria for various units including SBR is not given in the tender document. We presume that all required process units shall be designed in accordance with the latest CPHEEO manual 2013. Kindly Confirm.	Clarified as:- The required process units to be provided shall be designed by the bidder as per the NITs requirements and CPHEEO manual.
26	Section No. – IV Appendix 9 Page No. – 26-41 Cl. No.	Invert level of incoming sewer, Average Ground level, Finished Ground Level	We request you to please provide the Average Ground Level, Finished Ground Level, of IPS/MPS & STP site and Invert level of incoming sewer for receiving chamber design of MPS. Also provide HFL / Disposal	Clarified as:- Attached as Annexure-I and Annexure-II. The treated effluent will be discharged at the nearby drains/canal for

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			level of treated sewage at final disposal location. Distance of final disposal point from STP boundary. Kindly Confirm.	further discharging to the river within 3 km radius range from STP.
27	Section No. VII, Annexure-I Page No. – 83-89 Cl. No.	Typical Drawings	We request you to kindly provide AutoCAD drawing of proposed plot for STP and MPS. Kindly Confirm.	Clarified as:- Lat-long of the proposed plot for STP and MPS are attached as Annexure-V. Design and drawing of the proposed plot for STP and MPS are under bidder's scope.
28	Section No. - IV Appendix 9 Page No. – 29-32 Cl. No. 4	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items:	Raw sewage design parameters are not given in the tender document; in absence of the same bidder may consider different parameters for the design of the STP and it would be difficult to evaluate the bid at par during evaluation. Therefore, kindly allow the bidder to consider raw sewage parameters as per CPHEEO Manual, the same was accepted during the earlier "Integrated Sewerage system for Imphal City Phase II. (SH: Imphal Sewerage Project	Clarified as: Attached as Annexure-IV

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			Phase II for Imphal city zone 2,3, 4 &5 Package: ISP P-V(W))" i.e. 16 MLD STP in Annexure-II attached with the minutes of the Pre-bid meeting held on 05-05-2022. The raw sewage parameters as per Annexure-II are as follows for reference: pH: 5.5-9.0 BOD: 250mg/l COD: 425mg/l TSS: 375mg/l TKN: 45 mg/l TP: 7mg/l Kindly confirm.	
29	Section No. – IV, Appendix 9 Page No. – 29-32 Cl. No. 4	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: …	Peak factor for the proposed 27 MLD STP project is not traceable in the tender document. We request you to kindly provide the same or allow to take as per the CPHEEO manual (i.e. 2.25) to keep all bidders at par.	Clarified as: As per CPHEEO manual
30	Section No. – III, Page No. – 12-13 Cl. No. 3	Evaluation and Qualification Criteria The Agency shall have a tie-up with a technology provider for Designing, Providing Key Equipments and Performance Guarantee for SBR technology and submit the affidavit to the Department regarding the tie-up with the technology provider. The technology provider must have provided	We understand outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as per the latest NGT guideline, as this is a Tender requirement. The outlet parameters are as follows :	Clarified as:- Yes, outlet parameters achieved and mentioned in Technology Provider's experience certificate shall be as

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		technology for at least one Sewage Treatment Plant of min. 15.00 MLD Capacity based on SBR technology during the last seven years in India or Abroad and are working satisfactorily for at least three years as on date of calling of tenders and achieving th e outlet parameters as per the tender requirement.	BOD ≤ 10 mg/l COD ≤ 50 mg/l TSS ≤ 10 mg/l TN ≤ 10 mg/l TP ≤ 1 mg/l Kindly confirm.	per latest NGT guidelines
31	Section No. – IV, Appendix 9 Page No. – 29-32 Cl. No. 4	Design, Drawing, Construction, Commissioning and trial run of different units of Sewage Treatment Plant 27 MLD (including Civil, Mechanical, Electrical, Area-2 hectare) at Langthabal Kunja as per specification mentioned in the schedule and meeting effluent characteristics by NGT and as per items: (i) Design, Drawing, Construction… (ii) Design, Drawing, Construction… (iii) Design, Drawing, Construction…	Process design Guidelines/Criteria for various units including SBR is not given in the tender document. We presume that all required process units shall be designed in accordance with the latest CPHEEO manual 2013. Kindly Confirm	Clarified as:- The required process units to be provided shall be designed by the bidder as per the NITs requirements and CPHEEO manual.
32	Section No. – IV, Appendix 9 Page No. – 27-33 Cl. No.	Invert level of incoming sewer, Average Ground level, Finished Ground Level	We request you to please provide the Average Ground Level, Finished Ground Level, of IPS/MPS & STP site and Invert level of incoming sewer for receiving chamber design of MPS. Also provide HFL / Disposal level of treated sewage at final disposal location. Distance of final disposal point from STP boundary. Kindly Confirm.	Clarified as:- Attached as Annexure-I and Annexure-II. The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.

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33	Section No. – VII, Annexure-I Page No. – 74-76 Cl. No.	Typical Drawings	We request you to kindly provide AutoCAD drawing of proposed plot for STP and MPS. Kindly Confirm.	Clarified as:- Lat-long of the proposed plot for STP and MPS are attached as Annexure-V. Design and drawing of the proposed plot for STP and MPS are under bidder's scope.
34	Section No. - Page No. - Cl. No.		1) For ascertaining the Actual Quantity of for Sewer network ROAD CUTTING & RESTORATION please provide the actual of bitumen, CC & Kaccha Road length. 2) For Excavation of Trench, please provide us with TRENCH EXCAVATION PROFILE. 3) Please provide the BEDDING PROFILE for DWC & DI pipes in respective Trench width. 4) As in BOQ Item description for DI K7 Pipeline lowering & laying, item says "Backfilling with Gravel- it seems unnecessary to backfill with Gravel- as it contain voids and can cause	All sewerage networks are to be laid in the centre of the road and are all bituminous road. The width of the trench at or below the top of the sewer should be sufficient enough for its proper installation with due consideration to its bedding. However, detailed soil investigations have to be performed during construction and suitable construction techniques have to be adopted. A

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			settlement on later stage. Please clarify if it's to be done or not. 5) As in BOQ Item description for DI K7 Pipeline lowering & laying, item says "Backfilling with Gravel" – it seems unnecessary to backfill with Gravel- as it contain void and can cause settlement on later stage. Please clarify if it's to be done or not. 6) There is no SCHEMATIC DRAWING of HOUSEHOLD CONNECTIONS with INSPECTION CHAMBER (I/C) HOUSEHOLD CHAMBER (HHC). Please define the Dimensions of IC/HHlC with a typical layout. 7) What MoC (Material of Construction) Manhole is to be used in sewer network, along with its Internal Diameter, Please provide.	minimum cover of 1m shall usually be maintained. Excavation of trenches has to be done as per approved design and drawing. Bedding profile is attached as Annexure-VI. However, the actual will be as per the approved design and drawing submitted by the successful bidder before execution. Backfilling should be done as per relevant IRC code. All manholes should be of Precast RCC type. Schematic drawing of household connection is attached as Annexure-VII.
35	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED	Effluent Parameters	Inlet and outlet Parameters required to design the STP are not provide with the tender documents, Pleas provide the same.	Clarified as: Attached as Annexure-IV for raw sewage. The outlet parameters achieved

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	Page No. : 75 onwards Para No/ Clause No. :			shall be as per latest NGT guidelines
36	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		Disposal of sludge distance form STP boundary is required for the cost estimation is not provided in the tender, It is requested to kindly provide the same.	Clarified as:- The final disposal point/location of treated sewage is within the STP premises which may be approx. within 1 km radius range.
37	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		Treated water disposal distance is required for the estimation is not provided in the tender, It is requested to kindly provide the same.	The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
38	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		We request department to provide the google earth file demarking STPs or Co-ordinates for location the plot area for STP, Pumping station and effluent disposal point so that we can have clear view/understanding. Kindly provide	Clarified as: Attached as Annexure-V
39	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO		What is the value of peak factor to be considered for this project? Please provide	Clarified as: As per CPHEEO manual

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	BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :			
40	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		We request department to please provide the drawing like Key Plan of STPs site, pumping station, and disposal point for STPs. Please provide the drawings in a suitable format so that it can be understood easily for reference during preparation of the proposal	Clarified as: Lat-long of the proposed plot for STP and MPS are attached as Annexure-V. Design and drawing of the proposed plot for STP and MPS are under bidder's scope. The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
41	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		It is requested to clarify that the treated effluent shall be disposed of through pipe or channel. Kindly specify the MOC as well.	The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
42	SECTION-VII		Land Area for the proposed	Clarified as:

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	SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		STPs are not provided in the tender document. Please provide the land available for STPs	Attached as Annexure-V
43	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		Please provide list of documents required for Submissions from the Bidder at the time of Bidding.	Clarified as: Please refer to NIT for submission of all the required documents.
44	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 75 onwards Para No/ Clause No. :		Kindly provide the list of makes (if any)?	Clarified as: All the materials and equipment should be as per the requirement given in NIT.
45	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 56	c) Contractor will be responsible for obtaining statutory approvals/permits related to E&S aspects including labor aspects. PHED will support the Contractor, if	As per Statutory norms the Environment Impact Assessment as required under the applicable Rules & Regulation has to be	Clarified as: Necessary clearances from Environment and Climate Change

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	Para No/ Clause No. : 9. ENVIRONMENTAL AND SOCIAL ASPECTS	required, for obtaining the necessary approvals.	done for the Project and necessary approvals including approvals from Ministry of Forest and Pollution Control Board (PCB) as applicable shall be taken by the Employer before commencement of Project along with Establish (CTE) approval under Environmental Law from the relevant authority. Please confirm that the same is complied with by the Employer. Also, the Employer being Proponent of the project has statutory responsibility to obtain the Consent to Operate (CTO) under Environmental Law from the relevant authority. Please confirm.	and Manipur Pollution Control Board have been obtained.
46	SECTION II INSTRUCTIONS TO BIDDERS (ITB) Page No. : 5 Para No/ Clause No. : A3. COST ESCALATION	A 3.1 No escalation will be allowed. The price quoted should be firm during the validity of contract period.	It is the standard commercial practice, If after bid submission/during execution, there is any change in law or enactment of new law/legislation or any unforeseeable circumstances which results into increase in the rate of Wages, Tax, or any other negative statutory variations thereby increase the cost of the Contractor, the same shall be reimbursed/paid/borne by the Employer. Please confirm	Clarified as: No change in NIT

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47	Section No.: NIL Page No. : NIL Para No/ Clause No. : NIL	Limitation of Liability	We understand that notwithstanding any other provision of the Contract the Bidder's maximum liability accrue or arise from the performance of the Contract against Employer or any other third party shall be limited upto maximum 10% of Contract Price. Please confirm	Clarified as: Payment will be made as per Clause 6.1 of GCC of NIT
48	Section No.: NIL Page No. : NIL Para No/ Clause No. : NIL	Limitation of Consequential Liability	We understand that as per standard commercial practice Contractor shall not be liable for any indirect loss of profits, loss of goodwill or reputation, special, punitive, incidental, or consequential damages to the Employer or any third Party. Please confirm.	Clarified as: Liability shall be as provided by the applicable law
49	Section No.: PWD Form – 12 Page No. : 72 Para No/ Clause No. : 35	Arbitration	That the reference of all or any dispute arising out of the Contract to referred to the sole arbitration of the person appointed by the Additional Chief Engineer, Public Health Engineering Department, Government of Manipur being final, conclusive and binding on both the parties with regard to appointment of Arbitrator is in prejudice to the Contractor and against the principle of natural justice thus kindly amend the	Clarified as: No change in NIT

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			clause as "*any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or the breach thereof shall be shall be referred to a sole arbitrator mutually appointed by the Parties. In case of disagreement upon the name of the sole arbitrator, the appointment of Sole Arbitrator shall be done in accordance with the provisions of Arbitration & Conciliation Act, 1996.*" Please Confirm.	
50	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 52 Para No/ Clause No. : 2.7	Termination	We understand that the Contractor shall have the right to Terminate the Contract on Default of Employer or breach of any terms and Conditions by the Employer under the Contract or any inordinate delay in payments to Contractors, without any direct or consequential loss, liability or damages. Please Confirm	Clarified as: Termination of the contract will be as per Section-VI, GCC (page no 43), Clause 2.7.
51	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 52	Suspension	We understand that contractor shall have the right to suspend the Contract by giving a notice of 14 days upon Default of owner or breach of any terms	Clarified as: Suspension of the contract will be as per Section-VI, GCC (page no 43), Clause

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	Para No/ Clause No. : 2.6		and Conditions by the owner under the Contract or inordinate delay in payments to Contractors until the Owner rectify the default within 30 days of receipt of such notice without any direct or consequential loss, liability or damages. Also the failure to rectify such default under notice by the Owner within 30 days of receipt of such notice give right to the Contractor to terminate the Contract without any direct or consequential loss, liability or damages. Please Confirm	2.7.
52	SECTION-VI GENERAL CONDITIONS OF CONTRACT	Force Majeure	In regard to Force Majeure Conditions provided in the Tender are incomplete and in light of the present scenario kindly also include "epidemic, Pandemic, quarantine restriction, freight embargo, lockdown or any other government restriction etc." as Force Majeure Conditions. Also, since there is no provision with regard to right/duty/liability of Parties upon occurrence of Force Majeure event thus we understand that in accordance with prevailing commercial	Clarified as: No change in NIT

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			practices, If the execution of the Works in progress or performance of the Contract is prevented for a continuous period of 84 days by reason of an Force Majeure Event of which Notice has been given to employer or for multiple periods which total more than 140 days due to any Force Majeure Event, then the Contractor shall have the right to Remedial Action i.e. cost & time implication and/or Termination entitlement. Please Confirm.	
53	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Please provide layout showing existing facilities in our area of work to ascertain the dismantling required.	Clarified as:- Site survey is under Bidder's scope
54	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Kindly furnish the contour plan of the site with NGL and FGL of the plant.	Clarified as: Site survey is under Bidder's scope
55	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Pl. provides the soil investigation report/ recommendations for foundation design. Also provide ground water table depth.	Clarified as: Attached as Annexure-III
56	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Please provide the tie in point for connecting storm water drainage. Please also confirm MOC of storm water drains	Clarified as: Storm water drains are not in the scope of NIT.
57	Page No. :- Tendernotice_1		Kindly confirm the material of construction and typ. Section of	Clarified as: All sewerage

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	Para No/ Clause No. :- Para No/ Clause No. :-		Roads, (inside and around battery limit) and Pathways.	networks are to be laid in the centre of the road and are all bituminous road.
58	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Please confirm if boundary wall or fencing is to be provided around battery limit of proposed plant. If yes please confirm the material of construction of boundary wall.	Clarified as: The boundary wall must be brick walled type with a height of approx. 1.8 m.
59	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Kindly confirm that construction power and construction water is in client's scope or Bidder's scope?	Clarified as:- All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder.
60	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Kindly provide the civil design basis.	Clarified as: Appropriate IS codes can be referred for design.
61	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :	Effluent Parameters	Inlet and outlet Parameters required to design the STP are not provide with the tender documents, Pleas provide the same.	Clarified as: Attached as Annexure-IV for raw sewage. The outlet parameters achieved shall be as per latest NGT guidelines
62	SECTION-VII		Disposal of sludge distance form	Clarified as:

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	SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		STP boundary is required for the cost estimation is not provided in the tender, It is requested to kindly provide the same.	The final disposal point/location of treated sewage is within the STP premises which may be approx. within 1 km radius range.
63	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		Treated water disposal distance is required for the estimation is not provided in the tender, It is requested to kindly provide the same.	Clarified as: The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
64	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		We request department to provide the google earth file demarking STPs or Co-ordinates for location the plot area for STP, Pumping station and effluent disposal point so that we can have clear view/understanding. Kindly provide	Clarified as: Attached as Annexure V. The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
65	SECTION-VII SUPPLEMENTARY INFORMATION		What is the value of peak factor to be considered for this project? Please provide	Clarified as: As per CPHEEO manual

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	REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :			
66	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		We request department to please provide the drawing like Key Plan of STPs site, pumping station, and disposal point for STPs. Please provide the drawings in a suitable format so that it can be understood easily for reference during preparation of the proposal	Clarified as: Lat-long of the proposed sites are attached as Annexure-V. The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
67	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		It is requested to clarify that the treated effluent shall be disposed of through pipe or channel. Kindly specify the MOC as well.	Clarified as: The treated effluent will be discharged at the nearby drains/canal for further discharging to the river within 3 km radius range from STP.
68	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards		Land Area for the proposed STPs are not provided in the tender document. Please provide the land available for STPs	Clarified as: Attached as annexure-V

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	Para No/ Clause No. :			
69	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		Please provide list of documents required for Submissions from the Bidder at the time of Bidding.	Clarified as: Please refer to NIT
70	SECTION-VII SUPPLEMENTARY INFORMATION REGARDING WORKS TO BE PROCURRED Page No. : 66 onwards Para No/ Clause No. :		Kindly provide the list of makes (if any)?	Clarified as: All the materials and equipment should be as per the requirement given in NIT
71	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 47 Para No/ Clause No. : 9. ENVIRONMENTAL AND SOCIAL ASPECTS	c) Contractor will be responsible for obtaining statutory approvals/permits related to E&S aspects including labor aspects. PHED will support the Contractor, if required, for obtaining the necessary approvals.	As per Statutory norms the Environment Impact Assessment as required under the applicable Rules & Regulation has to be done for the Project and necessary approvals including approvals from Ministry of Forest and Pollution Control Board (PCB) as applicable shall be taken by the Employer before commencement of Project along with Establish (CTE) approval under Environmental Law from the relevant authority. Please confirm that the same is complied with by the Employer. Also, the Employer being Proponent of the project has	Clarified as: Necessary clearances from Environment and Climate Change and Manipur Pollution Control Board have been obtained.

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			statutory responsibility to obtain the Consent to Operate (CTO) under Environmental Law from the relevant authority. Please confirm.	
72	SECTION II INSTRUCTIONS TO BIDDERS (ITB) Page No. : 5 Para No/ Clause No. : A3. COST ESCALATION	A 3.1 No escalation will be allowed. The price quoted should be firm during the validity of contract period.	It is the standard commercial practice, If after bid submission/during execution, there is any change in law or enactment of new law/legislation or any unforeseeable circumstances which results into increase in the rate of Wages, Tax, or any other negative statutory variations thereby increase the cost of the Contractor, the same shall be reimbursed/paid/borne by the Employer. Please confirm	Clarified as: No change in NIT
73	Section No.: NIL Page No. : NIL Para No/ Clause No. : NIL	Limitation of Liability	We understand that notwithstanding any other provision of the Contract the Bidder's maximum liability accrue or arise from the performance of the Contract against Employer or any other third party shall be limited upto maximum 10% of Contract Price. Please confirm	Clarified as: Payment will be made as per Clause 6.1 of GCC of NIT
74	Section No.: NIL Page No. : NIL Para No/ Clause No. : NIL	Limitation of Consequential Liability	We understand that as per standard commercial practice Contractor shall not be liable for any indirect loss of profits, loss	Clarified as: Liability shall be as provided by the applicable law

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			of goodwill or reputation, special, punitive, incidental, or consequential damages to the Employer or any third Party. Please confirm.	
75	Section No.: PWD Form – 12 Page No. : 63 Para No/ Clause No. : 35	Arbitration	That the reference of all or any dispute arising out of the Contract to referred to the sole arbitration of the person appointed by the Additional Chief Engineer, Public Health Engineering Department, Government of Manipur being final, conclusive and binding on both the parties with regard to appointment of Arbitrator is in prejudice to the Contractor and against the principle of natural justice thus kindly amend the clause as "*any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or the breach thereof shall be shall be referred to a sole arbitrator mutually appointed by the Parties. In case of disagreement upon the name of the sole arbitrator, the appointment of Sole Arbitrator shall be done in accordance with*	Clarified as: No change in NIT

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			the provisions of Arbitration & Conciliation Act, 1996." Please Confirm.	
76	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 43 Para No/ Clause No. : 2.7	Termination	We understand that the Contractor shall have the right to Terminate the Contract on Default of Employer or breach of any terms and Conditions by the Employer under the Contract or any inordinate delay in payments to Contractors, without any direct or consequential loss, liability or damages. Please Confirm	Clarified as: Termination of the contract will be as per Section-VI, GCC (page no 43), Clause 2.7
77	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 43 Para No/ Clause No. : 2.6	Suspension	We understand that contractor shall have the right to suspend the Contract by giving a notice of 14 days upon Default of owner or breach of any terms and Conditions by the owner under the Contract or inordinate delay in payments to Contractors until the Owner rectify the default within 30 days of receipt of such notice without any direct or consequential loss, liability or damages. Also the failure to rectify such default under notice by the Owner within 30 days of receipt of such notice give right to the Contractor to terminate the Contract without any direct or consequential loss, liability or	Clarified as: Suspension of the contract will be as per Section-VI, GCC (page no 43), Clause 2.7

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			damages. Please Confirm	
78	SECTION-VI GENERAL CONDITIONS OF CONTRACT Page No. : 42 Para No/ Clause No. : 2.5	Force Majeure	In regard to Force Majeure Conditions provided in the Tender are incomplete and in light of the present scenario kindly also include "epidemic, Pandemic, quarantine restriction, freight embargo, lockdown or any other government restriction etc." as Force Majeure Conditions. Also, since there is no provision with regard to right/duty/liability of Parties upon occurrence of Force Majeure event thus we understand that in accordance with prevailing commercial practices, If the execution of the	Clarified as: No change in NIT

			Works in progress or performance of the Contract is prevented for a continuous period of 84 days by reason of an Force Majeure Event of which Notice has been given to employer or for multiple periods which total more than 140 days due to any Force Majeure Event, then the Contractor shall have the right to Remedial Action i.e. cost & time implication and/or Termination entitlement. Please Confirm.	
79	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Please provide layout showing existing facilities in our area of work to ascertain the dismantling required.	Clarified as:- Site survey is under bidder's scope.
80	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Kindly furnish the contour plan of the site with NGL and FGL of the plant.	Clarified as: Site survey is under Bidder's scope
81	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Pl. provides the soil investigation report/ recommendations for foundation design. Also provide ground water table depth.	Clarified as: Attached as Annexure-III
82	Section No.: Tendernotice_1 Page No. :- Para No/ Clause No. :-		Please provide the tie in point for connecting storm water drainage. Please also confirm MOC of storm water drains	Clarified as: Storm water drains are not in the scope of NIT
83	Page No. :- Tendernotice_1 Para No/ Clause No. :-		Kindly confirm the material of construction and typ. Section of Roads, (inside and around	Clarified as: All sewerage networks are to be

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	Para No/ Clause No. :-		battery limit) and Pathways.	laid in the centre of the road and are all bituminous road.
84	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Please confirm if boundary wall or fencing is to be provided around battery limit of proposed plant. If yes please confirm the material of construction of boundary wall.	Clarified as: The boundary wall must be brick walled type with a height of approx. 1.8 m.
85	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Kindly confirm that construction power and construction water is in client's scope or Bidder's scope?	Clarified as:- All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder.
86	Page No. :- Tendernotice_1 Para No/ Clause No. :- Para No/ Clause No. :-		Kindly provide the civil design basis.	Clarified as: Appropriate IS codes can be referred for design.
87	Section-III Sl. No.-2 Page No. 11 Para/Clause No. A.1	The bidder should fulfil the following experience criteria: - (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) sewerage Treatment Plant (STP) with capacity 15 MLD or above in member countries of NDB during the last five years from 2017-18 to 2021-22. (ii) Providing, laying, jointing, testing & commissioning of sewerage pipeline with	Experience for full completion/substantial completion of similar works during previous 7 years (2014-15 2020-21) as cited below. Similar works on EPC mode 1. Sewerage treatment Plant infrastructures not below the capacity of 15 MLD	Clarified as: No change in NIT.

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		minimum 150 mm diameter & above for a length of minimum 80 km in a single project during the last 5 years (from FY2016-17 to FY2020-21)	having financial value not less than 70 crore or 2. Construction experience of WTP not below 35 MLD having financial value not less than 70 crore.	
88	Section-II Page No. 7 Para/Clause No. A.8	The defect liability period in respect of the entire structure as a whole or in parts of individual components included in the contract shall be 6 months after successful completion of work in all respects and its testing & commissioning.	From the referred clause it is understood that DLP of 6 months in concurrent with 7 years of O & M which shall commence after construction duration 36 months. Please Confirm the same.	Clarified as: The project construction period of 3 years is including 3 months Trial run before commissioning of the project. Further, the O&M period of 7 years will start immediately after commissioning and 6 months DLP is also concurrent with 1st year of O&M.
89	Section-IV Page No. 27 Note-5	PHED provided the prices for each items for reference only.	Kindly confirm about given Qty.	Clarified as: As per NIT.
90	Section-III Page No. Para/Clause No. A.1, Sl.2	The bidder should fulfil the following experience criteria: - (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) sewerage Treatment Plant (STP) with capacity 15 MLD or above in member countries of NDB during the last five years from 2017-18 to	Experience for full completion/substantial completion of similar works during previous 7 years (2014-15 to 2020-21) as cited below. Similar works on EPC mode 1. Sewerage treatment Plant	Clarified as: No change in NIT.

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		2021-22. (ii) Providing, laying, jointing, testing & commissioning of sewerage pipeline with minimum 150 mm diameter & above for a length of minimum 80 km in a single project during the last 5 years (from FY2016-17 to FY2020-21)	infrastructures not below the capacity of 15 MLD having financial value not less than 70 crore or 2. Construction experience of WTP not below 35 MLD having financial value not less than 70 crore.	
91	Section-II Page No. 7 Para/Clause No. A.8	The defect liability period in respect of the entire structure as a whole or in parts of individual components included in the contract shall be 6 months after successful completion of work in all respects and its testing & commissioning.	From the referred clause it is understood that DLP of 6 months in concurrent with 7 years of O & M which shall commence after construction duration 36 months. Please Confirm the same.	Clarified as: The project construction period of 3 years is including 3 months Trial run before commissioning of the project. Further, the O&M period of 7 years will start immediately after commissioning and 6 months DLP is also concurrent with 1st year of O&M.
92	Section-IV Page No. 42, Note-5 Para/Clause No.	PHED provided the prices for each items for reference only.	Kindly confirm about given Qty.	Clarified as: As per NIT
93	Section-III Page No. 12 Para/Clause No. A.1, Sl.2	The bidder should fulfil the following experience criteria: - (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) sewerage Treatment Plant (STP) with capacity 15 MLD or above in member countries of NDB	Experience for full completion/substantial completion of similar works during previous 7 years (2014-15 to 2020-21) as cited below. Similar works on EPC mode	Clarified as: No change in NIT.

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		during the last five years from 2017-18 to 2021-22. (ii) Providing, laying, jointing, testing & commissioning of sewerage pipeline with minimum 150 mm diameter & above for a length of minimum 80 km in a single project during the last 5 years (from FY2016-17 to FY2020-21)	1. Sewerage treatment Plant infrastructures not below the capacity of 15 MLD having financial value not less than 70 crore or 2. Construction experience of WTP not below 35 MLD having financial value not less than 70 crore.	
94	Section-II Page No. 7 Para/Clause No. A.8	The defect liability period in respect of the entire structure as a whole or in parts of individual components included in the contract shall be 6 months after successful completion of work in all respects and its testing & commissioning.	From the referred clause it is understood that DLP of 6 months in concurrent with 7 years of O & M which shall commence after construction duration 36 months. Please Confirm the same.	Clarified as: The project construction period of 3 years is including 3 months Trial run before commissioning of the project. Further, the O&M period of 7 years will start immediately after commissioning and 6 months DLP is also concurrent with 1st year of O&M.
95	Section-IV Page No. 33, Note-5 Para/Clause No.	PHED provided the prices for each items for reference only.	Kindly confirm about given Qty.	Clarified as: As per NIT
96	Section-III Page No. 12 Para/Clause No. A.1, Sl.2	The bidder should fulfil the following experience criteria: - (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) sewerage Treatment Plant (STP) with capacity 15	Experience for full completion/substantial completion of similar works during previous 7 years (2014-15 to 2020-21) as cited below.	Clarified as: No change in NIT.

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		MLD or above in member countries of NDB during the last five years from 2017-18 to 2021-22. (ii) Providing, laying, jointing, testing & commissioning of sewerage pipeline with minimum 150 mm diameter & above for a length of minimum 80 km in a single project during the last 5 years (from FY2016-17 to FY2020-21)	Similar works on EPC mode 1 Sewerage treatment Plant infrastructures not below the capacity of 15 MLD having financial value not less than 70 crore or 2 Construction experience of WTP not below 35 MLD having financial value not less than 70 crore.	
97	Section-II Page No. 7 Para/Clause No. A.8	The defect liability period in respect of the entire structure as a whole or in parts of individual components included in the contract shall be 6 months after successful completion of work in all respects and its testing & commissioning.	From the referred clause it is understood that DLP of 6 months in concurrent with 7 years of O & M which shall commence after construction duration 36 months. Please Confirm the same.	Clarified as: The project construction period of 3 years is including 3 months Trial run before commissioning of the project. Further, the O&M period of 7 years will start immediately after commissioning and 6 months DLP is also concurrent with 1st year of O&M.
98	Section-IV Page No. 27, Note-5 Para/Clause No.	PHED provided the prices for each items for reference only.	Kindly confirm about given Qty.	Clarified as: As per NIT
99	Section-IV Page No. 26, item No.1 Para/Clause No.	Providing and Laying of DWC Sewer pipes conforming to IS:16098 P2: 2013 and IS:14333: 1996 or relevant IS code of laying of DWC pipe spec including utility shifting,	1. The bidders scope of work shall be limited to items given in the tender BOQ. However bidder will execute	Clarified as: The bidder's scope of work shall be as per the NITs

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			STP shall be design. And also confirm about KIP (key Index Parameter) of treated sewage. 3. We understand, Raw feed sewage to STP is municipal sewage. No ingress of Industrial effluent into raw sewage is envisaged. Please confirm. 4. In the price bid, it is mentioned that, receiving chamber in STP should be 1W & 1S. as there no any EMI items. WE presume that, receiving chamber can be given 1 no. kindly confirm. 5. We understand that power charges for scheme Run during operation phase shall be paid by Client. Please confirm. 6. We presume that the sise, nos, working and standby provided along with BOQ and drawing are only for indication/reference but bidders will free to [change as per CPHEEO manual/design / site requirement. 7. In BOQ given flow rates/capacity of ISP, MPS,	guideline. Raw feed sewage to STP is municipal sewage. No change in the number of receiving chamber. All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder. The sizes, unit arrangements provided along with drawings are indicative and based on site conditions, any change in the actual sizes, unit arrangements, if necessary, approvals of the competent authority along with drawings and designs shall be required. The mentioned flow rates for IPS and MPS are inclusive of peak factor.

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		excavation, transportation the excavated earth, shoring, timbering, sheet piping, dewatering etc by all means, and sand bedding, concreting, jointing, backfilling ;with gravel, proper compaction, road restoration as previous condition including black topping, providing and laying of necessary fittings, specials as per relevant IS code and household connection 6567 nos including all necessary materials, testing, etc. complete. Design, drawing and construction of pipe crossing steel truss bridge across river/nallah, etc and RCc manhole including inside ladder with DI cover 1538 nos, inspection chamber/household chamber 2190 nos including testing of pipe joints, fittings, valve and disinfection of all pipe, trial run and commissioning etc complete as given quantity. 150 mm dia – 52800 m. 200 mm dia – 2779 m 250 mm dia – 1581 m 300 mm dia – 1525 m 400 mm dia – 1598 m	the other as a extra cost on mutually agreed terms. Please confirm. 2. Bidders request to provide the contour plan, NGL, FGL, and invert level of incoming sewer network. 3. In Items description also specify the scope of pipe crossing steel truss bridge. In order to estimate for the same. Please provide length/width and nos. of the nallah/river crossing. 4. Kindly provide the location and distance of earth disposal site/pipe stock yard from the pipe laying location. 5. Kindly provide the boundry/scope of household connection and its GAD	requirement. Attached as Annexure-I. The approximate length for river/canal/waterbody crossing steel truss bridge is 200 Rm. The maintenance of pipe stock yard or earth disposal site is under bidder's scope. Attached as Annexure-VII for scope of household connection.
100	Section-IV Page No. 38, Item No.6 Para/Clause No.	Design, Drawing, construction and commissioning and trial run of different units of Sewage Treatment Plant (STP) 6 MLD (including Civil, Mechanical, Electrical, area 2 hectare) at Lamphelpat as per spec mentioned in the schedule and meeting effluent characteristics by NGT and as per items.	1. Kindly provide the ground water table, NGL, HFL of nearby River or nallah. And also required SBC (Soil bearing capacity) of STP and other structure plot. 2. Kindly provide the Raw sewage Parameters for which	Clarified as:- Attached as Annexure-III and Annexure-IV. KIP (key Index Parameter) of treated sewage shall be as per latest NGT

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			&STP. We understand, the specified flow rate/capacity are inclusive of peak factor.	
101	Section-IV Page No. 41, Sr. No.-7 Para/Clause No.	Operation & Maintenance of the above Infra structure for a period of 7 years after commissioning of the project on turn-key basis.	1. We understand that DLP of 6 month is included in O & M period. Please confirm. 2. In case power charges to be included in 0&M. please provide the unit rate of power to be considered.	Clarified as: The project construction period of 3 years is including 3 months Trial run before commissioning of the project. Further, the O&M period of 7 years will start immediately after commissioning and 6 months DLP is also concurrent with 1st year of O&M. All the charges including consumables, power, w/c etc. during the construction phase and 7 years O/M period are in the scope of bidder.
102	Section-IV Page No. 42, Note-5 Para/Clause No.	PHED provided the prices for each items for reference only	Kindly confirm about given Qty.	Clarified as: As per NIT
103	Section- Page No. Para/Clause No.	Land for Construction of STP and related work	We understand that required land for construction of structure is in possession of Client. Please confirm.	Clarified as: The land required for the project are readily available at

Th. Bebina Devi Th. Yogita

				site. Clear Right of way is made available at the sides of the road and if in any case, utility shifting/river/ culvert crossings etc. are also in bidder's scope.
104	Section- Page No. Para/Clause No.	SOIL INVESTIGATION REPORT	Bidder request to kindly provide soil investigation report of all location of structure for preliminary design	Clarified as: Attached as Annexure-III
105	Section- III EVALUATION & QUALIFICATION CRITERIA Page No. 12 Para/Clause No. A.1, Sr. No.-2	The bidder should fulfill the following experience criteria:- (i) Basic and detailed engineering including procurement, construction of minimum 1 (one) Sewerage Treatment Plant (STP) with capacity 15 MLD or above in member countries of NDB during the last five years from 2017-18 to 2021-22.	**"Similar work- " Basic and detailed engineering including procurement and construction of sewerage/ water infrastructure (not below 15.00 MLD)" Kindly approve.	Clarified as: No change in NIT.
106	Section- III Page No. 12, Sr. No.2 Para/Clause No.	The bidder should fulfil the following experience criteria:- Experience of having successfully completed similar works during the last 7 years (2014-15 to 2020-21) should be either of the following:- (a) Three similar completed works costing not less than the amount equal to Rs.87.49 crore, or (b) Two similar completed works costing not	Request to consider in providing relaxation for the qualification in Sewerage Infrastructure to similar work as "Sewerage Treatment Plant not less than 15.00 MLD with value of 50.00 Cr."	Clarified as: Please refer NIT.

Th. Bebina Devi Th. Yogita

		less than the amount equal to Rs. 109.36 crore, or (c) One similar completed works costing not less than the amount equal to Rs. 174.98 crore. **similar works- "Basic and detailed engineering including procurement and construction of Sewerage Infrastructure (not below 15.00 MLD)".		
107	Section- VI Page No. 57 Para/Clause No. 10	PWD form no. 12 for lump sum contract will be a part of the GC of contract. No mobilization advanced. Clause 10 (C), clause 10 (CA) and clause 10 (CC) of forms no. CPWD 7 & 8 also would not be entertained.	We would like to bring to your kind notice that mobilisation advanced has been provided for various sewerage Infrastructure projects that were envisaged across projects in India. Hence in order to facilitate and better cash flow of the project. We request you to provide interest free mobilisation advanced of 10% of the contract value.	Clarified as: No change in NIT
108	Section- III Page No. 11, Sl. No. 2 Para/Clause No.	The bidder should fulfil the following experience criteria:- Experience of having successfully completed similar works during the last 7 years (2014-15 to 2020-21) should be either of the following:- (a) Three similar completed works costing not less than the amount equal to Rs.87.49 crore, or (b) Two similar completed works costing not less than the amount equal to Rs. 109.36 crore, or (c) One similar completed works costing	Request to consider in providing relaxation for the qualification in Sewerage Infrastructure to similar work as "Sewerage Treatment Plant not less than 15.00 MLD with value of 50.00 Cr."	Clarified as: Please refer NIT

Th. Bebina Devi Th. Yogita

		not less than the amount equal to Rs. 174.98 crore. **similar works- "Basic and detailed engineering including procurement and construction of Sewerage Infrastructure (not below 15.00 MLD)".		
109	Section- VI Page No. 38 Para/Clause No. 10	PWD form no. 12 for lump sum contract will be a part of the GC of contract. No mobilization advanced. Clause 10 (C), clause 10 (CA) and clause 10 (CC) of forms no. CPWD 7 & 8 also would not be entertained.	We would like to bring to your kind notice that mobilisation advanced has been provided for various sewerage Infrastructure projects that were envisaged across projects in India. Hence in order to facilitate and better cash flow of the project. We request you to provide interest free mobilisation advanced of 10% of the contract value.	Clarified as: No change in NIT
110	Section- III Page No. 12, Sl. No. 2 Para/Clause No.	The bidder should fulfil the following experience criteria:- Experience of having successfully completed similar works during the last 7 years (2014-15 to 2020-21) should be either of the following:- a. Three similar completed works costing not less than the amount equal to Rs.87.49 crore, or b. Two similar completed works costing not less than the amount equal to Rs. 109.36 crore, or c. One similar completed works costing not less than the amount equal to Rs. 174.98 crore. **similar works- "Basic and detailed engineering including	Request to consider in providing relaxation for the qualification in Sewerage Infrastructure to similar work as "Sewerage Treatment Plant not less than 15.00 MLD with value of 50.00 Cr."	Clarified as: Please refer NIT.

Th. Bebina Devi Th. Yogita

		procurement and construction of Sewerage Infrastructure (not below 15.00 MLD)".		
111	Section- VI Page No. 39 Para/Clause No. 10	PWD form no. 12 for lump sum contract will be a part of the GC of contract. No mobilization advanced. Clause 10 (C), clause 10 (CA) and clause 10 (CC) of forms no. CPWD 7 & 8 also would not be entertained.	We would like to bring to your kind notice that mobilisation advanced has been provided for various sewerage Infrastructure projects that were envisaged across projects in India. Hence in order to facilitate and better cash flow of the project. We request you to provide interest free mobilisation advanced of 10% of the contract value.	Clarified as: No change in NIT
112	Section- III Page No. 12, Sl. No. 2 Para/Clause No.	The bidder should fulfil the following experience criteria:- Experience of having successfully completed similar works during the last 7 years (2014-15 to 2020-21) should be either of the following:- a. Three similar completed works costing not less than the amount equal to Rs.87.49 crore, or b. Two similar completed works costing not less than the amount equal to Rs. 109.36 crore, or c. One similar completed works costing not less than the amount equal to Rs. 174.98 crore. **similar works- "Basic and detailed engineering including procurement and construction of Sewerage Infrastructure (not below 15.00 MLD)".	Request to consider in providing relaxation for the qualification in Sewerage Infrastructure to similar work as "Sewerage Treatment Plant not less than 15.00 MLD with value of 50.00 Cr."	Clarified as: Please refer NIT.

Th. Bebina Devi Th. Yogita

113	Section- VI Page No. 48 Para/Clause No. 10	PWD form no. 12 for lump sum contract will be a part of the GC of contract. No mobilization advanced. Clause 10 (C), clause 10 (CA) and clause 10 (CC) of forms no. CPWD 7 & 8 also would not be entertained.	We would like to bring to your kind notice that mobilisation advanced has been provided for various sewerage Infrastructure projects that were envisaged across projects in India. Hence in order to facilitate and better cash flow of the project. We request you to provide interest free mobilisation advanced of 10% of the contract value.	Clarified as: No change in NIT
114	Section- Page No. Para/Clause No.		We are interested in participating in the above mentioned Tender as a sub contractor. It is seen that the sub-contracting clause No 3.5 (Pg 35 of the NIT) in the tender is incomplete with respect to other similar nature tenders. Since, in other similar tenders sub contracting to the maximum tune of 49% is allowed but in this tender there is no mention of such clause. Hence, we request you to incorporate the clause of sub contracting of max 49% in the tender so that we can participate in tenders.	Clarified as: No change in NIT

Executive Engineer,
Water Supply Maintenance Division No.-II
P.H.E.D. Manipur

Executive Engineer,
Drainage & Sewerage Division,
P.H.E.D. Manipur

Th. Babina Devi
Superintending Engineer
Urban Circle, PHED
Manipur

Th Yogita
Superintending Engineer
Planning & Monitoring Circle
PHED, Govt. of Manipur

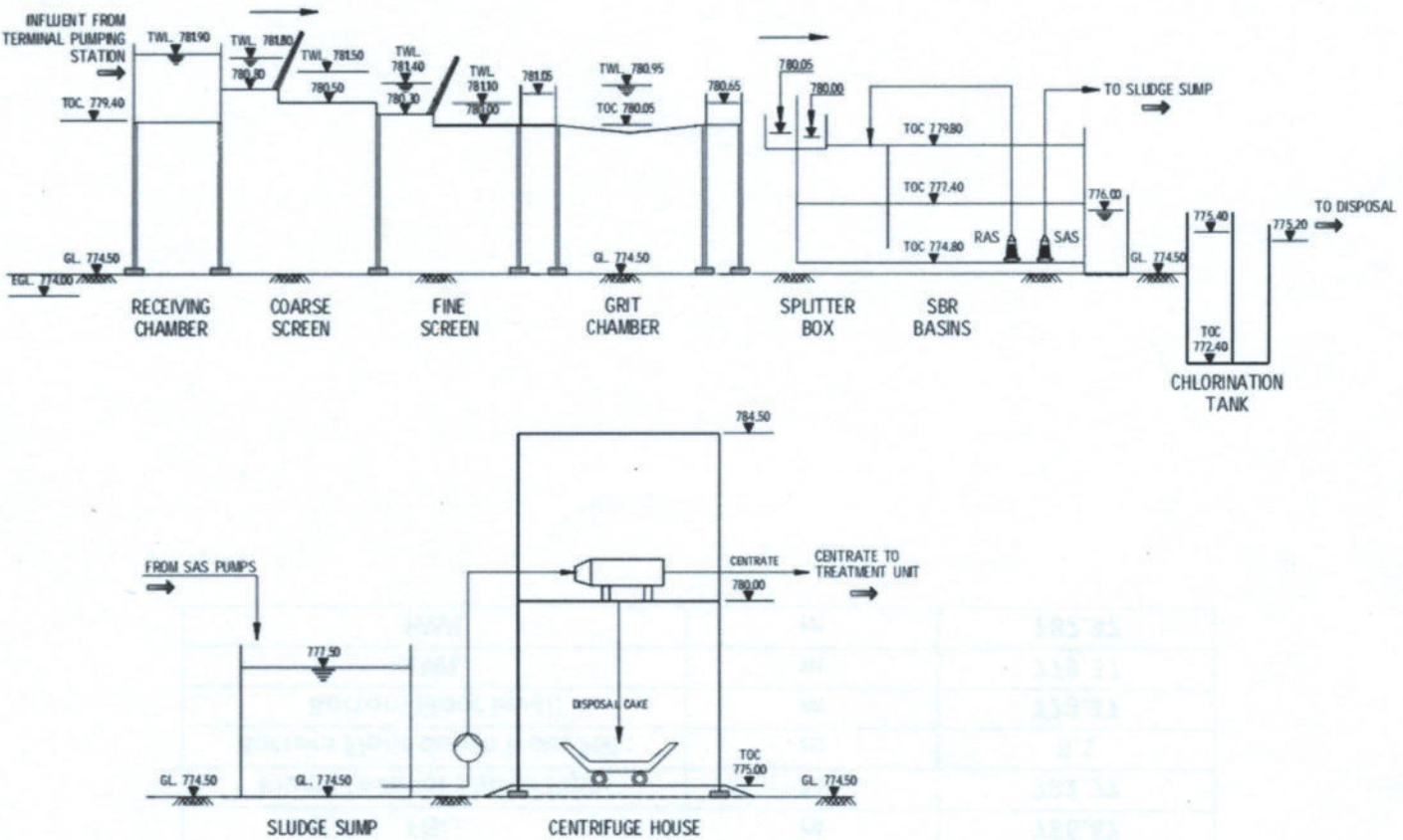
CHIEF ENGINEER, PHED
GOVERNMENT OF MANIPUR

ANNEXURE-I

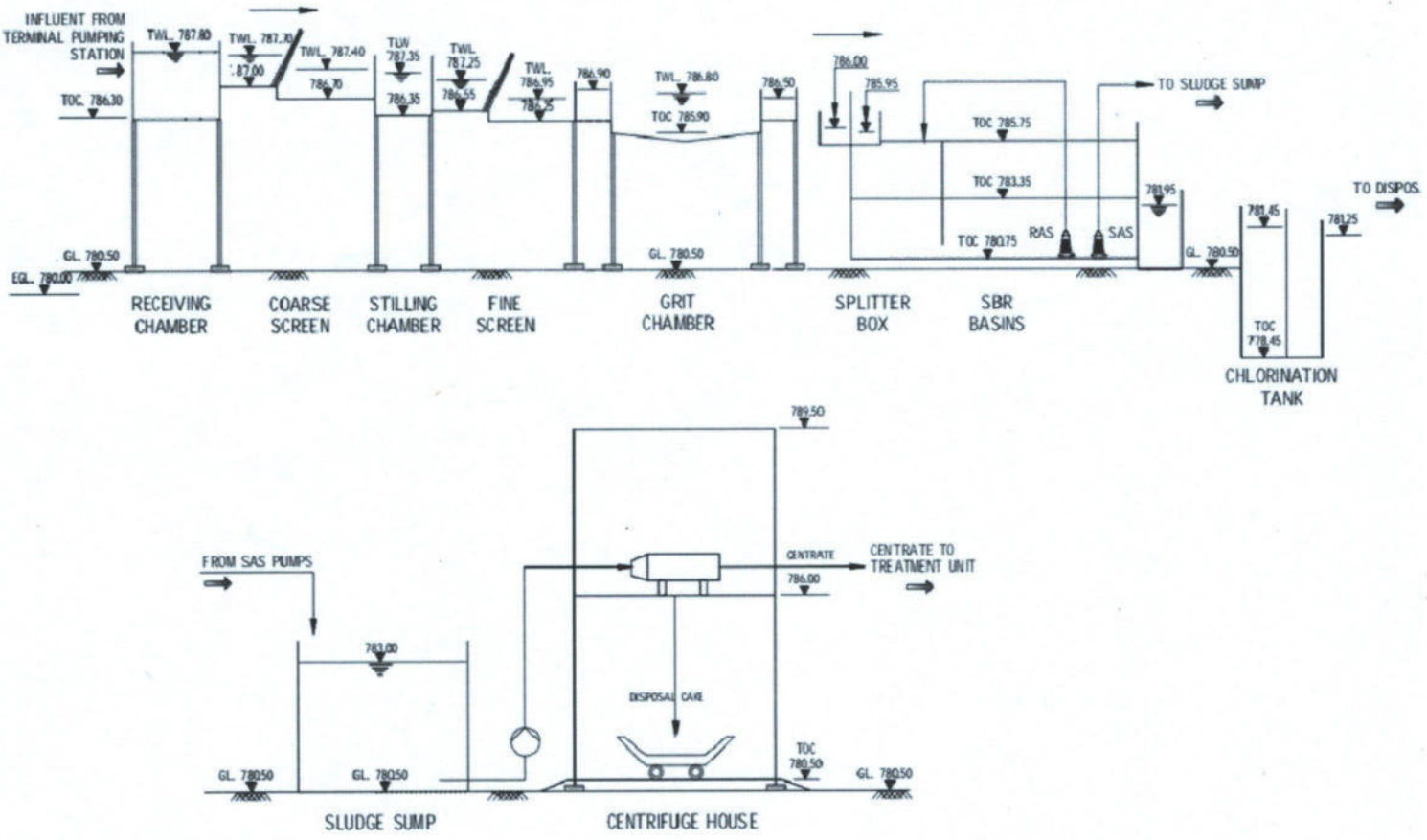
		Zone I
Description	Unit	MPS 1
FGL:	m	780.73
Invert Level of Sewer Pipe:	m	775.12
Bottom Floor depth from FGL:	m	10.41
Bottom Floor level:	m	770.32
LWL	m	771.72
HWL	m	774.72

		Zone VI
Description	Unit	IPS 1
FGL:	m	786.47
Invert Level of Sewer Pipe:	m	782.77
Bottom Floor depth from FGL:	m	8.1
Bottom Floor level:	m	778.37
LWL	m	779.37
HWL	m	782.37

ANNEXURE-II



HFD of 27 MLD STP at Langthabal Kunja



HFD of 6 MLD STP at Lamphelpat

ANNEXURE-III

Soil test report

YEAR-2017

PROJECT: A REPORT ON SOIL INVESTIGATION WORK FOR PREPARATION OF DETAILED PROJECT REPORT FOR INTEGRATED SEWERAGE SYSTEM FOR IMPHAL CITY, MANIPUR.

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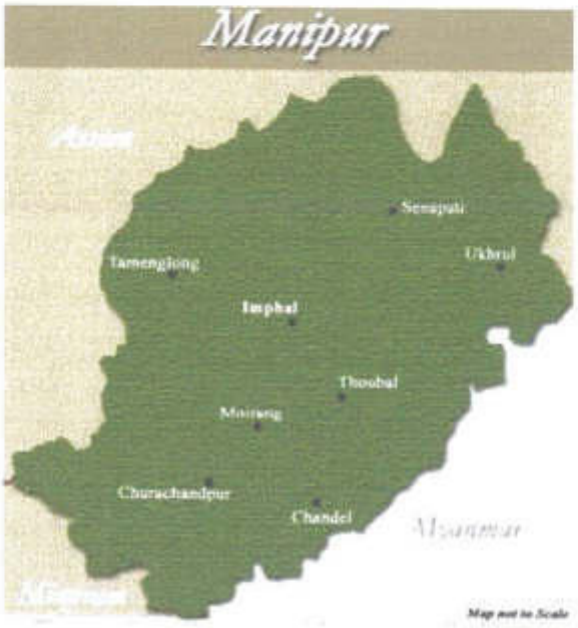


SOIL INVESTIGATION WORK EXECUTED AND REPORT PREPARED BY :

RIGHT SITE SURVEY

NEW TOWN
RAJARHAT
KOLKATA

GKW Consult GmbH Berlin Sector V Received 29/01/18

Right Site Survey Kolkata Rajarhat

EXISTING STP SITE PHOTO

IPS-I ZONE-IV

IPS-I ZONE-V

IPS-I ZONE-VI

IPS-II ZONE-II&III

IPS-III ZONE-IV

IPS-III ZONE-V

IPS-II ZONE-V

IPS-VI ZONE-V

MPS-I ZONE-I

MPS-II ZONE-IV

MPS-III ZONE-V

PROP.STP-II

PROP.STP-II

PROP.STP-III

Project: Soil Investigation work for Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

CONTENTS

CHAPTER – I

1.0 PREFACE

1.1 It is decided by the Authority to develop Sewerage System for Imphal City. A detailed Geo-technical Investigation work and Preparation of Report for designing of Foundation system assigned to us. We have conducted the Geotechnical Investigation work at proposed sites and Prepared this soil investigation report for designing the foundation system for Integrated Sewerage System for Imphal City at Manipur.

1.2 Scope of Investigation

The scope of work as per the assignment consists of sinking vertical bore hole of maximum 20.0m depth below ground level at exploratory site for construction of proposed various MPS,IPS and STP..

The present sub-soil investigation work can be broadly divided into the following activities.

a) Sinking of bore holes.

b) Carrying out Standard penetration tests.

c) Collection of disturbed and undisturbed soil samples.

d) Carrying out laboratory tests.

e) Preparation and Submission of report

The objects of the present sub-soil investigation are:

i) Identification of the sub-soil profile.

ii) Determination of the soil design parameters.

iii) Recommendation for bearing capacity of foundations.

1.3 The Project Site

The proposed sites were within the territory of Imphal city in the State of Manipur. The topography of the sites were regular in terrain.

CHAPTER - II

2.0 METHOD OF INVESTIGATION

2.1 General:

To achieve most economic and safe design of foundation for the proposed Sewerage System at this site, Geotechnical Investigation was envisaged. The Entire Investigation programme had been divided mainly into two parts, i)Field works & ii) Laboratory tests .

i) Detailed Field works unfold the sub-surface condition of soil strata and deposit types and their characteristics and

ii) Laboratory tests part would help determining the relevant physical and geotechnical properties of the sub-surface deposits leading to finalization of the foundation depths of the structures and bearing capacity with particular reference to the sub-structure types and their strength parameters and settlement potentials at the site.

2.2 The exploratory site, bore hole No., depths of bore hole, static water level are mentioned below.

Sl.No	Exploratory site	Borehole No	Termination depth (m)	Bore Hole Level,EGL (m)	Static Ground Water table below EGL (m)
1	MPS-1(Zone-1)	1	20.0	100.0 (assumed)	0.50
2	do	2	20.0		0.50
3	Existing STP-1 (zone-1)	1	20.0		At EGL
4	do	2	20.0		At EGL

Sl.No	Exploratory site	Borehole No	Termination depth (m)	Bore Hole Level,EGL (m)	Static Ground Water table below EGL (m)
5	do	3	20.0	100.0 (assumed)	At EGL
6	IPS-2(Zone 2&3)	1	20.0		1.0
7	do	2	20.0		1.0
8	IPS-1(zone 2&3)	1	20.0		0.50
9	Do	2	20.0		0.30
10	IPS-4(Zone-2&3)	1	20.0		1.00
11	do	2	20.0		1.00
12	IPS-5 (Zone -2&3)	1	20.0		1.50
13	do	2	20.0		1.50
14	IPS-3(Zone 2&3)	1	20.0		0.50
15	do	2	20.0		0.50
16	IPS-6(Zone 2 &3)	1	20.0		1.00
17	do	2	20.0		1.00
18	IPS—7(Zone 2 & 3)	1	20.0		1.50
19	do	2	20.0		1.50
20	IPS-8 (Zone 2 & 3)	1	20.0		2.50
21	do	2	20.0		2.50
22	IPS-3 (Zone-4)	1	20.0		1.50
23	do	2	20.0		1.50
24	MPS-2(Zone-4)	1	20.0		1.20
25	do	2	20.0		1.20
26	IPS-2 (zone-4)	1	20.0		1.00
27	do	2	20.0		1.00
28	IPS-1 (Zone-4)	1	20.0		2.00
29	do	2	20.0		2.00

Sl.No	Exploratory site	Borehole No	Termination depth (m)	Bore Hole Level,EGL (m)	Static Ground Water table below EGL (m)
30	IPS-6 (Zone 5)	1	20.0	100.0 (assumed)	At EGL
31	do	2	20.0		At EGL
32	MPS-3 (Zone-5)	1	20.0		1.0
33	do	2	20.0		1.0
34	IPS -5(Zone-5)	1	20.0		1.0
35	do	2	20.0		1.0
36	IPS-4(Zone-5)	1	20.0		0.30
37	do	2	20.0		0.30
38	IPS-3 (Zone-5)	1	20.0		2.0
39	do	2	20.0		2.0
40	IPS-2(Zone-5)	1	20.0		1.0
41	do	2	20.0		1.0
42	IPS-1(Zone -5)	1	20.0		0.50
43	do	2	20.0		At EGL
44	IPS-1 (Zone-6)	1	20.0		0.50
45	do	2	20.0		0.50
46	Prop STP-2	1	20.0		3.00
47	do	2	20.0		0.50
48	do	3	20.0		0.50
49	Prop STP-3	1	20.0		1.00
50	do	2	20.0		3.00
51	do	3	20.0		2.50

2.3 The borehole is sunk in accordance with the provisions of BIS 1892-1979. Bore hole is advanced using Auger, Shell and standard powered winch with tripod rig & tools held by wire rope. Rotary mud drilling has also been adopted to advance the bore hole further beyond shell boring. The diameter of the boreholes is 150mm. The sides of the bore hole are supported using temporary casings in stages of advancement. The shell is used to bore and remove soil cuttings. Care is taken to minimize disturbance to the soil at the base of the bore hole. Adequate cleaning of bases is done before SPT or UDS collection. Ground water level when struck with is recorded. It was also measured and recorded after 24 hours of removal of casings and is designated as static water level.

2.4 During the execution of the field works, the disturbed soil samples were collected at regular intervals from the split spoon sampler after conducting the standard penetration tests. These samples were used in the preparation of bore hole logs, for identification & classification purpose and conducting some specific tests as per the provisions laid down in IS: 1498-1970.

2.5 Nominal 100mm diameter undisturbed samples were recovered from borehole. The sampling equipment used consists of a seamless steel sample tube of 450mm in length fitted at its lower end with cutting shoe. The sampling assembly was driven by means of jarring link to its full length or as far downs as was found practicable. After withdrawal, the ends of the tubes were sealed with wax and capped before onward transmission to the laboratory.

2.6 The standard penetration tests (SPT) were conducted at regular intervals as per provisions laid down in IS: 2131-1981. The standard Split spoon sampler was used for conducting the above test by dropping a hammer of 63.5 kg. falling freely from a height of 75 cm. 'A' type drill rod was used for carrying out the SPT test. G.I pipes were fully withdrawn before lowering the SPT assembly in to the bore hole. The penetration resistances commonly known as `N' value were recorded by counting the number of blows for middle 30 cm penetration of a total penetration

of 45 cm. 'N' values thus obtained are shown in bore log data sheet. The water table in the bore hole was recorded during the field work.

2.7 Laboratory Investigation

For proper identification and classification of the sub-soil deposits and for deriving adequate information regarding its relevant physical and geotechnical properties at the site under investigation, the following laboratory tests are conducted on the soil samples collected from the exploratory bore holes:

a) Natural moisture content
b) Bulk and Dry Density
c) Specific Gravity
d) Atterberg Limits
e) Grain Size Analysis (Sieve and Hydrometer)
f) Triaxial Test/Direct Shear Test
g) Consolidation Test
h) UCC test
i) Swelling Index

2.8 Brief Description of various laboratory Test:-

i) NATURAL MOISTURE CONTENT (as per IS 2720-Part 18):-

It is the ratio of the weight of water to the dry weight of soil determined by oven drying.

ii) BULK DENSITY:-

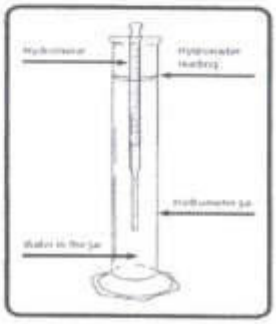
The bulk density γ is defined as the total weight W of a soil mass per unit of its total volume V.

iii) GARIN SIZE ANALYSIS (as per IS 2720-Part-4) :-

a) Sieve Analysis-

The complete sieve analysis can be divided into two parts, i.e, the coarse analysis and fine analysis. An oven dried samples of soil is separated into two fractions by sieving it through a 4.75 mm IS sieve. The portion retained of it (+4.75mm size) is termed as the gravel fraction and is kept for the coarse analysis, while the portion passing through it (-4.75mm size) is subjected to fine sieve analysis.

b) HYDROMETER ANALYSIS:-



In the wet method of mechanical analysis or sedimentation analysis, the soil fraction, finer than 75 micron size is kept in suspension in a liquid (usually water) medium. The analysis is based on stoke's law, according to which the velocity at which grains settle out of suspension, all other factor being equal, is depended upon the shape, weight and size of the particles/grains.

The procedure depends of stoke's equation for the terminal velocity of falling sphere. The effective diameter , D, can be computed from the equation.

$$D = \sqrt{18\mu/(\gamma s - \gamma w)} \times \sqrt{Zr/t}$$

Where μ = Viscosity of water at the test temperature.

γw = Unit wt. of water at test temperature.

γs = Unit wt. of soil solids.

Zr = Distance from the surface of suspension to the centre of volume of the hydrometer

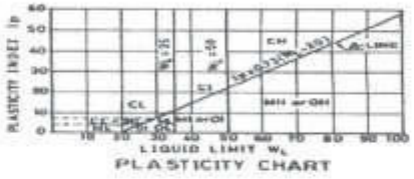
t = Total elapsed time.

iv) ATTERBERG LIMITS (as per IS 2720, Part-5):-

These are arbitrary moisture contents to determine the instant at which the soil is on the verge of being viscous liquid (Liquid limit) or non–plastic /Plastic limit. Liquid limits determined with the help of a liquid limit apparatus. Plastic limit is the water content at which the soil begins to crumble when rolled out into a thin thread of 3mm.

Diagram illustrating Liquid limit test

This test is of considerable interest to foundation engineers because the liquid limit and plastic limit of soils are correlated to their engineering properties. It has been observed from experiences that the OMC (Optimum Moisture Content) is found to be close to the plastic limit of cohesive soil. This may be very useful information required while compacting such soil. Soil Classification for fine grained soil has been done on the basis of atterberg Limits.

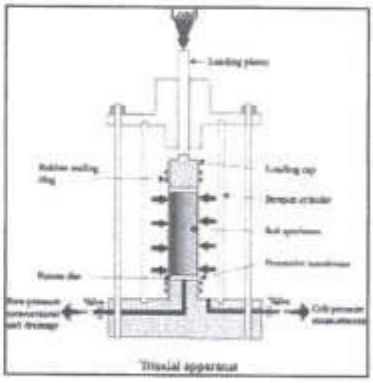


PLASTICITY CHART

v) SPECIFIC GRAVITY:-

It is the ratio of unit weight of soil solids to that of water.

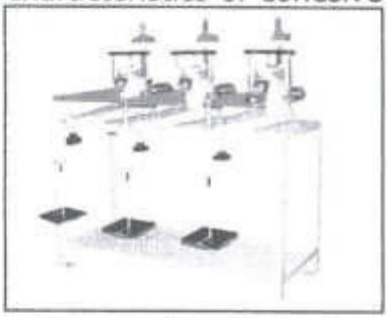
vi) TRI-AXIAL SHEAR TEST (as per IS 2720 part 11):-



Tri-axial test is conducted on mixed type of soils (C-Ø soil) like sandy clayey silt/silty clay and other cohesive soil. The sample, in this test, are subjected to different lateral stress, (e.g. 0.50,1.0,1.50 kg/sq cm etc.) i.e, cell/confining pressure as well as vertical stress and tested up to a maximum axial strain of 20% under a quick condition at a rate of 1.25 mm/min. The lateral stress on the sample is kept constant when the test continuous.

vii) CONSOLIDATION TEST (as per IS 2720 part-15):-

This test is necessary to estimate the settlement characteristics of cohesive soils. In the consolidometer ring of 6.25 cm dia and 2 cm high. A sample is taken with porous stones on top and bottom. After saturation a compressive load is applied and maintained for 24 hours. The compression of the sample is measured at regular intervals by a dial gauge. From the results obtained, e-log P curve drawn to estimate the compression index (Cc) from the straight portion of the curve.



viii) UNCONFINED COMPRESSION TEST (as per IS 2720-Part 10):-

Unconfined compression tests are conducted on cohesive soil like clay/clayey silt samples to determine their shear strengths. The samples are tested under quick condition at a rate of 1.25mm/min and are loaded upto a maximum of axial strain. This is a special type of tri-axial test where no

cell/confining pressure is applied laterally. The cylindrical specimen of soil is subject to major principal stress till the specimen fails due to shearing along a critical plane of failure.

All the tests, wherever possible, were conducted as per relevant Indian Standard Specifications. The result of all the laboratory tests have been reflected in a borehole log and test result data sheet enclosed at the annex. Graphical and pictorial presentations of test observations wherever relevant were also reflected and enclosed at the annex for better appreciation.

CHAPTER – III

3.0 SUB-SOIL CONDITIONS & PROPERTIES

3.1 The site has been investigated by sinking of bore hole of maximum 20.0m depth below existing ground level. The bore log, laboratory test results, sub-soil profile and sample calculation are presented in this report. The figures, graphs related to laboratory and field tests are also presented in Annexure of this report. Reader may go through the individual bore log and laboratory test results for detailed description, thickness, 'N' values and other physical properties. Incidentally, it has been observed that bore log indicated almost similar and identical soil stratification in the respective exploratory site with minor variation in the thickness of the individual strata as well as in respect of the presence of some intermediate pocket layer of dissimilar soils.

Based on the field test and laboratory test results of the soil investigation work, the condition of the sub-soil under the sites classified in merely 3 nos different stratum. The sub-soil deposit upto about 1.50m depth below E.G.L. at the exploratory site is found to be consisted of heterogeneous filled up material consisted moorum, brick bats etc. From 1.50 m depth to 13.0m depth very soft dark grey clayey silt / silty clay of medium to high plasticity with varying percentage of decomposed wood and peat/muck observed .Cohesion of soil found to be 0.10-0.15 kg/cm^2. From 13.0 m to termination depth of boreholes medium to stiff silty clay layer encountered with decomposed wood and peat/muck observed. Cohesion of soil found to be 0.30-0.50 kg/cm^2.

It is understood that the subsoil characteristics throughout the depth of investigation is very poor with respect to swell, shrinkage, shear strength and consolidation parameters. The SPT "N" values are very poor and it is varies between 0 to 4 in upper reaches. Whereas N value 5 to 9 has been observed in lower reaches of the boreholes.

CHAPTER – IV

4.0 RECOMMENDATIONS

4.1 The characteristics of sub-soil deposit at up to termination depth of boreholes as revealed from the detail investigation work is very poor with respect to shear, settlement and swelling parameters.

It is also understood that the superstructures proposed to be constructed at this site would be mostly medium to high loading.

Differential free swell test conducted from the soil samples indicated that clay deposit exhibits the expansive characteristics, the degree of expansiveness being mostly moderate to high in nature. More over presence of peat, decomposed vegetation and muck should be intricated the situation.

Considering such subsoil condition and proposed medium to highly loaded super structure to be constructed at this site, we are of the considered opinion that the structures may be supported with provision of **small under-reamed pile foundation system which becomes effective for such very soft, crack prone organic soil properties and hence considered to be a prudent proposition.** The structure may be supported on group of piles embedded in pile caps depending on the total super imposed loads. Pile load capacity should be confirmed by pile load test.

We do not envisage any shallow foundation system for these exploratory sites.

METHOD OF PILE LOAD CAPACITY CALCULATION:

1. Safe load carrying capacity of RCC cast-in-place Under -Reamed pile has been ascertained by static formula as per IS :2911 (Part III) as a ready reference to the Design Engineer

   Following formula has been adopted for the calculation of Load carrying Capacity of Under Reamed Pile (Ref IS 2911 (Part III-1979):-

   $$Qu = Ap.Nc.Cp + Aa.Nc.C'a + C'a.A's + \text{œ} . Ca.As$$

Factor of safety has been considered 2.50 for all practical purposes

Load Carrying Capacity for Deep Foundation (Under ream pile)

Location : MPS-1 (Zone-1)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.00	5.00
0.30	0.75	13.00	11.50	1.50	7.50	5.40
0.40	1.00	12.00	10.50	1.50	10.20	6.90
0.40	1.00	13.00	11.50	1.50	10.90	7.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.10	5.0
0.30	0.75	13.00	11.50	1.50	7.60	5.40
0.40	0.75	12.00	10.50	1.50	10.30	7.00
0.40	1.00	13.00	11.50	1.50	11.00	7.60

Location : STP-1-Existing Site

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	10.60	7.80
0.30	0.75	13.00	11.50	1.50	11.20	8.30
0.40	1.00	12.00	10.50	1.50	16.20	11.60
0.40	1.00	13.00	11.50	1.50	17.00	12.30
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	10.80	8.00
0.30	0.75	13.00	11.50	1.50	11.40	8.40
0.40	0.75	12.00	10.50	1.50	16.60	12.0
0.40	1.00	13.00	11.50	1.50	17.40	12.60

Location : IPS-2(ZONE-2&3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.20	4.90
0.30	0.75	13.00	11.50	1.50	7.50	5.20
0.40	1.00	12.00	10.50	1.50	11.10	7.40
0.40	1.00	13.00	11.50	1.50	11.60	7.80
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.30	5.00
0.30	0.75	13.00	11.50	1.50	7.70	5.30
0.40	0.75	12.00	10.50	1.50	11.40	7.60
0.40	1.00	13.00	11.50	1.50	11.80	8.00

Location :IPS-1 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	9.40	7.00
0.30	0.75	13.00	11.50	1.50	9.90	7.40
0.40	1.00	12.00	10.50	1.50	14.40	10.50
0.40	1.00	13.00	11.50	1.50	15.10	11.00
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	9.60	7.20
0.30	0.75	13.00	11.50	1.50	10.10	7.60
0.40	0.75	12.00	10.50	1.50	14.70	10.80
0.40	1.00	13.00	11.50	1.50	15.40	11.30.

Location :IPS-4 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.20	5.10
0.30	0.75	13.00	11.50	1.50	7.40	5.30
0.40	1.00	12.00	10.50	1.50	11.50	8.00
0.40	1.00	13.00	11.50	1.50	11.90	8.30
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.40	5.20
0.30	0.75	13.00	11.50	1.50	7.60	5.50
0.40	0.75	12.00	10.50	1.50	11.80	8.30
0.40	1.00	13.00	11.50	1.50	12.20	8.60

Location :IPS-5 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	6.50	4.80
0.30	0.75	13.00	11.50	1.50	7.00	5.20
0.40	1.00	12.00	10.50	1.50	9.70	7.00
0.40	1.00	13.00	11.50	1.50	10.30	7.40
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.60	4.90
0.30	0.75	13.00	11.50	1.50	7.10	5.20
0.40	0.75	12.00	10.50	1.50	9.90	7.10
0.40	1.00	13.00	11.50	1.50	10.40	7.60

Location :IPS-3 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	5.70	4.20
0.30	0.75	13.00	11.50	1.50	6.00	4.40
0.40	1.00	12.00	10.50	1.50	8.70	6.20
0.40	1.00	13.00	11.50	1.50	9.10	6.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	5.80	4.20
0.30	0.75	13.00	11.50	1.50	6.10	4.50
0.40	0.75	12.00	10.50	1.50	8.90	6.40
0.40	1.00	13.00	11.50	1.50	9.30	6.70

Location :IPS-6 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.40	5.20
0.30	0.75	13.00	11.50	1.50	7.80	5.50
0.40	1.00	12.00	10.50	1.50	11.40	7.80
0.40	1.00	13.00	11.50	1.50	11.90	8.20
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.60	5.30
0.30	0.75	13.00	11.50	1.50	7.90	5.60
0.40	0.75	12.00	10.50	1.50	11.70	8.00
0.40	1.00	13.00	11.50	1.50	12.20	8.40

Location :IPS-7 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.60	5.50
0.30	0.75	13.00	11.50	1.50	8.10	5.90
0.40	1.00	12.00	10.50	1.50	11.30	7.90
0.40	1.00	13.00	11.50	1.50	12.00	8.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.80	5.60
0.30	0.75	13.00	11.50	1.50	8.20	6.00
0.40	0.75	12.00	10.50	1.50	11.50	8.10
0.40	1.00	13.00	11.50	1.50	12.20	8.60

Location :IPS-8 (ZONE 2 & 3)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	6.30	4.20
0.30	0.75	13.00	11.50	1.50	6.60	4.40
0.40	1.00	12.00	10.50	1.50	9.80	6.20
0.40	1.00	13.00	11.50	1.50	10.20	6.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.40	4.20
0.30	0.75	13.00	11.50	1.50	6.70	4.50
0.40	0.75	12.00	10.50	1.50	10.0	6.40
0.40	1.00	13.00	11.50	1.50	10.40	6.70

Location :IPS-3 (ZONE 4)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	10.90	8.00
0.30	0.75	13.00	11.50	1.50	11.50	8.50
0.40	1.00	12.00	10.50	1.50	16.70	12.00
0.40	1.00	13.00	11.50	1.50	17.50	12.70
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	11.10	8.20
0.30	0.75	13.00	11.50	1.50	11.70	8.70
0.40	0.75	12.00	10.50	1.50	17.10	12.40
0.40	1.00	13.00	11.50	1.50	17.90	13.00

Location :MPS 2 (ZONE 4)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.40	5.50
0.30	0.75	13.00	11.50	1.50	7.80	5.90
0.40	1.00	12.00	10.50	1.50	10.90	7.90
0.40	1.00	13.00	11.50	1.50	11.50	8.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.50	5.60
0.30	0.75	13.00	11.50	1.50	7.90	6.00
0.40	0.75	12.00	10.50	1.50	11.10	8.10
0.40	1.00	13.00	11.50	1.50	11.70	8.60

Location :IPS 2 (ZONE 4)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.30	5.20
0.30	0.75	13.00	11.50	1.50	7.70	5.50
0.40	1.00	12.00	10.50	1.50	11.20	7.80
0.40	1.00	13.00	11.50	1.50	11.70	8.20
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.40	5.30
0.30	0.75	13.00	11.50	1.50	7.80	5.60
0.40	0.75	12.00	10.50	1.50	11.50	8.00
0.40	1.00	13.00	11.50	1.50	12.00	8.40

Location :IPS 1 (ZONE 4)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	8.30	6.30
0.30	0.75	13.00	11.50	1.50	8.70	6.60
0.40	1.00	12.00	10.50	1.50	12.80	9.50
0.40	1.00	13.00	11.50	1.50	13.30	10.00
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	8.50	6.40
0.30	0.75	13.00	11.50	1.50	8.90	6.80
0.40	0.75	12.00	10.50	1.50	13.10	9.80
0.40	1.00	13.00	11.50	1.50	13.70	10.30

Location :IPS 6 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.50	5.50
0.30	0.75	13.00	11.50	1.50	7.90	5.80
0.40	1.00	12.00	10.50	1.50	11.40	8.20
0.40	1.00	13.00	11.50	1.50	11.90	8.60
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.60	5.60
0.30	0.75	13.00	11.50	1.50	8.00	5.90
0.40	0.75	12.00	10.50	1.50	11.70	8.40
0.40	1.00	13.00	11.50	1.50	12.20	8.80

Location :MPS 3 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	10.20	7.80
0.30	0.75	13.00	11.50	1.50	10.70	8.30
0.40	1.00	12.00	10.50	1.50	15.40	11.60
0.40	1.00	13.00	11.50	1.50	16.20	12.30
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	10.40	8.00
0.30	0.75	13.00	11.50	1.50	10.90	8.40
0.40	0.75	12.00	10.50	1.50	15.80	12.00
0.40	1.00	13.00	11.50	1.50	16.60	12.60

Location :IPS 5 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	6.70	5.20
0.30	0.75	13.00	11.50	1.50	7.10	5.50
0.40	1.00	12.00	10.50	1.50	10.20	7.80
0.40	1.00	13.00	11.50	1.50	10.70	8.20
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.90	5.30
0.30	0.75	13.00	11.50	1.50	7.30	5.60
0.40	0.75	12.00	10.50	1.50	10.50	8.00
0.40	1.00	13.00	11.50	1.50	11.00	8.40

Location :IPS 4 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	6.50	4.60
0.30	0.75	13.00	11.50	1.50	6.90	5.00
0.40	1.00	12.00	10.50	1.50	9.80	6.80
0.40	1.00	13.00	11.50	1.50	10.30	7.20
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.60	4.70
0.30	0.75	13.00	11.50	1.50	7.00	5.00
0.40	0.75	12.00	10.50	1.50	9.90	6.90
0.40	1.00	13.00	11.50	1.50	10.50	7.40

Location :IPS 3 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	5.90	4.20
0.30	0.75	13.00	11.50	1.50	6.20	4.40
0.40	1.00	12.00	10.50	1.50	9.00	6.20
0.40	1.00	13.00	11.50	1.50	9.40	6.50
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.00	4.20
0.30	0.75	13.00	11.50	1.50	6.30	4.50
0.40	0.75	12.00	10.50	1.50	9.20	6.40
0.40	1.00	13.00	11.50	1.50	9.60	6.70

Location :IPS 2 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	7.60	5.70
0.30	0.75	13.00	11.50	1.50	8.00	6.10
0.40	1.00	12.00	10.50	1.50	11.50	8.10
0.40	1.00	13.00	11.50	1.50	12.10	9.00
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	7.70	5.80
0.30	0.75	13.00	11.50	1.50	8.10	6.20
0.40	0.75	12.00	10.50	1.50	11.80	8.80
0.40	1.00	13.00	11.50	1.50	12.30	9.20

Location :IPS 1 (ZONE 5)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	10.10	7.50
0.30	0.75	13.00	11.50	1.50	10.60	8.00
0.40	1.00	12.00	10.50	1.50	15.30	11.30
0.40	1.00	13.00	11.50	1.50	16.10	11.90
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	10.30	7.70
0.30	0.75	13.00	11.50	1.50	10.80	8.20
0.40	0.75	12.00	10.50	1.50	15.70	11.60
0.40	1.00	13.00	11.50	1.50	16.40	12.20

Location :IPS 1 (ZONE 6)

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	6.10	4.70
0.30	0.75	13.00	11.50	1.50	6.40	5.00
0.40	1.00	12.00	10.50	1.50	9.20	7.0
0.40	1.00	13.00	11.50	1.50	9.70	7.40
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	6.20	4.80
0.30	0.75	13.00	11.50	1.50	6.60	5.10
0.40	0.75	12.00	10.50	1.50	9.50	7.20
0.40	1.00	13.00	11.50	1.50	9.90	7.60

Location :Proposed STP -2

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	5.60	4.00
0.30	0.75	13.00	11.50	1.50	5.90	4.30
0.40	1.00	12.00	10.50	1.50	8.60	6.00
0.40	1.00	13.00	11.50	1.50	9.00	6.40
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	5.70	4.10
0.30	0.75	13.00	11.50	1.50	6.00	4.40
0.40	0.75	12.00	10.50	1.50	8.80	6.20
0.40	1.00	13.00	11.50	1.50	9.20	6.50

Location :Proposed STP -3

Under – Reamed (Single)Pile Foundation						
Diameter of pile stem (m)	Under Reamed Diameter (m)	Shaft Length (m)	Effective Length of pile shaft (m)	Cut off depth (m)	Safe Load Carrying Capacity of individual pile (ton)	Safe Uplift capacity (ton)
0.30	0.75	12.00	10.50	1.50	10.00	6.90
0.30	0.75	13.00	11.50	1.50	10.60	7.50
0.40	1.00	12.00	10.50	1.50	14.70	9.80
0.40	1.00	13.00	11.50	1.50	15.60	10.60
Under – Reamed (Double)Pile Foundation						
0.30	0.75	12.00	10.50	1.50	10.10	7.00
0.30	0.75	13.00	11.50	1.50	10.70	7.60
0.40	0.75	12.00	10.50	1.50	15.00	10.00
0.40	1.00	13.00	11.50	1.50	15.80	10.70

However, the aforesaid load carrying capacity involves various limitation and many simplifying assumption. And also, the performance of pile foundation is very much sensitive to the method of installation, equipment used, level of supervision adopted during execution of work. Therefore, the load carrying capacity of pile as obtained should preferably be cross-checked and established by conduction of load test of pile as specified in IS 2911 part IV.

4.2 Notes & Suggestion:-

- Based on the actual loading from superstructure if necessary the design engineer may provide appropriate pile foundation based on this soil report. **The actual load carrying capacity may be ascertained based on pile load test as per relevant IS code.**
- While piles are in group the piles may be installed at a center to center spacing of 2.50 times the diameter of the pile.
- Every precautionary measures as laid down in the relevant IS codes and as applicable for the particular type of foundation is to be adopted here must be taken during execution of foundation work. Due consideration should particularly be given towards the safety of nearby existing structure, if any.

4.3 LIMITATION

While interpreting and subsequently ascertaining the test results, observation and safe allowable bearing capacity or load carrying capacity obtained thereof, due consideration should be attributed towards capriciousness of the soil properties, restricted no. of boreholes and their locations, various limitations and constraints usually associated with such sub-soil exploration work and many simplifying assumptions made during subsequent analysis. **If during execution of foundation, local sub-soil variations with respect to the condition revealed at the present boring location were noticed, then the load capacity values must be modified accordingly and the recommendations to be reviewed in the right perspective.**

Thus, it is expected that this report should be used as a guideline in the process of further design. The particular type and nature of foundation to be adopted will, however, depend on the Design Engineers with due consideration to the nature and complexity of the structure.

It is also relevant to mention here that this report should be read in totality and not in isolation or just any selected portion of it in order to avoid any mis-interpretation.

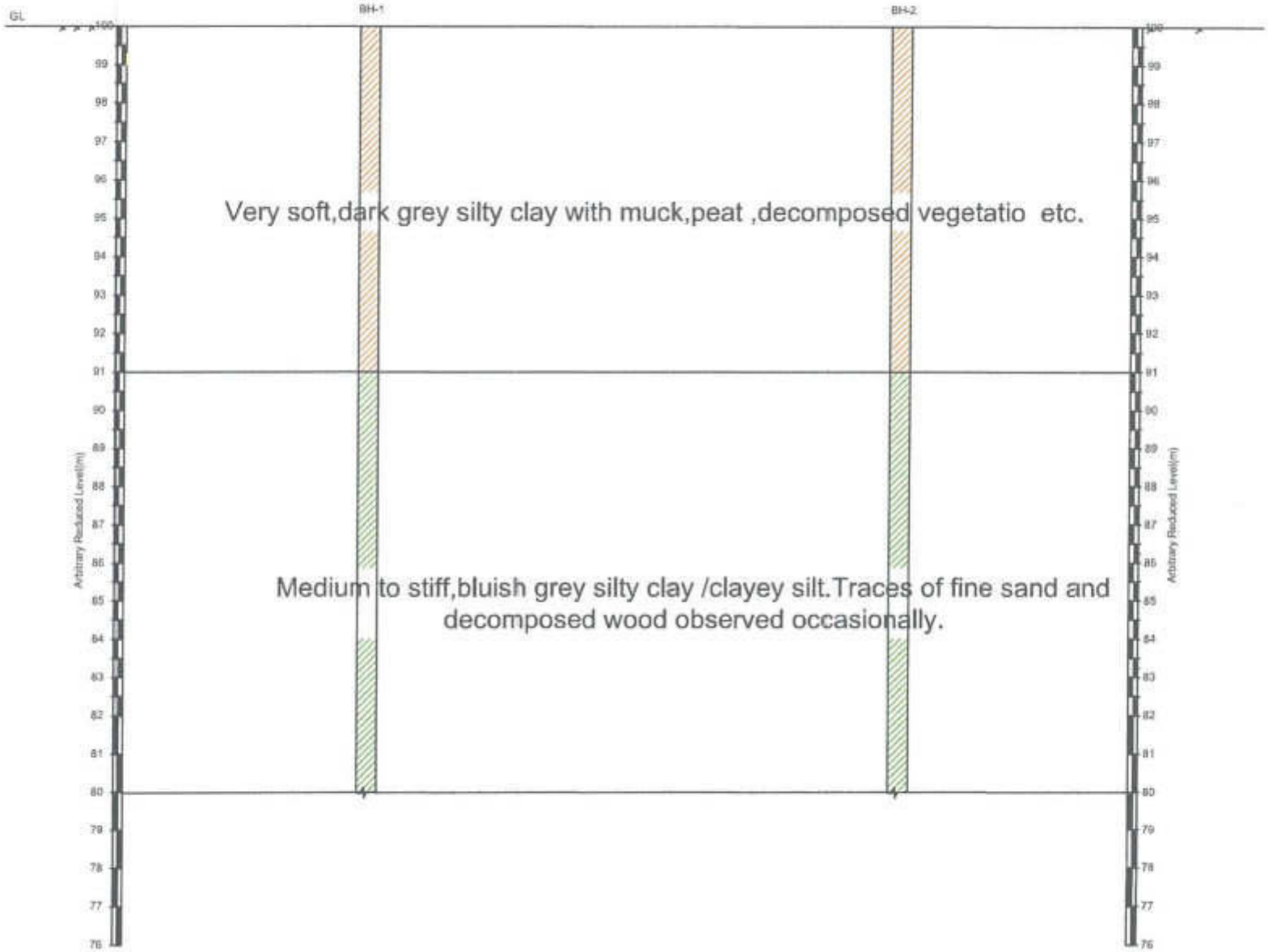
We appreciate the opportunity to perform this investigation for you and have pleasure in submitting this report. Please contact us when we can be of further service to you.

Right Site Survey Kolkata Bajarhat

(A .MONDAL)
M.TECH IN GEOTECHNICAL ENGINEERING
CHARTERED ENGINEER.

ANNEXURE-1

⇒ GENERALISED SOIL PROFILE


GL
BH-1
BH-2
Very soft,dark grey silty clay with muck,peat ,decomposed vegetatio etc.
Medium to stiff,bluish grey silty clay /clayey silt.Traces of fine sand and decomposed wood observed occasionally.
Arbitrary Reduced Level(m)
100
99
98
97
96
95
94
93
92
91
90
89
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79
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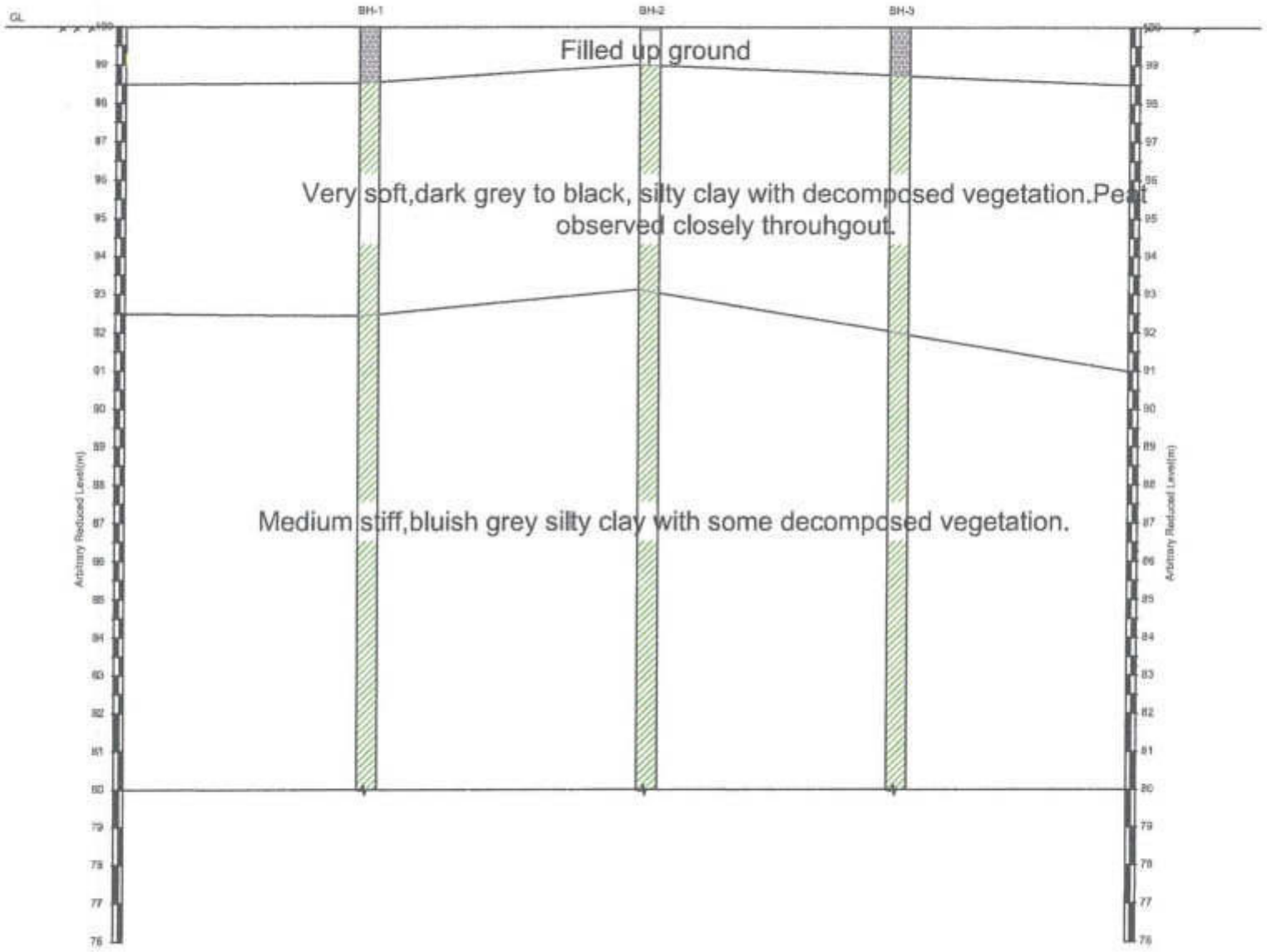
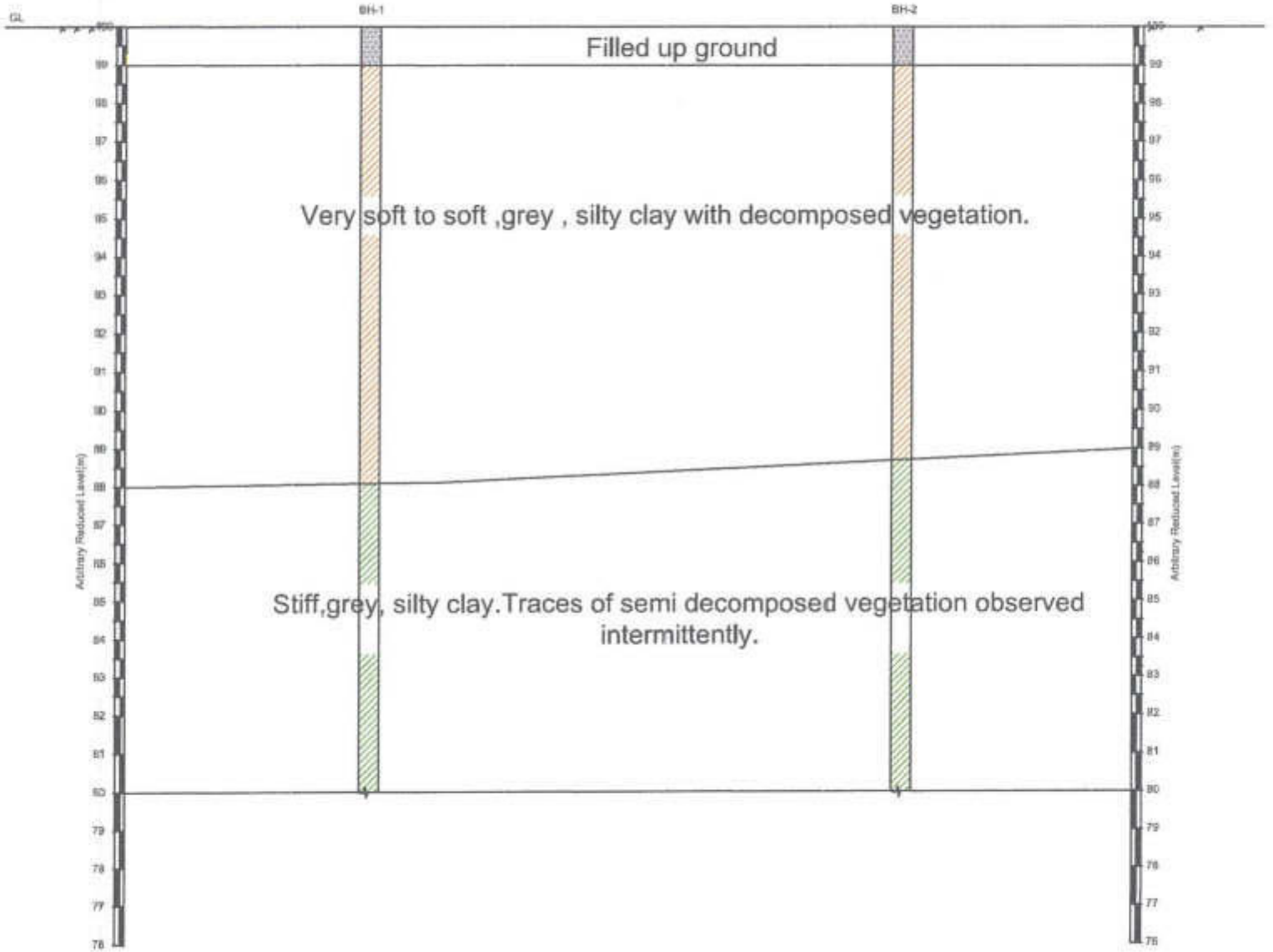
77
76

Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



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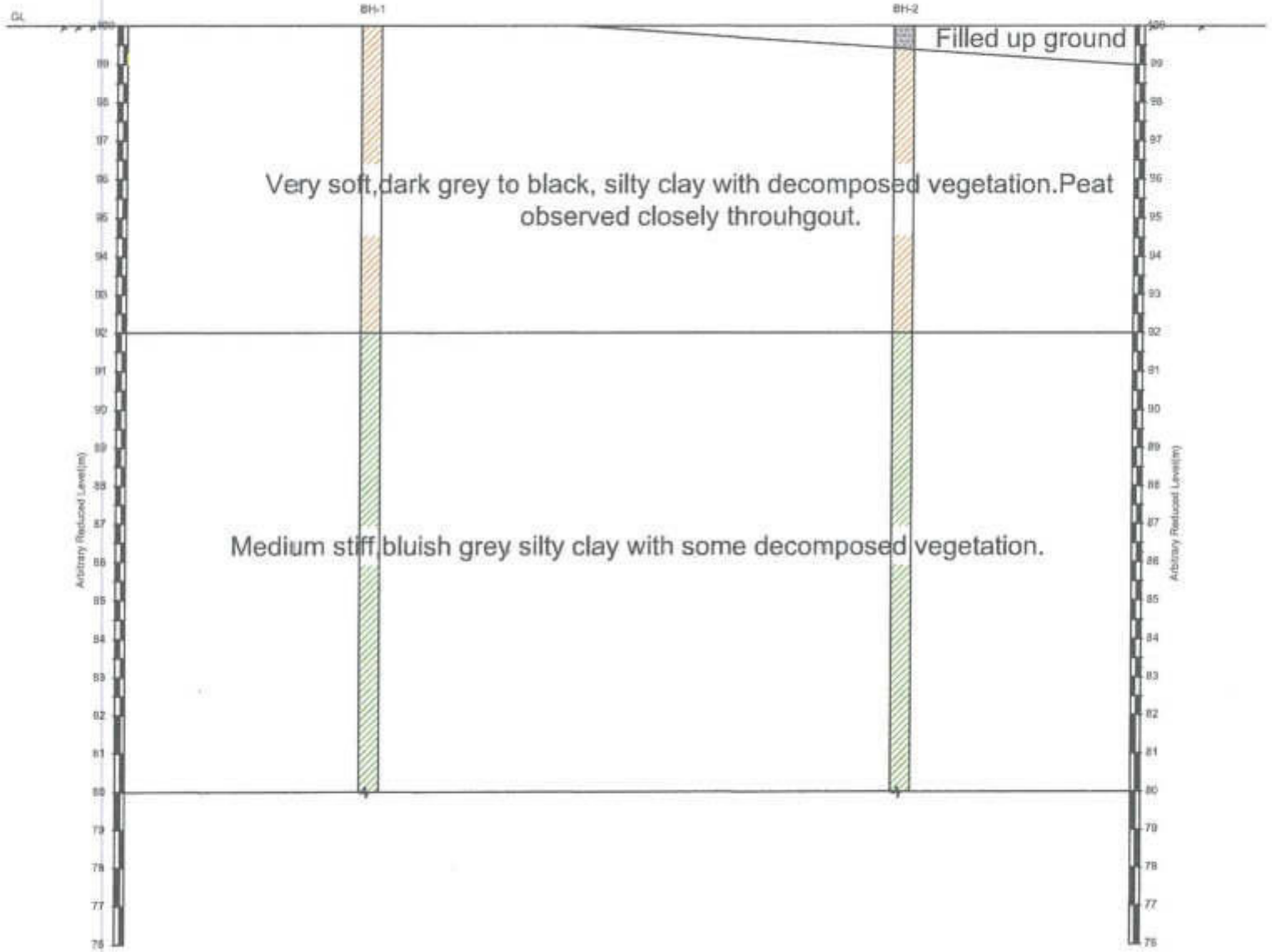

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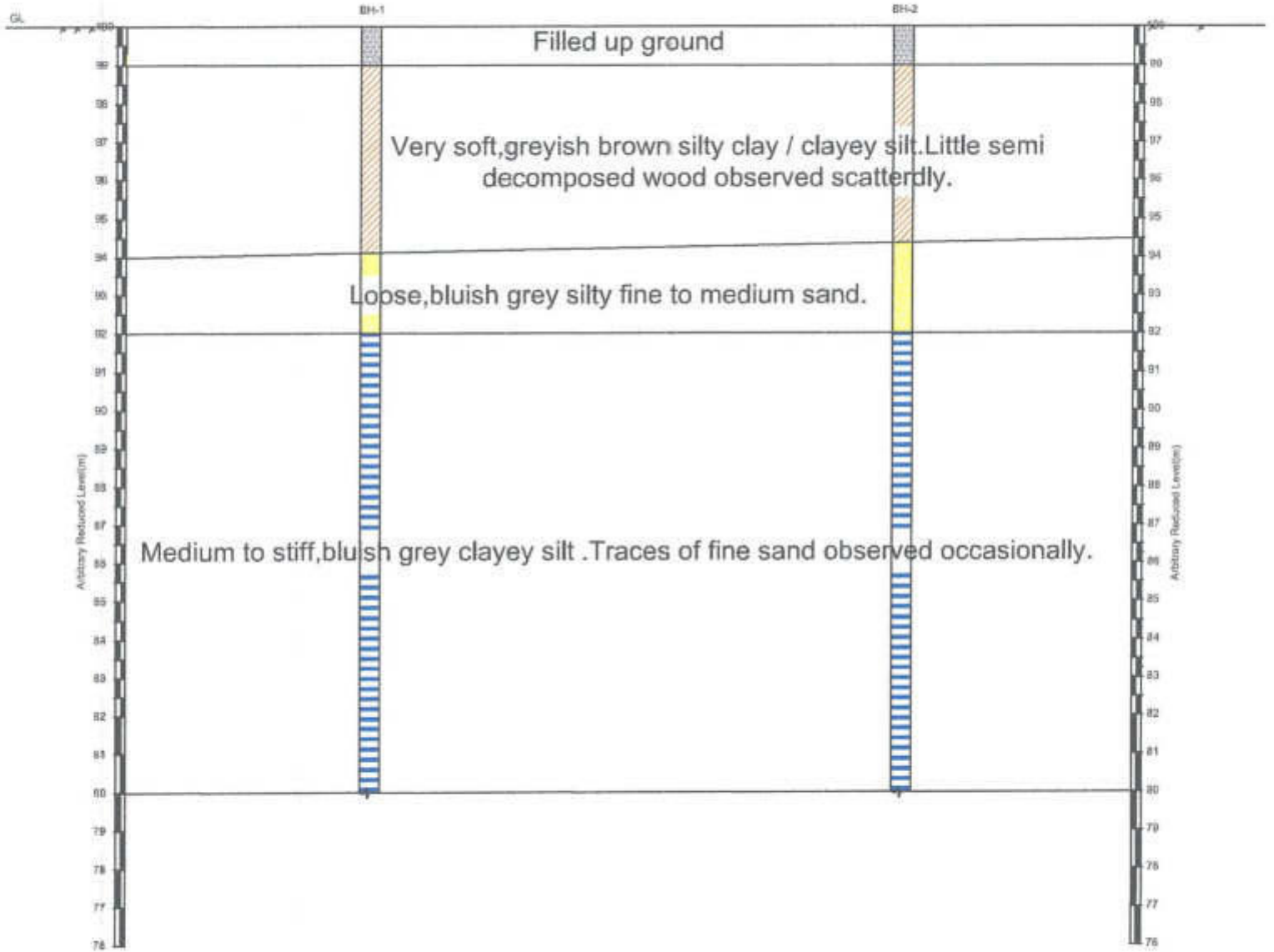
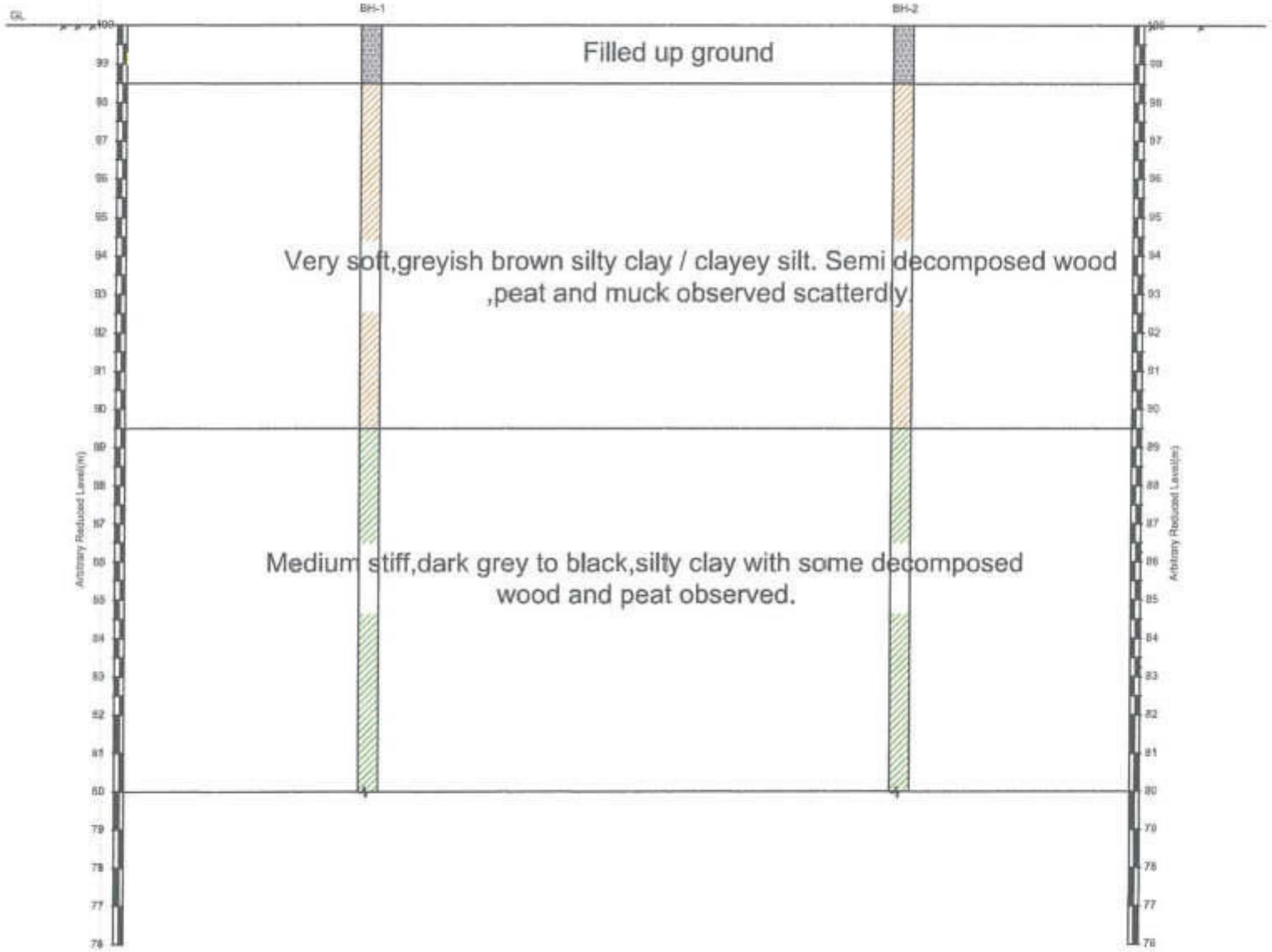
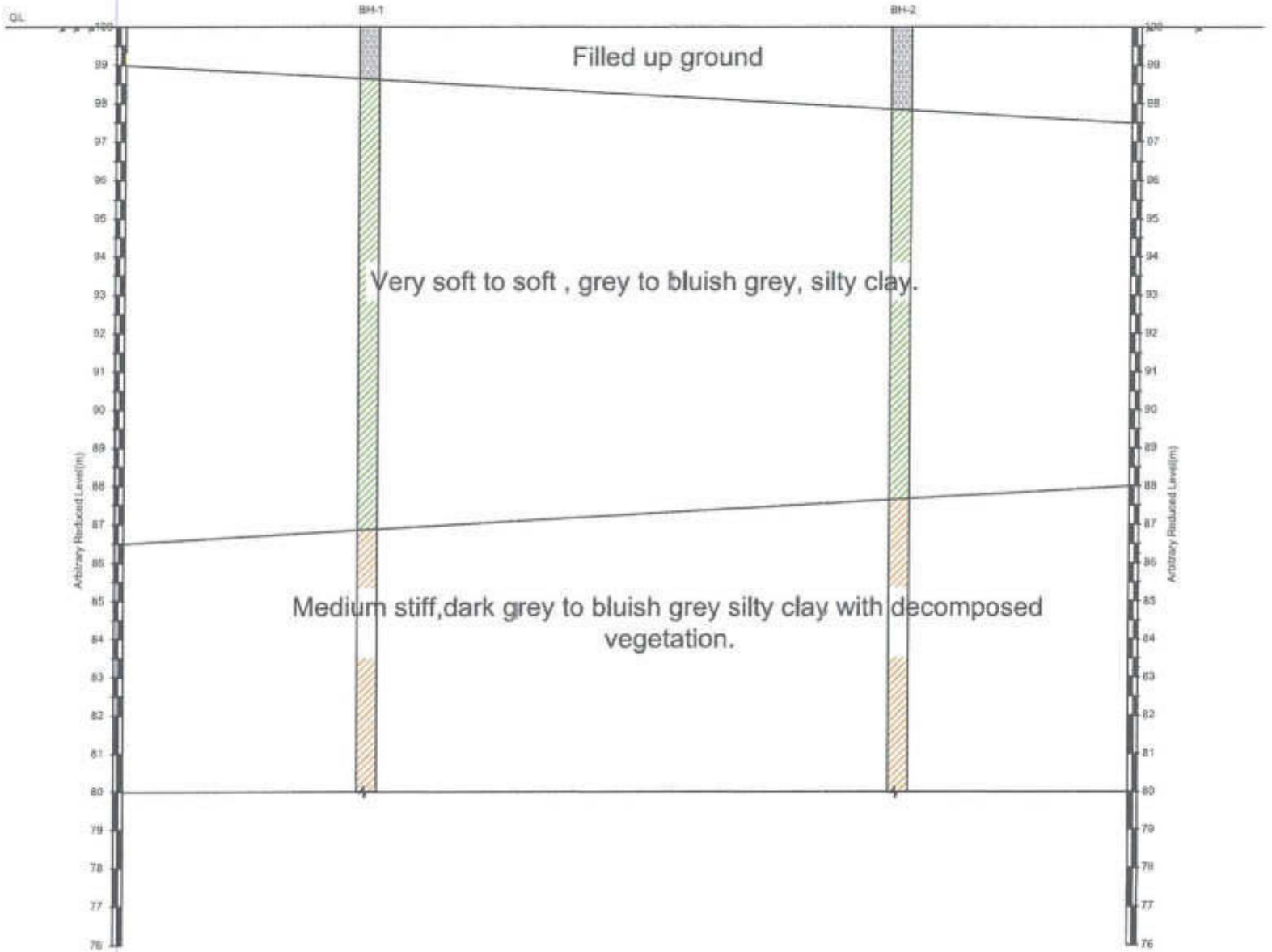


Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.




GL
BH-1
BH-2
Filled up ground
Very soft to soft , grey to bluish grey, silty clay.
Medium stiff,dark grey to bluish grey silty clay with decomposed vegetation.
Arbitrary Reduced Level(m)
100
99
98
97
96
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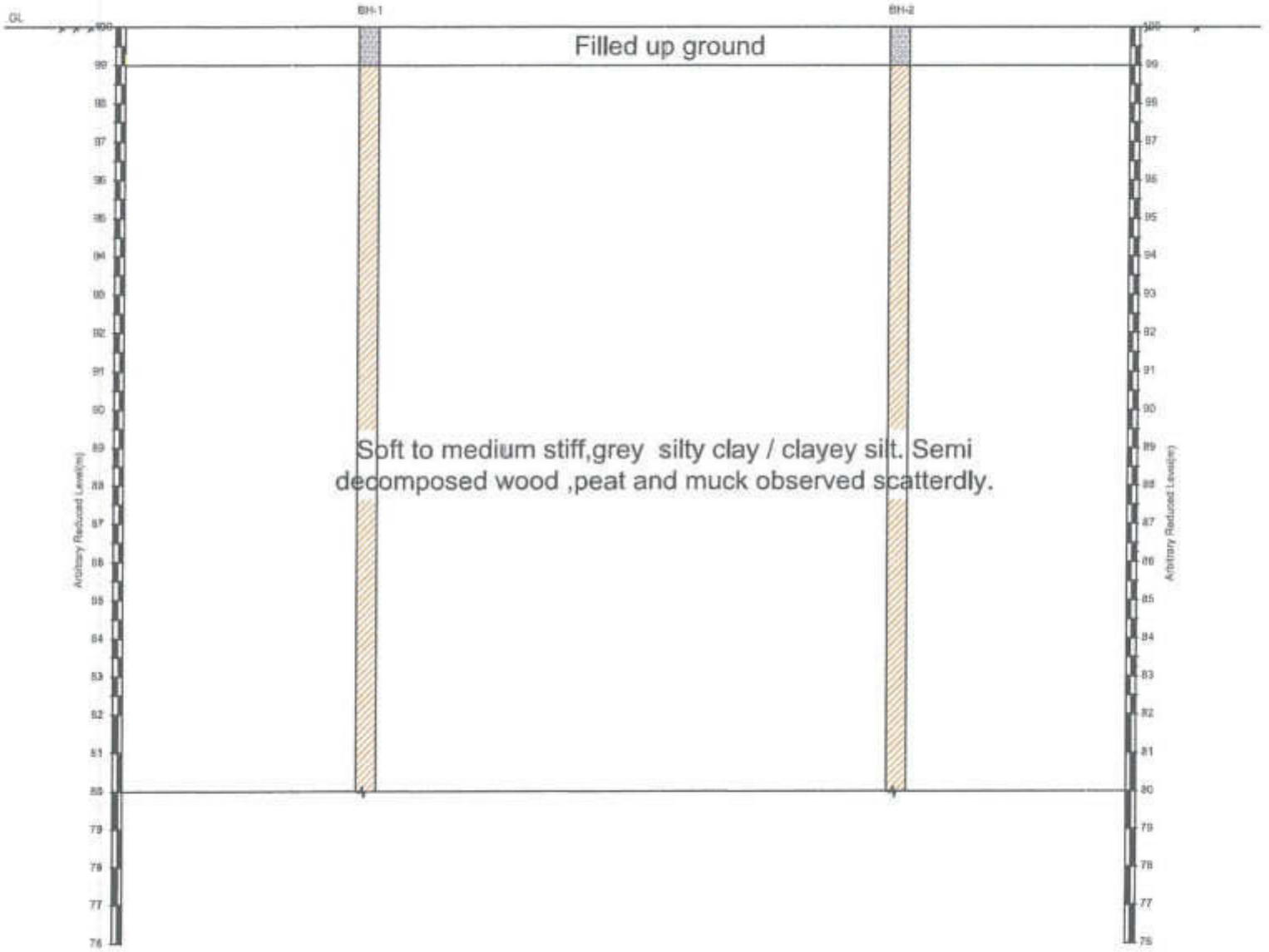
GL
BH-1
BH-2
Filled up ground
Soft to medium stiff,grey silty clay / clayey silt. Semi decomposed wood ,peat and muck observed scatterdly.
Arbitrary Reduced Level(m)

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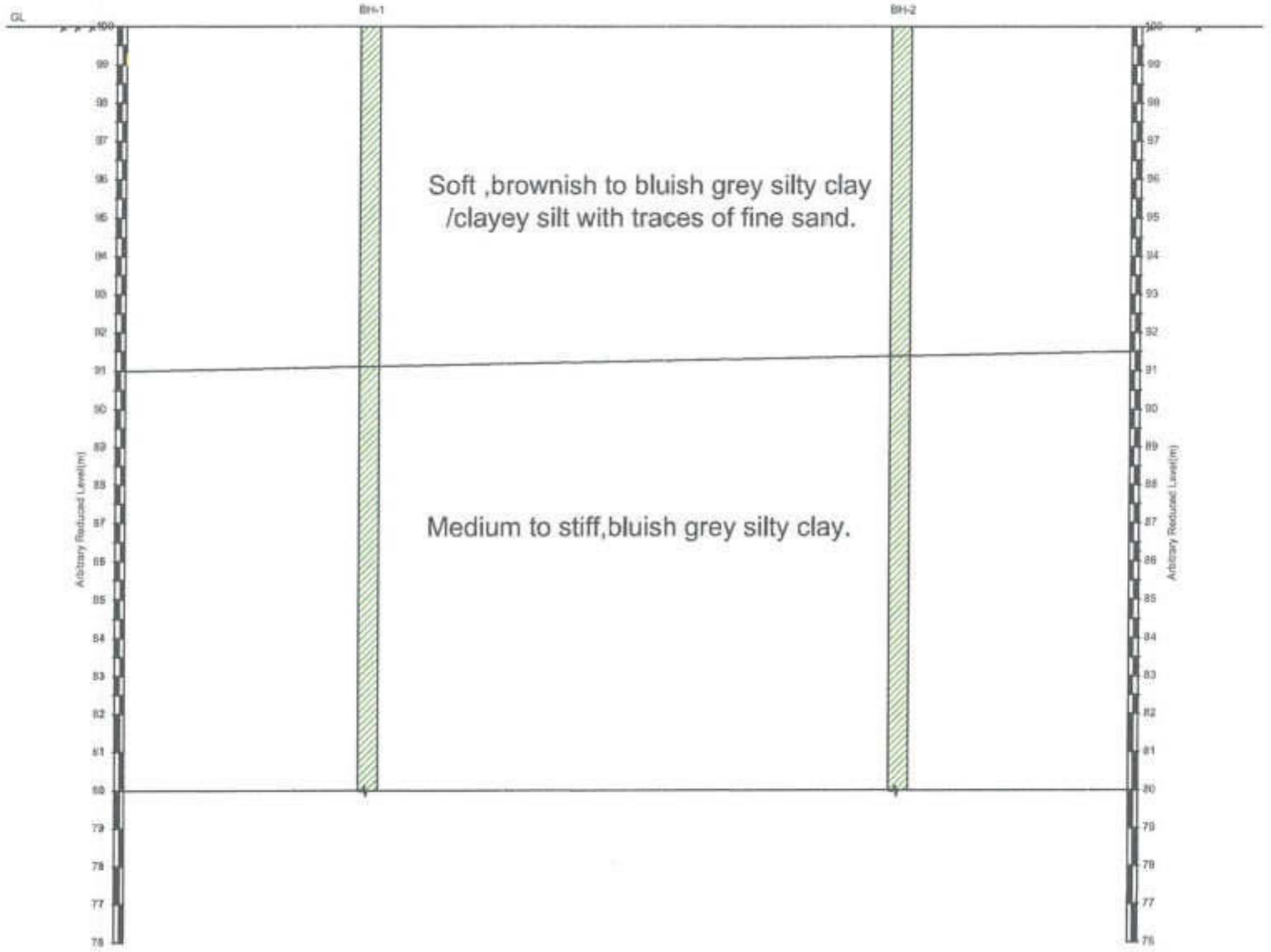
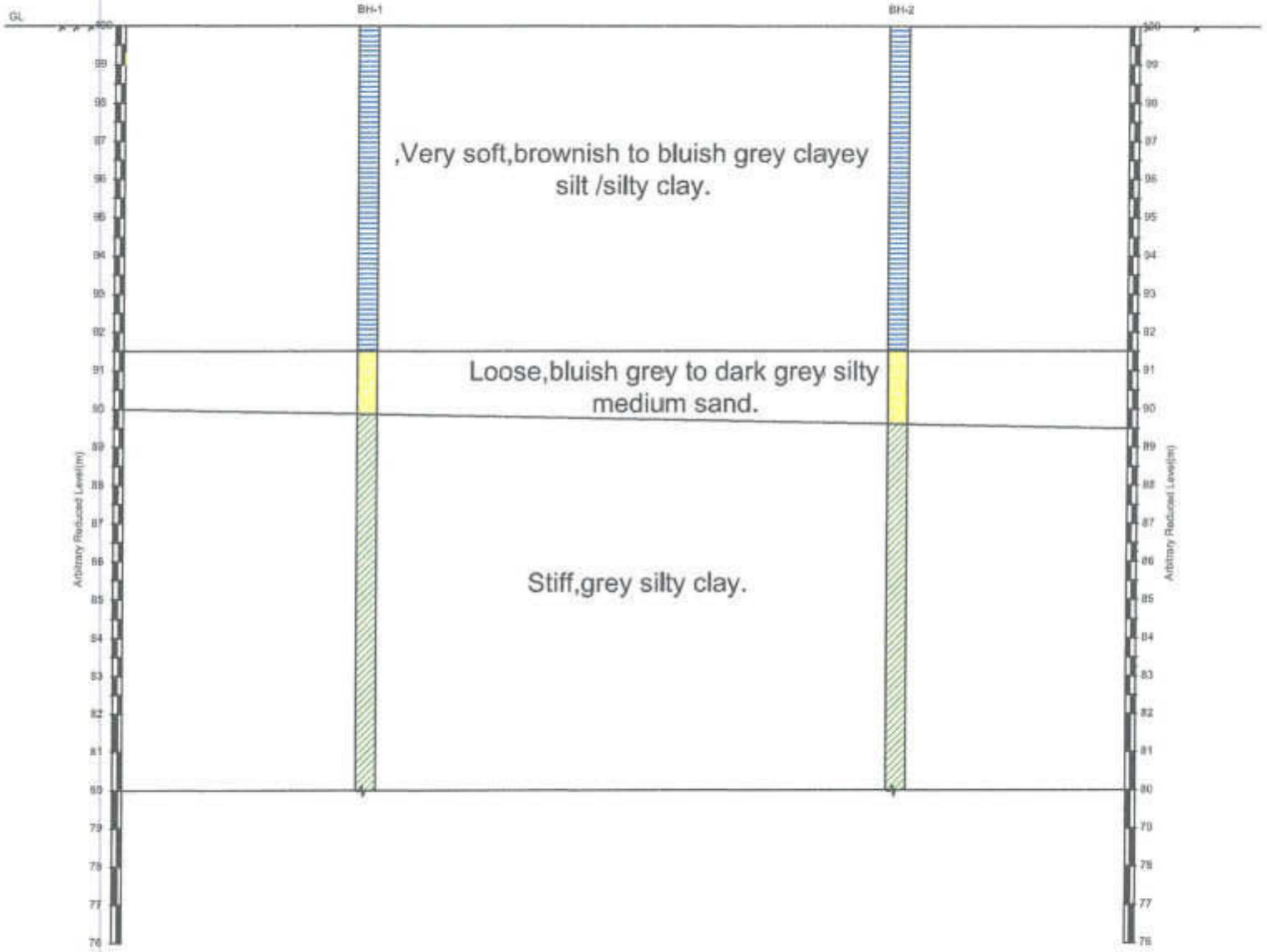
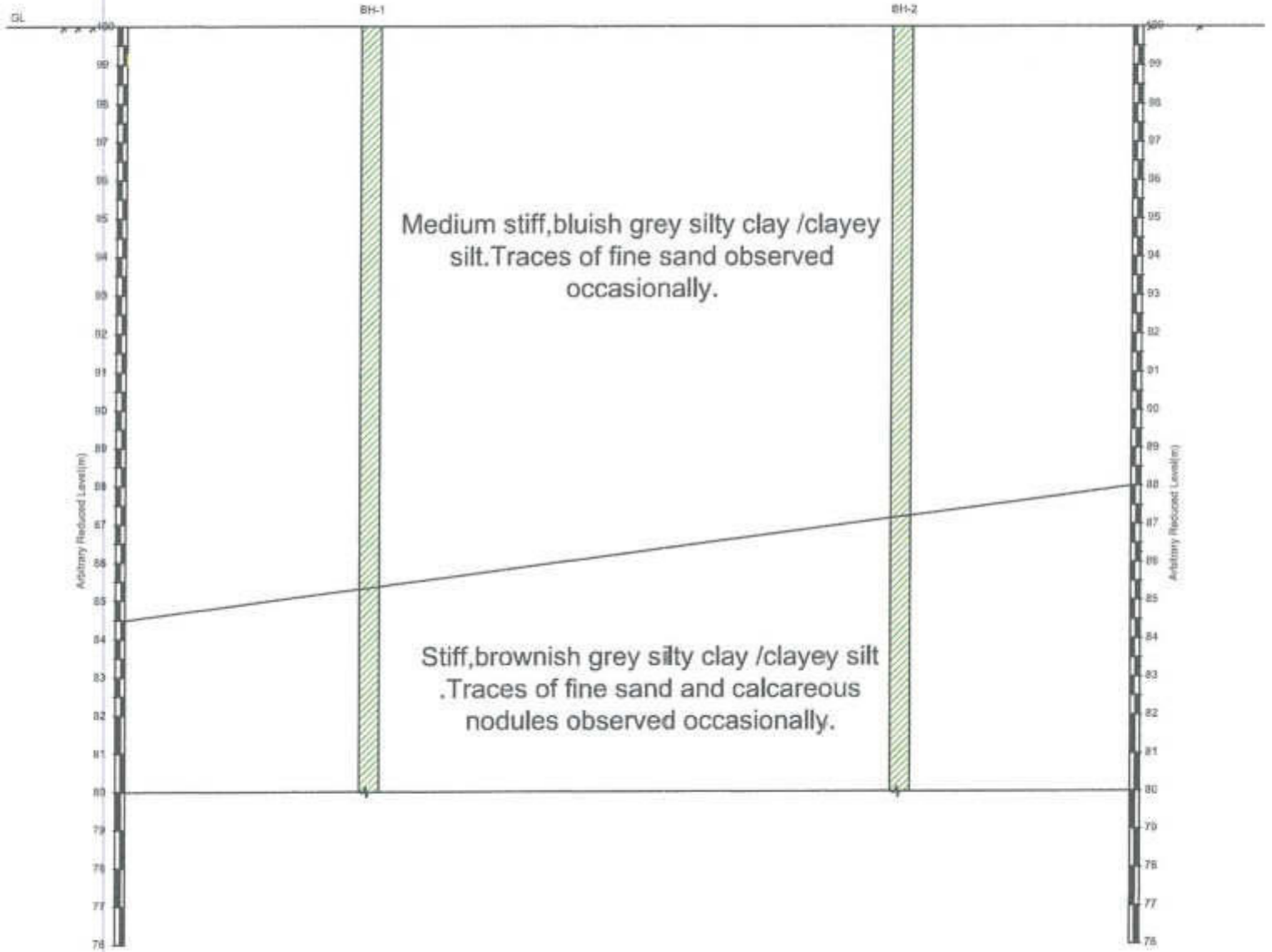


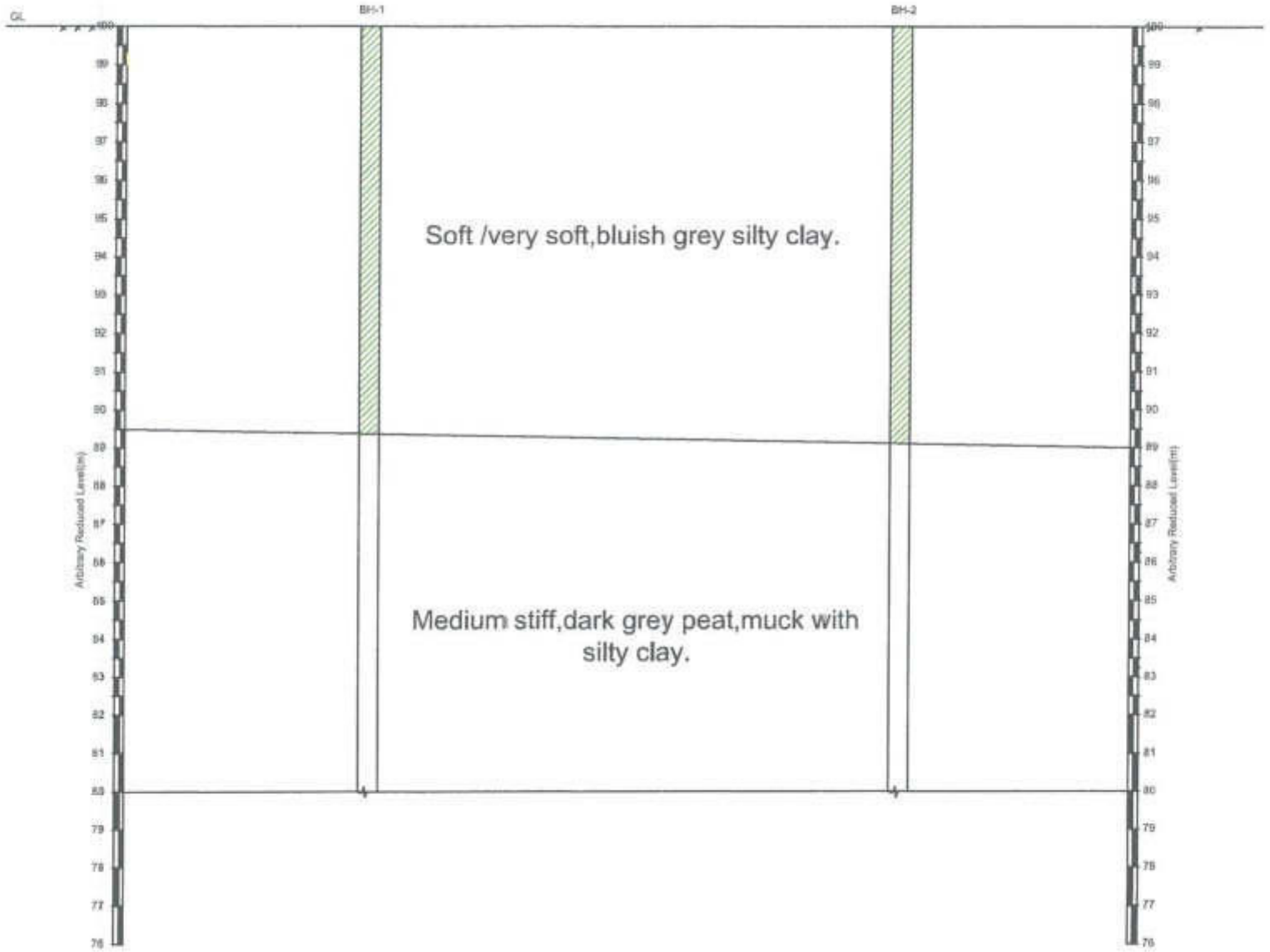
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



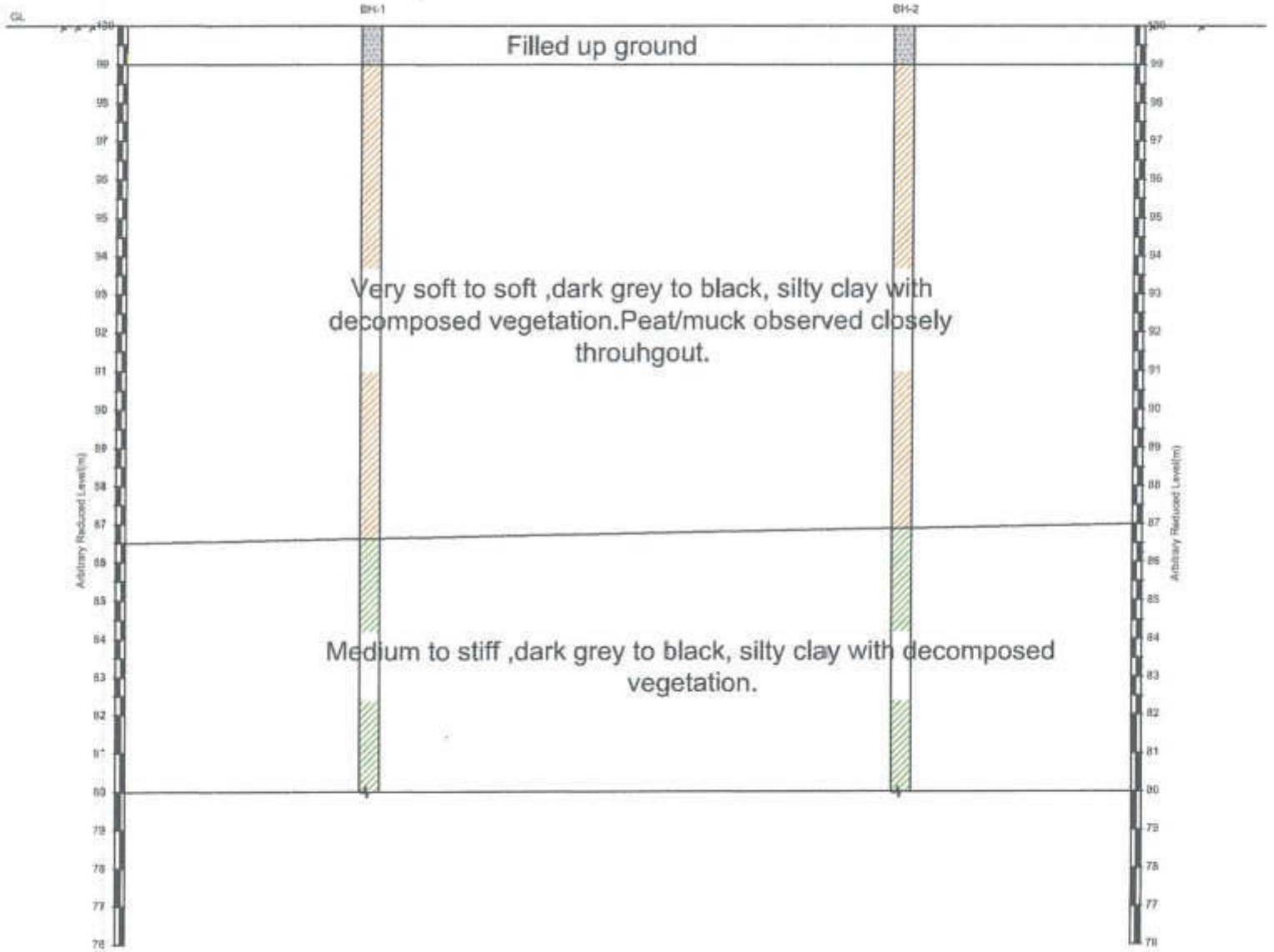
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



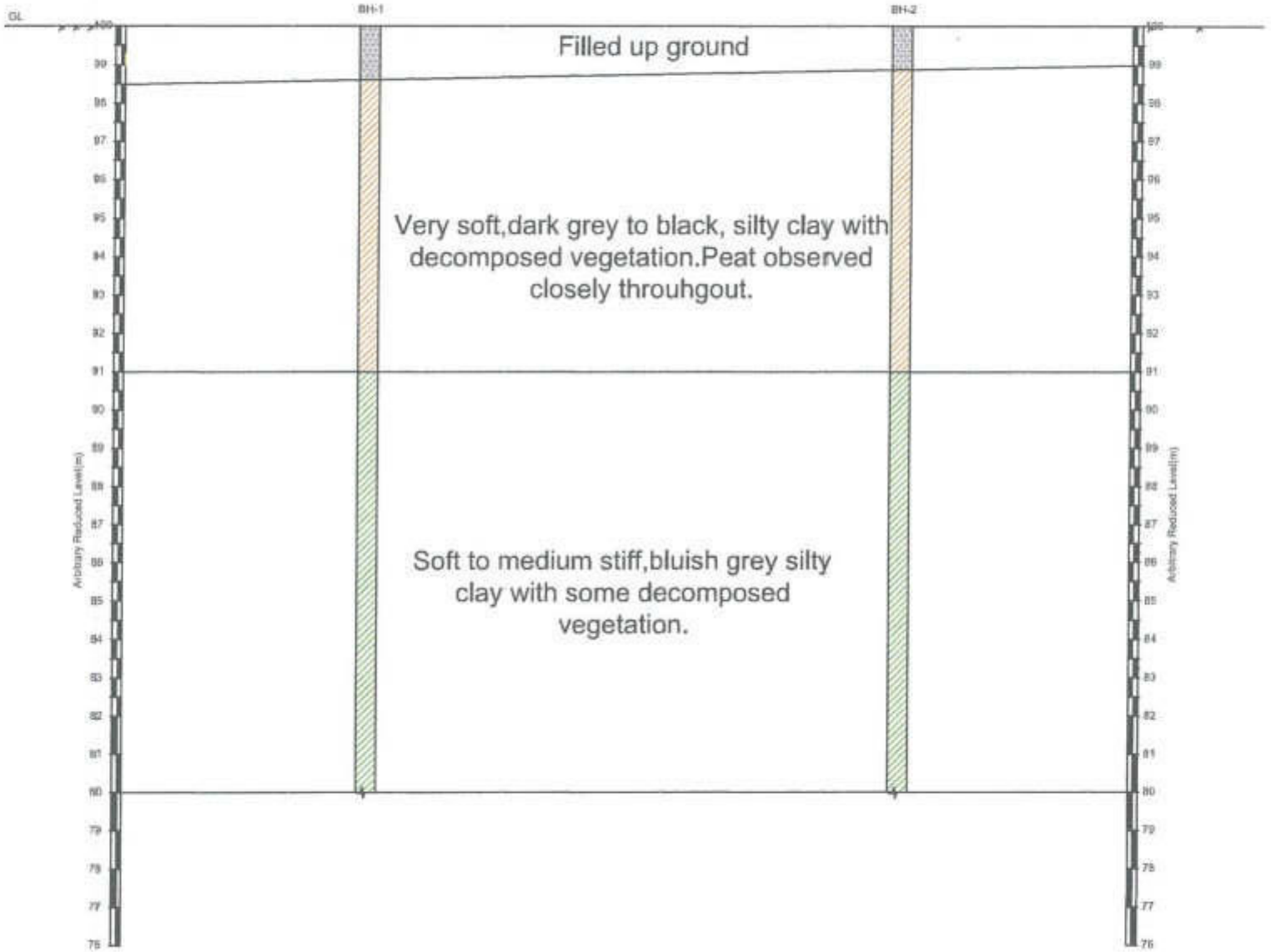
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

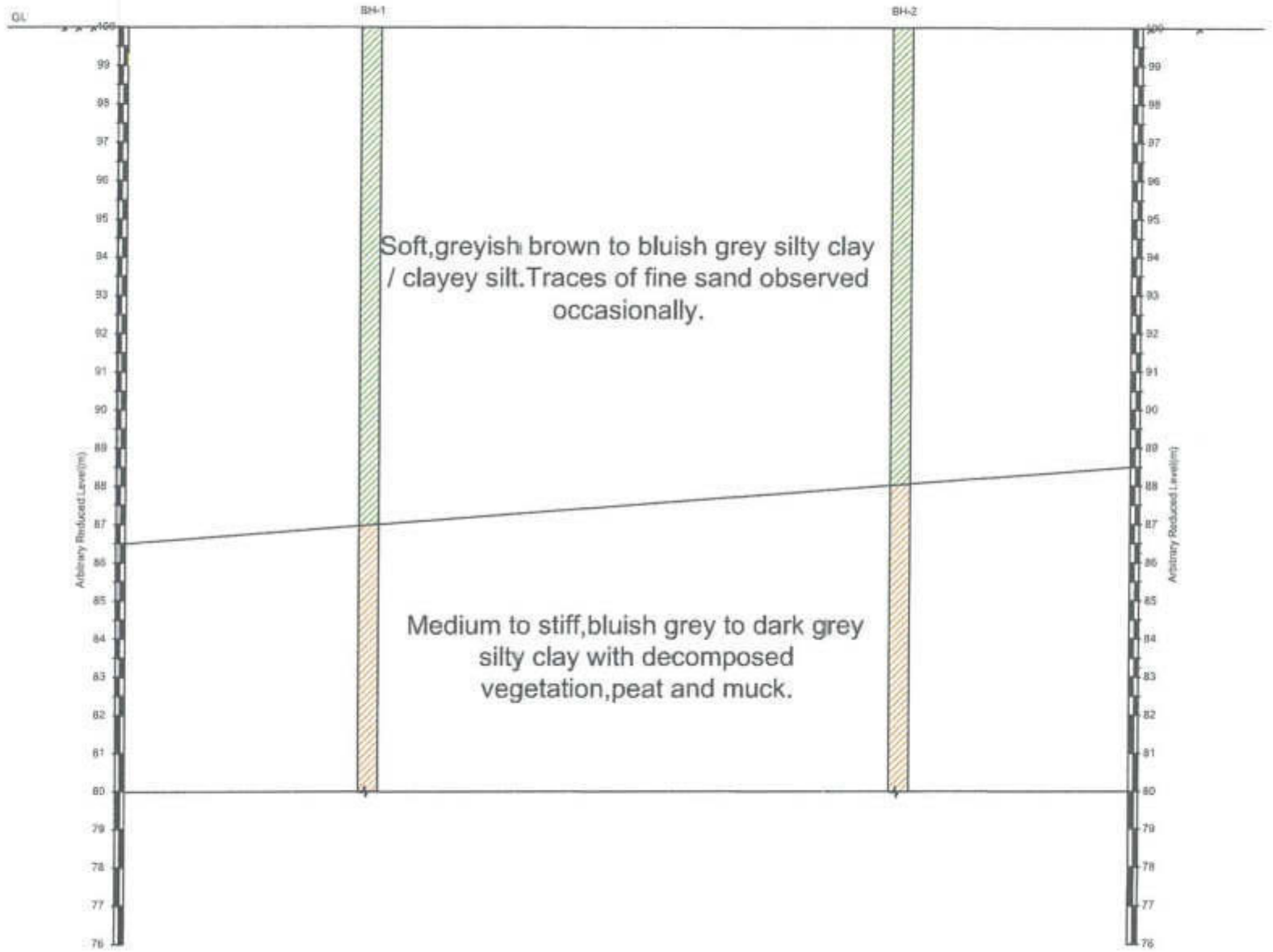


Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.




GL
BH-1
BH-2
Soft,greyish brown to bluish grey silty clay / clayey silt.Traces of fine sand observed occasionally.
Medium to stiff,bluish grey to dark grey silty clay with decomposed vegetation,peat and muck.
Arbitrary Reduced Level(m)
99
98
97
96
95
94
93
92
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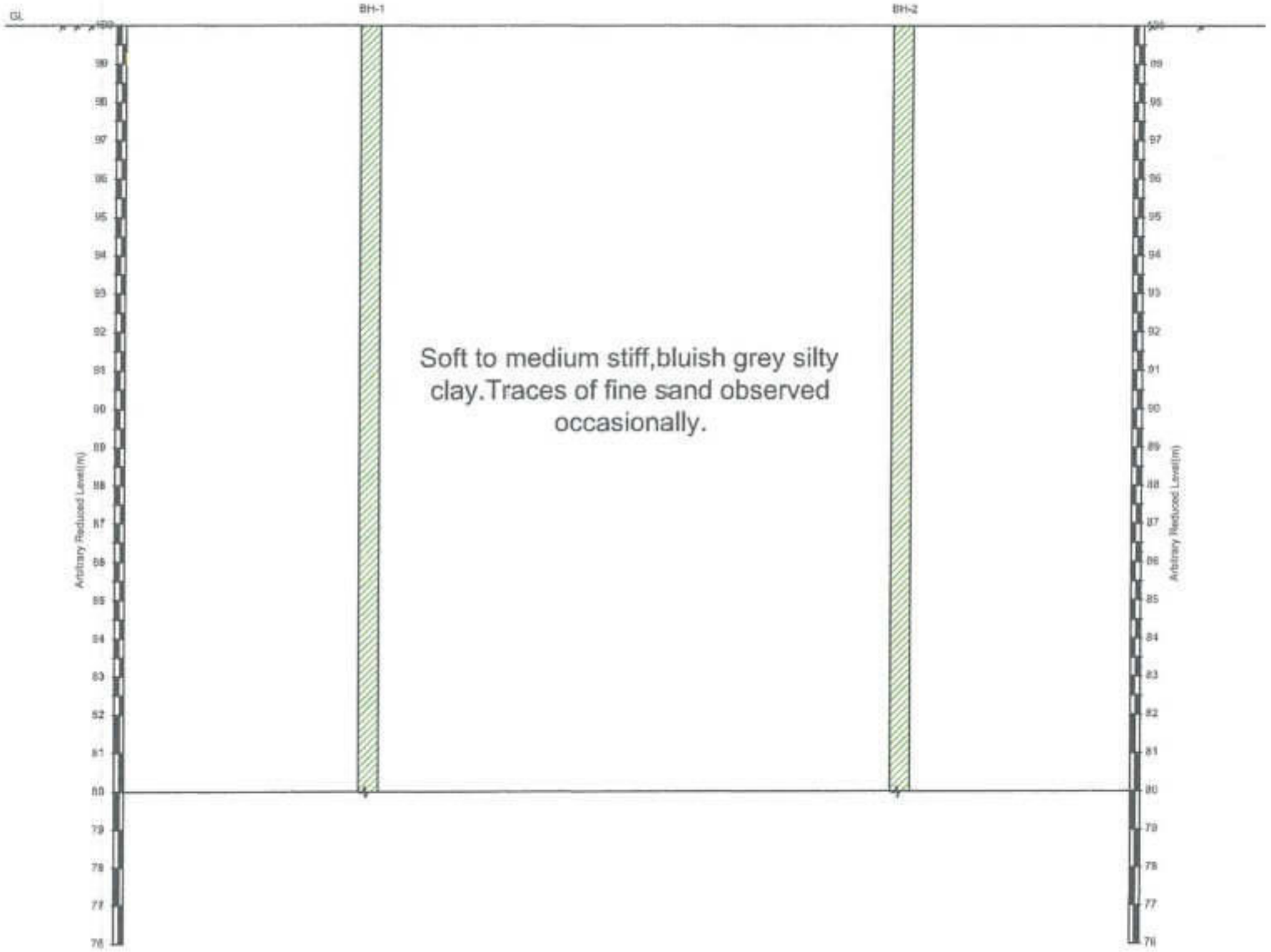
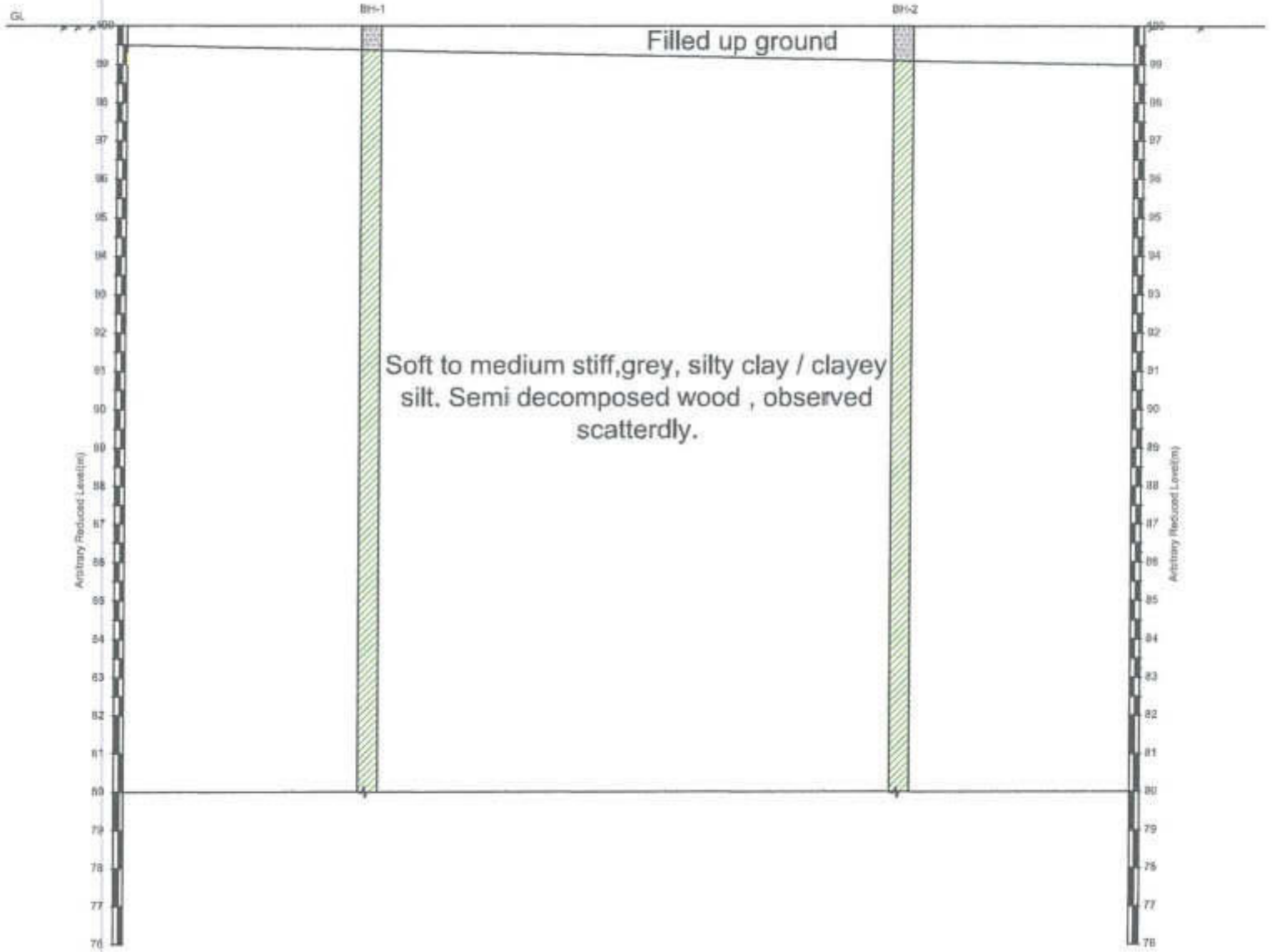
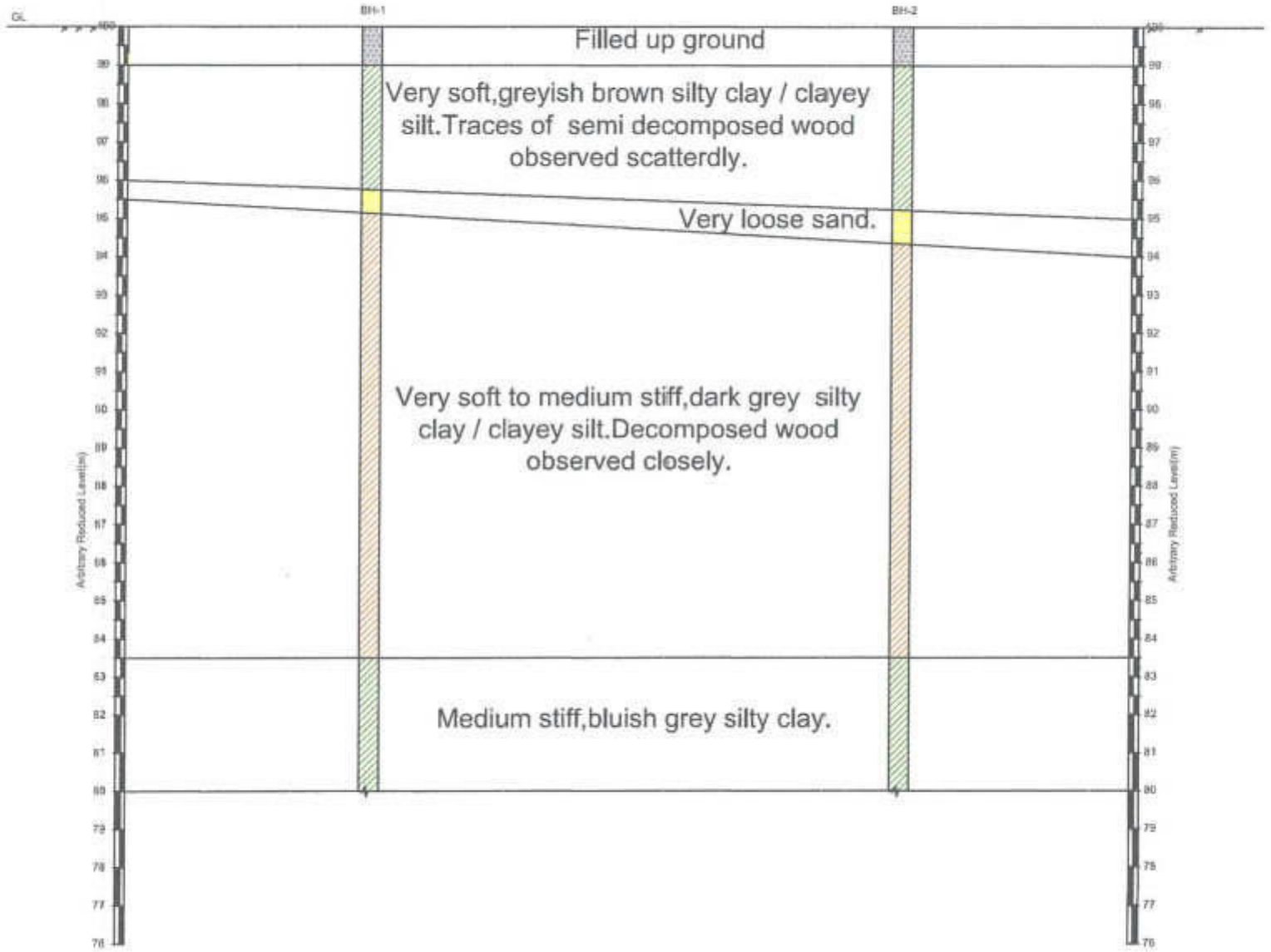
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

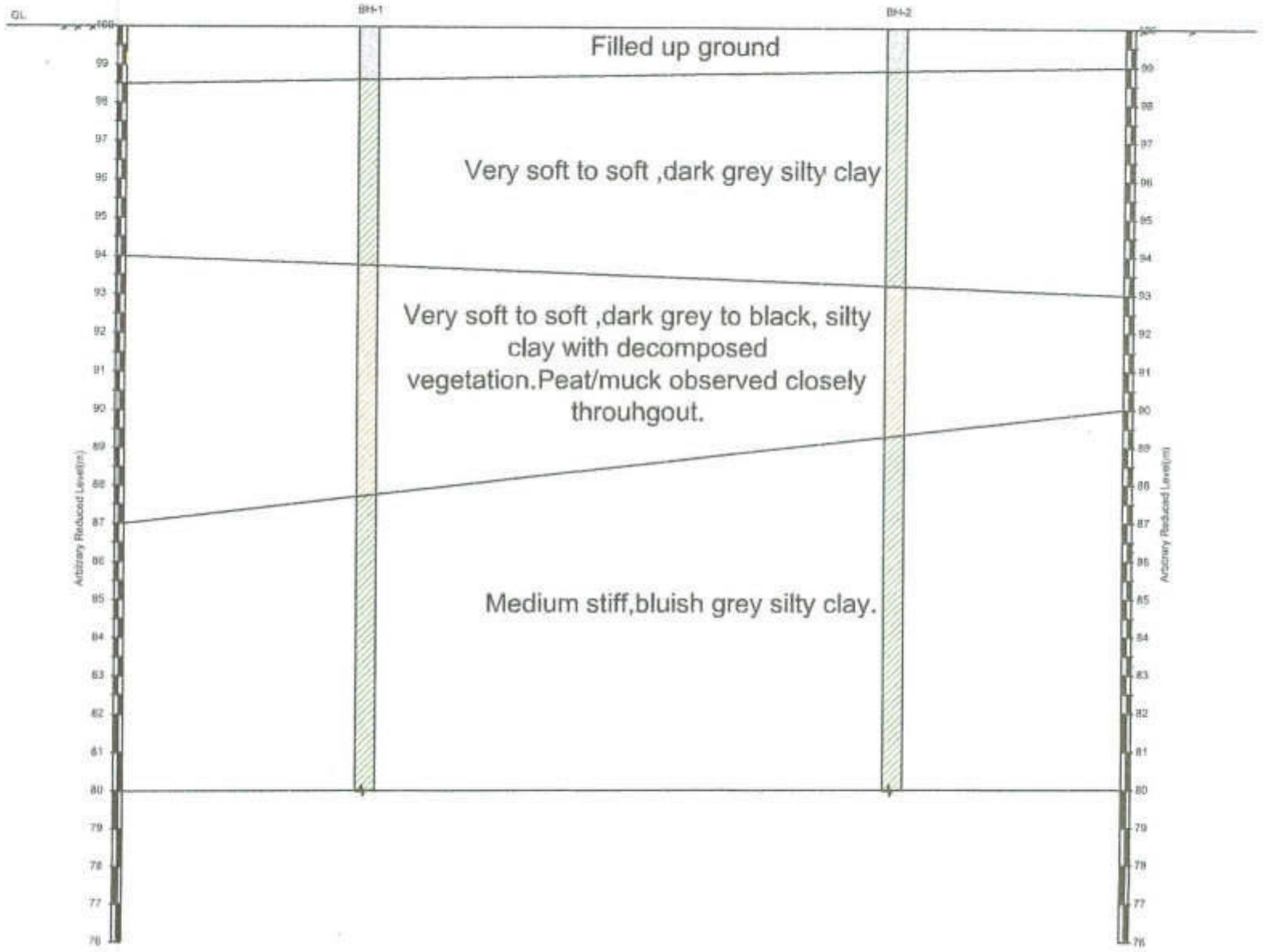


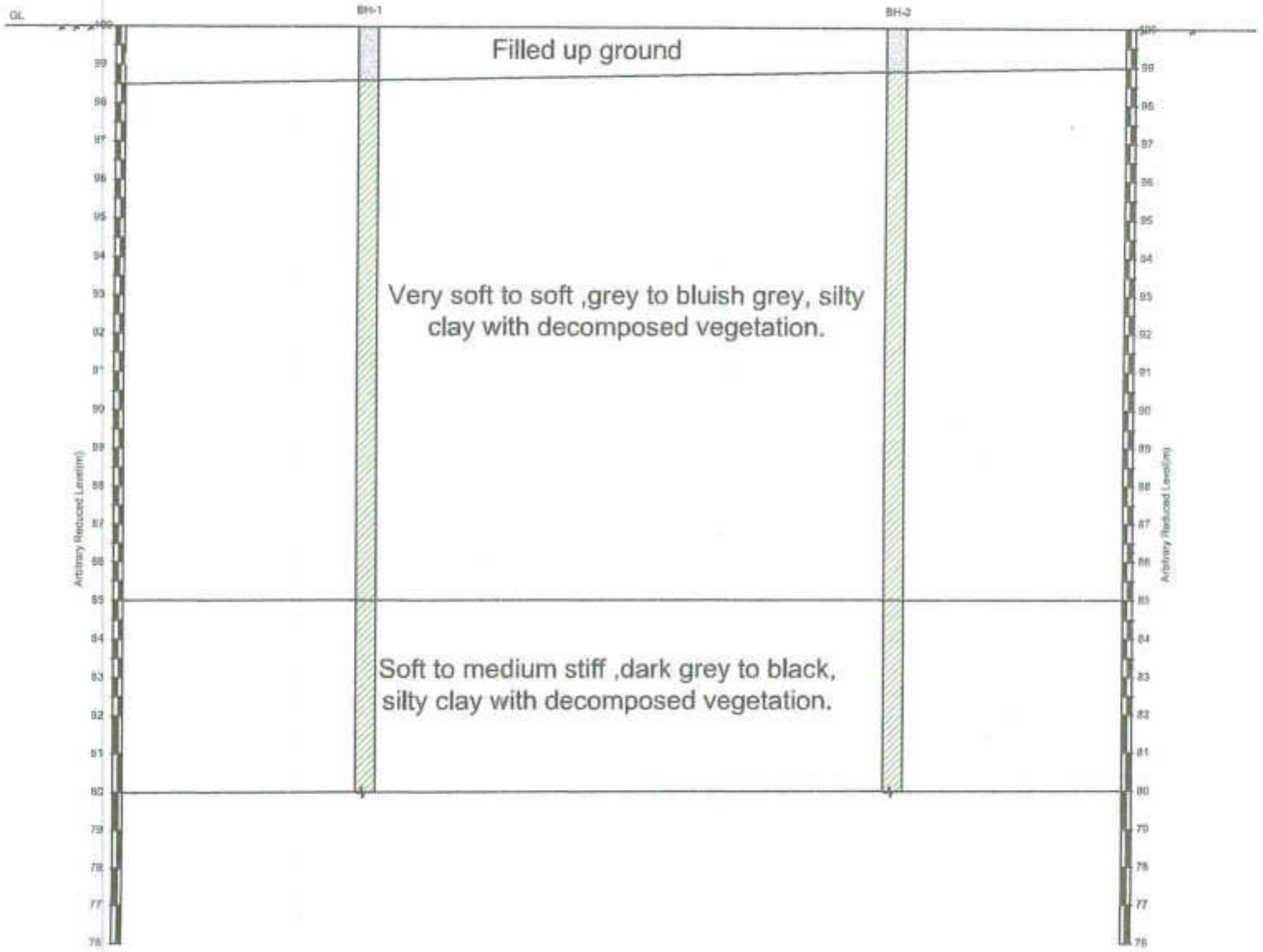
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

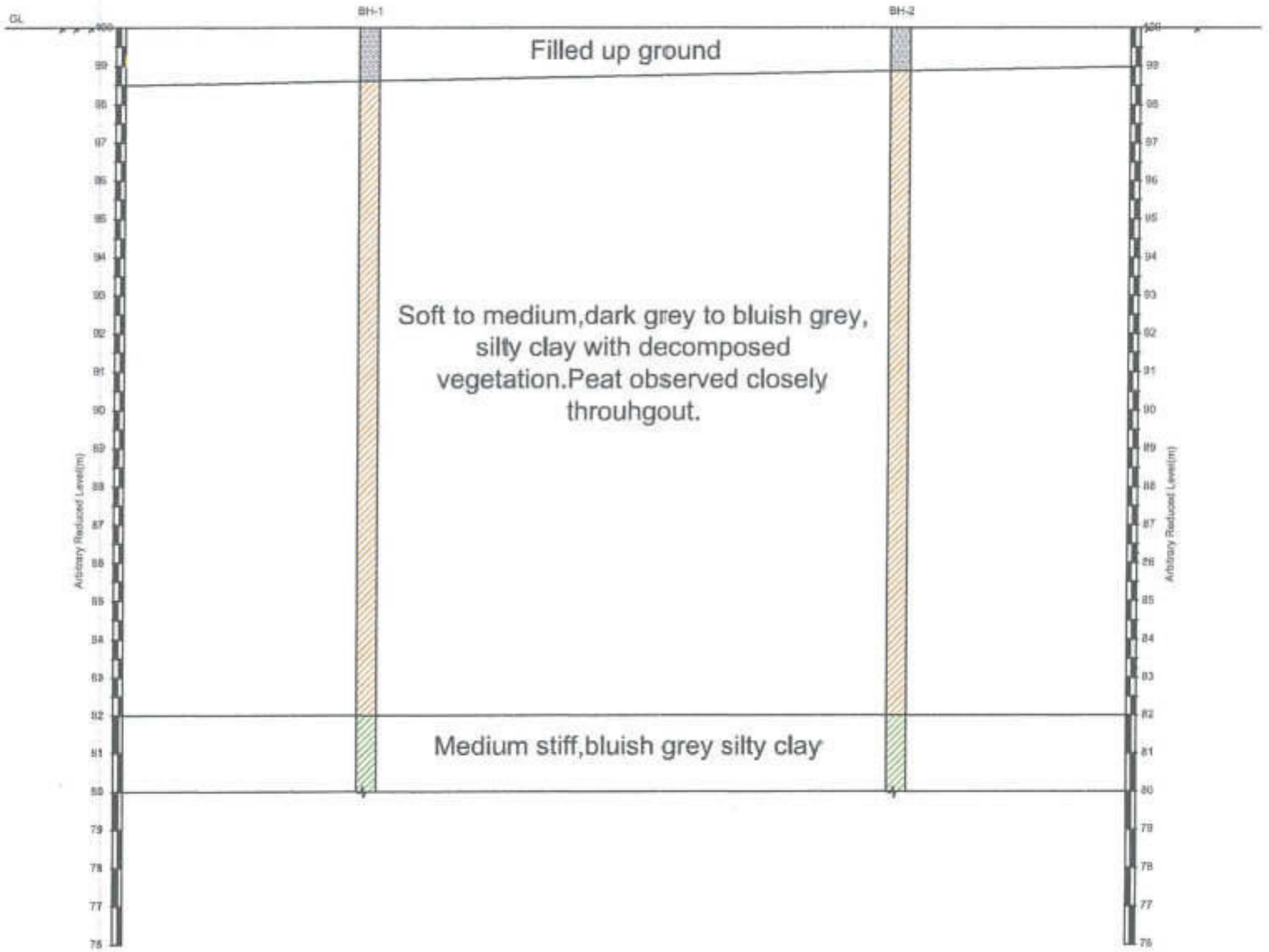


Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

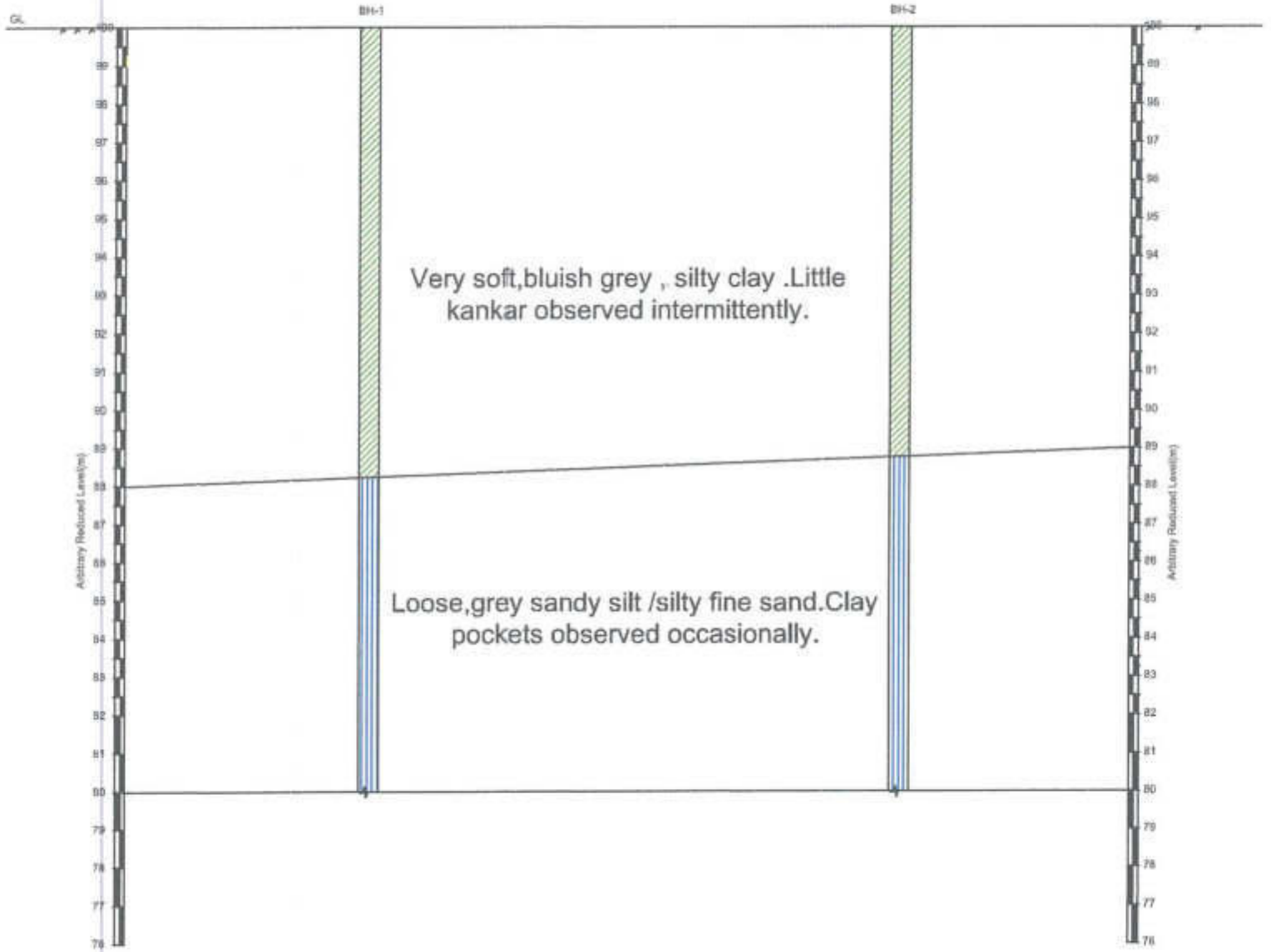



GL
BH-1
BH-2
Filled up ground
Very soft to soft ,dark grey silty clay
Very soft to soft ,dark grey to black, silty clay with decomposed vegetation.Peat/muck observed closely throuhgout.
Medium stiff,bluish grey silty clay.
Arbitrary Reduced Level(m)
Arbitrary Reduced Level(m)

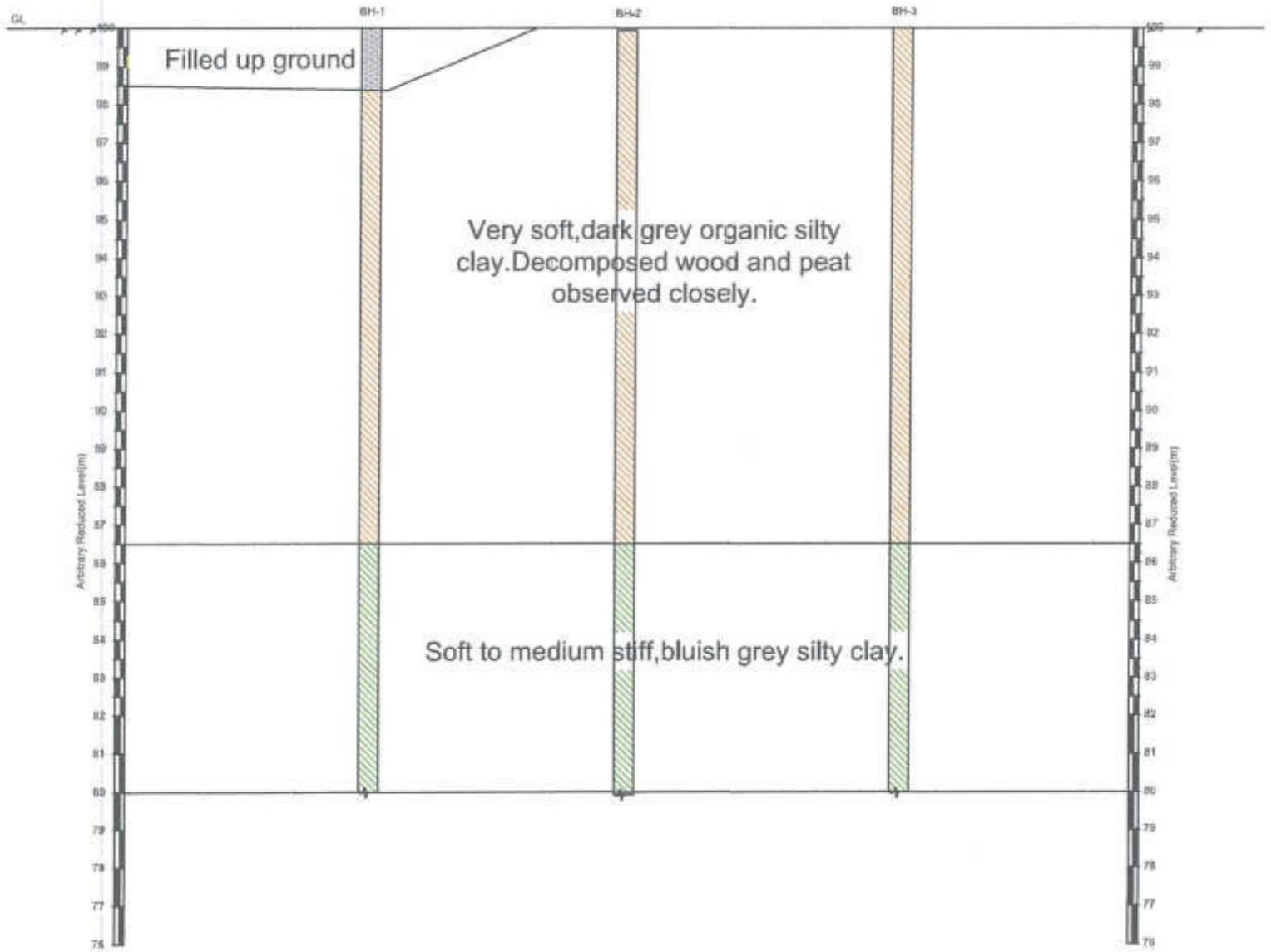

GL
BH-1
BH-2
Filled up ground
Very soft to soft ,grey to bluish grey, silty clay with decomposed vegetation.
Soft to medium stiff ,dark grey to black, silty clay with decomposed vegetation.
Arbitrary Reduced Level(m)

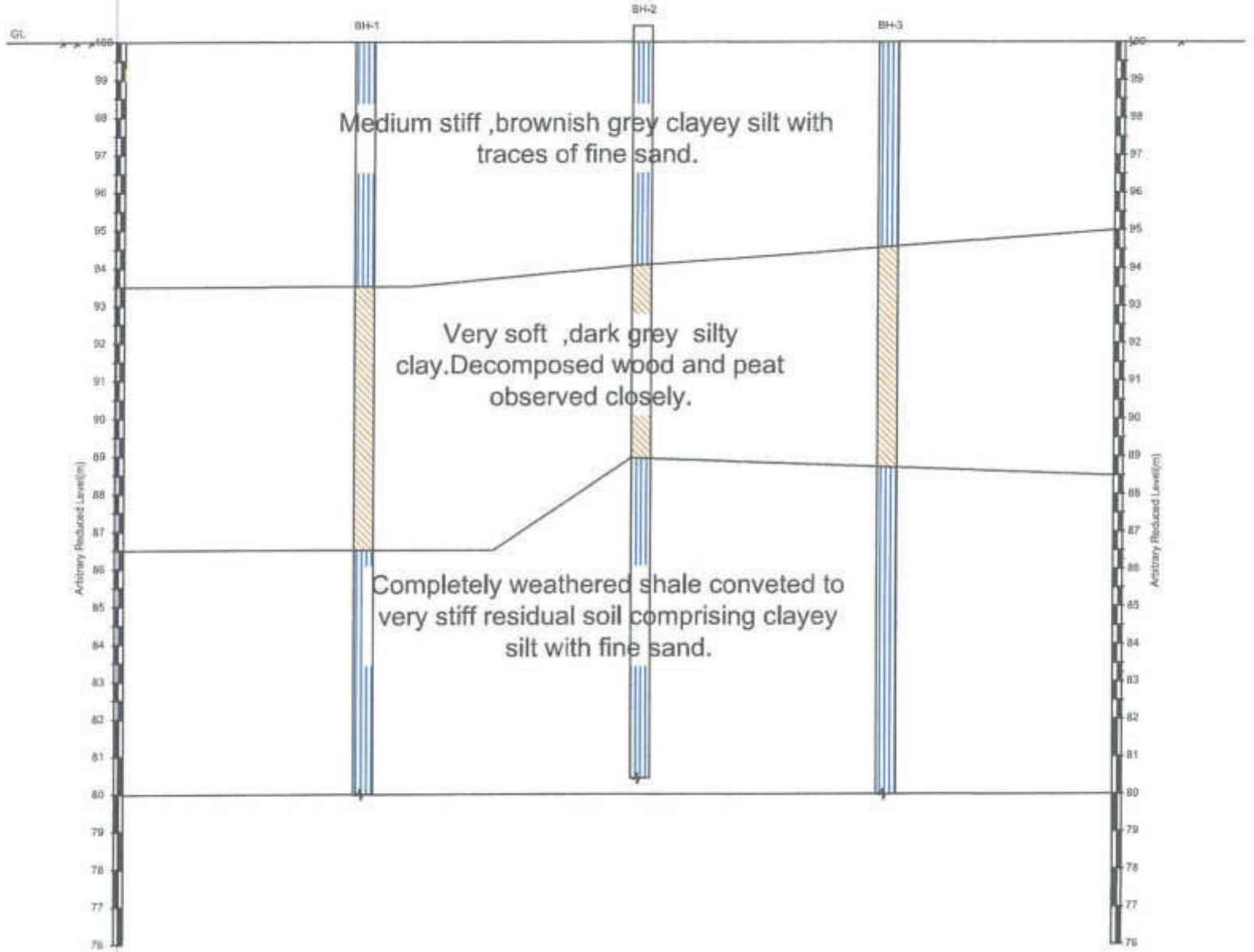

GL
BH-1
BH-2
Filled up ground
Soft to medium,dark grey to bluish grey, silty clay with decomposed vegetation.Peat observed closely throuhgout.
Medium stiff,bluish grey silty clay
Arbitrary Reduced Level(m)
Arbitrary Reduced Level(m)

Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.



Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.




GL
BH-1
BH-2
BH-3
Medium stiff ,brownish grey clayey silt with traces of fine sand.
Very soft ,dark grey silty clay.Decomposed wood and peat observed closely.
Completely weathered shale conveted to very stiff residual soil comprising clayey silt with fine sand.
Arbitrary Reduced Level(m)
100
99
98
97
96
95
94
93
92
91
90
89
88
87
86
85
84
83
82
81
80
79
78
77
76

ANNEXURE-2

⇒ BOREHOLE LOG & TEST RESULTS

⇒ CURVES

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Block core sample	
UDS	:Undisturbed sample	RQD: Rock Quality Designation	
Si.	:Slipped	CR:Core Recovery	
TS	:Triaxial test/UCS	DT: Direct Shear test	
K	:Co-efficient of Permeability		

Site : MPS-1 (ZONE-1)
Bore Hole No: 1(one)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 23.07.17.
Date of completion: 23.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			HCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C.R.(%)	R.Q.D.(%)					% Gravel	% Sand	% Silt	% clay						L.L.(%)	PL.(%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	P_0
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	4																								
2.00																												
2.50	UDS	2.50-2.954								OH	0	0	52	48	41	55.0	1.550	1.00	2.51	75	48	27	TS	0.11	0.00	0.15	0.45	1.51
3.00	DS	3.00-3.45	3.00	0																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	0				Top surface soil followed by very soft,dark grey silty clay with rauck,peas ,decomposed vegetalio etc.	to						Past														
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	1																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	1						OH	0	0	50	50	38					78	52	26						
8.00																												
8.50									9.00																			
9.00	DS	9.00-9.45	9.00	5					9.00																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	7																								
11.00	UDS	11.0-11.45						Med ium to stiff,bluish grey silty clay /clayey silt.Traces of fine sand and decomposed wood observed occasionally		CH	0	0	60	40	33	34.0	1.850	1.38	2.69	56	25	31	TS	0.40	0.00	0.85	0.20	0.95
11.50																												
12.00	DS	12.00-12.45	12.00	7					to																			
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	6																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed Sample	RQD	:Rock Quality Designation
SL	:Slippo	CR	:Core Recovery
TS	:Triaxial test (UU	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : MPS-1 (ZONE-1)

Bore Hole No: 1(one)

R.L. of BH (m): 100.00 (Nearest Road Level : 00m assumed)

Date of starting: 23.07.17.

Date of completion: 23.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	C_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00	UDS	17.0-17.45								CH	0	0	65	35		29.0	1.850	1.43	2.68	65	25	40	TS	0.46	0.00	-	0.20	0.87
17.50																												
18.00	DS	18.00-18.45	18.00	8				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	11																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
St	Slipped	PR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : MPS-1 (ZONE-1)
Bore Hole No: 2(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m received)

Date of starting: 23.07.17.
Date of completion: 23.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Run)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	ε
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	2																								
2.00	UDS	2.0-2.45								OH	0	0	56	44	38	56.0	1.600	1.03	2.56	66	46	20	TS	0.10	0.00	0.13	0.37	1.50
2.50																												
3.00	DS	3.00-3.45	3.00	0											Peat													
3.50																												
4.00								Top surface soil followed by very soft,dark grey silty clay with muck,peat ,decomposed vegetatio etc.	to																			
4.50	DS	4.50-4.95	4.50	1											Peat													
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	0																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2						CH	0	0	64	36	40					65	25	40						
8.00																												
8.50									9.00																			
9.00	DS	9.00-9.45	9.00	6					9.00																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	6																								
11.00																												
11.50	UDS	11.50-11.95						Medium to stiff,bluish grey silty clay /clayey silt.Traces of fine sand and decomposed wood observed occasionally																				
12.00	DS	12.00-12.45	12.00	8					to	CH	0	0	54	46	35	35.0	1.840	1.40	2.71	60	25	35	TS	0.44	0.00	0.85	0.22	0.93
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	7																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sliped	CR	Core Recovery
TS	Thin tube sampler	DS	Direct Shear test
K	Co-efficient of Permeability		

Site : MPS-1 (ZONE-1)
Bore Hole No: 2(Two)
R.L. of SH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 23.07.17.
Date of completion: 23.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	ϕ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	9				-do-		CH	0	0	60	40						64	26	38						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : STP-1-Existing Site
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 24.07.17.
Date of completion: 24.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Cast core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test,UCC	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'n'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	mv
0.00									0.00																			
0.50	DS	0.50						Filled up ground	to	Fill																		
1.00	DS	1.00							1.50																			
1.50	DS	1.50-1.95	1.50	3					1.50																			
2.00	UDS	2.0-2.45								CI	0	0	59	41	31	36.0	1.700	1.25	2.60	49	24	25	TS	0.20	0.00	0.40	0.24	1.08
2.50																												
3.00	DS	3.00-3.45	3.00	1						Pt																		
3.50								Very soft,dark grey to black, silty clay with decomposed vegetation.Peat observed clusely throughout.																				
4.00																												
4.50	DS	4.50-4.95	4.50	0					to	Pt																		
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	1						OH	0	0	48	52	46	-	-	-	-	66	40	26	-	-	-	-	-	-
6.50																												
7.00									7.50																			
7.50	DS	7.50-7.95	7.50	4					7.50																			
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	8																								
9.50	UDS	9.50-9.95								CH	0	0	54	46	33	31.0	1.380	1.44	2.68	56	25	31	TS	0.50	0.00	1.10	0.18	0.87
10.00																												
10.50	DS	10.50-10.95	10.50	7																								
11.00								Medium stiff,bluish grey silty clay with some decomposed vegetation.																				
11.50									to																			
12.00	DS	12.00-12.45	12.00	6						CH	0	0	61	39	33	--	-	-	-	55	24	31	-	-	--	-	-	-
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	8																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	8					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : STP-1-Existing Site
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 24.07.17.
Date of completion: 24.7.17
Method of boring : Shell & Augur, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m): 20.0m

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Signal	CR	Core Recovery
TS	Terzaghi Tube	FT	Field Vane Test
K	Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample (m)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00	UDS	17.0-17.45								CH	0	0	55	45		33.0	1.880	1.41	2.69	60	25	35	TS	0.50	0.00	1.00	0.22	0.90
17.50																												
18.00	DS	18.00-18.45	18.00	9				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8						CH	0	1	51	48		--	-	-	-	62	25	37	-	-	-	-	-	-
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed Sample	RQD	:Rock Quality Designation
SL	:Slippal	CR	:Core Recovery
TS	:Triaxial test(UU)	DST	: Direct Shear test
K	:Co-efficient of Permeability		

Site : STP-1-Existing Site
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Reduced Level 100 m assumed)

Date of starting: 24.07.17.
Date of completion: 24.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00																												
0.50	DS	0.50						Filled up ground	0.00 to 1.0	Fill																		
1.00	DS	1.00-1.45	1.00	3					1.00																			
1.50																												
2.00	UDS	2.0-2.45								OH	0	0	52	48	41	52.0	1.620	1.07	2.59	75	39	36	TS	0.14	0.00	0.20	0.35	1.43
2.50	DS	2.50-2.95	2.50	1																								
3.00								Very soft,dark grey to black, silty clay with decomposed vegetation.Peat observed closely throughout.																				
3.50									to																			
4.00	DS	4.00-4.45	4.00	1																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	0						Pt																		
6.00																												
6.50									7.00																			
7.00	DS	7.00-7.45	7.00	3					7.00																			
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	5						CH	0	0	55	45	40	-	-	-	-	61	25	36	-	-	-	-	-	-
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	6																								
10.50	UDS	10.50-10.95								CH	0	0	48	52	29	34.0	1.860	1.39	2.64	65	24	41	TS	0.45	0.00	0.95	0.22	0.90
11.00								Medium stiff,bluish grey silty clay with some decomposed vegetation.																				
11.50	DS	11.50-11.95	11.50	7					to																			
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	9																								
13.50	UDS	13.50-13.95								CH	0	1	54	45		31.0	1.880	1.44	2.65	61	25	36	TS	0.52	0.00	1.00	0.20	0.85
14.00																												
14.50	DS	14.50-14.95	14.50	7					20.45																			
15.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	C	:Core Recovery
FS	:Free at Test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : **STP-1-Existing Site**

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 24.07.17.

Date of completion: 24.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
15.50																												
16.00	DS	16.00-16.45	16.00	7																								
16.50																												
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	10				-do-		CH	0	0	59	41		-	-	-	-	61	25	36	-	-	-	-	-	-
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : STP-1-Existing Site
Bore Hole No: 03(Three)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 25.07.17.
Date of completi 25.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
0.00																												
0.50	DS	0.50						Filled up ground	0.00 to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	2					1.50																			
2.00																												
2.50	UDS	2.50-2.95								CH	0	0	54	46	31	35.0	1.710	1.27	2.64	61	24	37	TS	0.15	0.00	0.16	0.24	1.08
3.00	DS	3.00-3.45	3.00	1																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	1				Very soft,dark grey to black, silty clay with decomposed vegetation.Peat observed closely throughout.		Pt																		
5.00									to																			
5.50																												
6.00	DS	6.00-6.45	6.00	2																								
6.50																												
7.00																												
7.50	UDS	7.50-7.95								OH	0	0	59	41	36	49.0	1.610	1.08	2.65	71	48	23	TS	0.19	0.00	0.16	0.35	1.45
8.00																												
8.50									9.00																			
9.00	DS	9.00-9.45	9.00	6					9.00																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	7						CH	0	0	64	36	33					61	24	37						
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	8				Medium stiff,bluish grey silty clay with some decomposed vegetation.	to																			
12.50	UDS	12.50-12.95								CH	0	1	59	40		31.5	1.870	1.42	2.66	60	24	36	TS	0.48	0.00	0.90	0.18	0.87
13.00																												
13.50	DS	13.50-13.95	13.50	8																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	8					20.00																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Sieved	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
K	:Co-efficient of Permeability		

Site : STP-1-Existing Site

Bore Hole No: 03(Three)

R.L. of BH (m): 100.00 (Near of Road Level 100m assumed)

Date of starting: 25.07.17.

Date of complet 25.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	ϕ (degree)		Cc	e_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-																				
18.50	UDS	18.50-18.95								CH	0	0	55	45		32.2	1.850	1.40	2.66	61	25	36	TS	0.45	0.00	0.92	0.22	0.90
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
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26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Shelby core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slitted	CR	:Core Recovery
TS	:Thin tube sample(UD)	VT	:Vane Shear test
K	:Co-efficient of Permeability		

Site : IPS-2(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 26.04.17.
Date of completion: 26.4.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			LCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	ε_0
0.00																												
0.50	DS	0.50						Filled up ground with sand	0.00 to 1.0	Fill																		
1.00	DS	1.00							1.00																			
1.50	DS	1.50-1.95	1.50	4																								
2.00	UDS	2.00-2.45								CI	0	0	64	36	30	32.0	1.770	1.34	2.71	50	23	27	TS	0.20	0.00	0.44	0.23	1.02
2.50																												
3.00	DS	3.00-3.45	3.00	0																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	0																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	4																								
6.50	UDS	6.50-6.95						Very soft grey , silty clay with decomposed vegetation.	to	CH	0	0	52	48	39	31.0	1.800	1.37	2.70	61	25	36	TS	0.20	0.00	0.45	0.21	0.97
7.00																												
7.50	DS	7.50-7.95	7.50	3																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	4																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	5																								
11.00																												
11.50									12.00																			
12.00	DS	12.00-12.45	12.00	12					12.00																			
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	9				Stiff grey, silty clay.	to																			
14.00	UDS	14.0-14.45								CH	0	0	48	52	31	33.0	1.880	1.41	2.69	65	25	40	TS	0.50	0.00	1.10	0.19	0.90
14.50																												
15.00	DS	15.00-15.45	15.00	9					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SI.	:Silt/soil	CR:Core Recovery	
TS	:Triaxial test(UU)	DT :Direct Shear test	
K	:Co-efficient of Permeability		

Site : **IPS-2(ZONE-2&3)**
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 26.04.17.
Date of completion: 26.4.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion kg/cm²	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	10				-do-		CI	0	0	67	33						48	23	25						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	12																								
20.50																												
21.00																												
21.50																												
22.00																												
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RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-2(ZONE-2&3)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 26.04.17.
Date of completion: 27.4.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 4.00m BGL
Termination Depth (m):20.0m

Notation

DS	:Disturbed Sample	CS	:Rock Core Strength
UDS	:Undisturbed Sample	RQD	:Rock Quality Designation
SS	:Slipped	CR	:Core Recovery
TS	:Thinwall Tube (UD)	DT	:Direct Shear Test
k	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "n"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		C_c	c_v
0.00																												
0.50	DS	0.50						Filled up ground with earth.	0.00 to 1.0	Fill																		
1.00	DS	1.00-1.45	1.00	3					1.00	OH	0	0	48	52						75	46	29						
1.50																												
2.00	UDS	2.0-2.45								CI	0	0	65	35		35.0	1.760	1.30	2.72	50	24	26	TS	0.16	0.00	0.30	0.24	1.09
2.50	DS	2.50-2.95	2.50	2																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	1						CH	0	0	53	47	36					60	25	35						
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	3				Very soft to soft ,grey , silty clay with decomposed vegetation.	to																			
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2																								
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	4																								
9.00	UDS	9.0-9.45								CH	0	0	40	60	35	39.0	1.820	1.31	2.75	70	26	44	TS	0.20	0.00	0.44	0.25	1.10
9.50																												
10.00	DS	10.00-10.45	10.00	4					11.00																			
10.50																												
11.00									11.00																			
11.50	DS	11.50-11.95	11.50	10																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	7				Stiff,grey, silty clay.Traces of semi decomposed vegetation observed intermittently.	to	CH	0	0	54	46						68	25	43						
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	11					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock's core sample	
UDS	:Undisturbed sample	RQD Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test (UU)	DST : Direct Shear Test	
IL	:Liquefaction of Permeability		

Site : IPS-2(ZONE-2&3)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m measured)

Date of starting: 26.04.17.

Date of completion: 27.4.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL

Termination Depth (m):20.0m

Depth below NGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	10				-do-		CI	0	0	69	31						47	23	24						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 24.07.17.
Date of completio 24.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SI. :Slipped
PS :Penetration(UU)
K :Co-efficient of Permeability
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	σ_0
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00								OH	0	0	48	52		-	-	-	-	75	45	30	-	-	-	-	-	-
1.50	DS	1.50-1.95	1.50	4																								
2.00	UDS	2.0-2.45								CI	0	0	67	33	28	34.5	1.770	1.32	2.65	49	23	26	TS	0.20	0.00	0.33	0.22	1.01
2.50																												
3.00	DS	3.00-3.45	3.00	1				Very soft,dark grey to black, silty clay with decomposed vegetation.Peat observed closely throughout.																				
3.50									to																			
4.00																												
4.50	DS	4.50-4.95	4.50	1																								
5.00	UDS	4.50-4.95								CH	0	0	54	46	44	35.0	1.750	1.30	2.66	59	24	35	TS	0.14	0.00	0.25	0.23	1.05
5.50																												
6.00	DS	6.00-6.45	6.00	3																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	3					8.00																			
8.00									8.00																			
8.50																												
9.00	DS	9.00-9.45	9.00	11																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	6																								
11.00	UDS	11.0-11.45						Medium stiff,bluish grey silty clay with some decomposed vegetation.		CH	0	0	48	52	38	32.0	1.840	1.39	2.65	60	25	35	TS	0.44	0.00	0.90	0.21	0.90
11.50									to																			
12.00	DS	12.00-12.45	12.00	5																								
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	7																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	10					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test (UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-1(ZONE-2&3)

Bore Hole No: 01(One)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 24.07.17.

Date of completion 24.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	ε_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00	UDS	17.0-17.45								CI	0	0	69	31		27.0	1.900	1.50	2.68	48	23	25	TS	0.51	2.00	0.95	0.16	0.79
17.50																												
18.00	DS	18.00-18.45	18.00	10				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
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30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notetion

DS	:Disturbed Sample	CS	:Undisturbed sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
Sr.	:Sieve	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Coefficient of Permeability		

Site : IPS-1(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 27.07.17
Date of completion 27.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.30m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	ϕ (degree)		Cc	φ_0
0.00								Filled up ground with reddish mourum	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4					1.00																			
1.50																												
2.00	UDS	2.0-2.45								OH	0	0	45	55	45	46.0	1.520	1.04	2.52	75	48	27	TS	0.16	0.00	0.25	0.35	1.42
2.50	DS	2.50-2.95	2.50	2						Pt																		
3.00																												
3.50								Very soft,dark grey to black, silty clay with decomposed vegetation,Peat observed closely throughout.																				
4.00	DS	4.00-4.45	4.00	1					to	Pt																		
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	4						CH	0	0	52	48		-	-	-	-	65	25	40	-	-	-	-	-	-
7.50									8.00																			
8.00									8.00																			
8.50	DS	8.50-8.95	8.50	11																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	7																								
10.50	UDS	10.50-10.45								OH	0	0	44	56		40.0	1.550	1.11	2.56	75	49	26	TS	0.40	0.00	0.78	0.31	1.31
11.00								Medium stiff,bluish grey silty clay with some decomposed vegetation.																				
11.50	DS	11.50-11.95	11.50	7					to																			
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	7						CH	0	0	56	44		-	-	-	-	61	26	35	-	-	-	-	-	-
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	10					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : IPS-1(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 27.07.17
Date of completion 27.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.30m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	9				-do-		CI	0	0	69	31						48	23	25						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-4(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 28.07.17.
Date of completion:28.7.17
Method of boring : Shell & Auger , Rotary mud circulation

Static Ground Water Table: 1.10m BGL.
Termination Depth (m): 20.0m

Notation
DS :Disturbed Sample — CS Reel: core sample
UDS :Undisturbed sample — RQD,Rock Quality Designation
SI. :Slipped — Cl:Core Recovery
TS :Tri-axial test(UU) — DT : Direct Shear test
K :Co-efficient of Permeability

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Reel: Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/W.C (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
0.00								Filled up ground with soil,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00							1.00																			
1.50	DS	1.50-1.95	1.50	2																								
2.00	UDS	2.0-2.45						Very soft,greyish brown silty clay / clayey silt.Little semi decomposed wood observed scatterdly.		CI	0	1	69	30	28	33.2	1.750	1.31	2.70	48	23	25	TS	0.13	10.00	0.32	0.24	1.06
2.50																												
3.00	DS	3.00-3.45	3.00	1					to																			
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2						CI	0	0	64	36	29					50	23	27						
5.00																												
5.50									6.00																			
6.00	DS	6.00-6.45	6.00	6				Loose,bluish grey silty fine to medium sand.	6.00	SM	0	71	←——29——→			-	-	-	-	Non Plastic			-	-	-	-	-	-
6.50									to																			
7.00																												
7.50	DS	7.50-7.95	7.50	8					8.00																			
8.00									8.00																			
8.50																												
9.00	DS	9.00-9.45	9.00	7																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	9																								
11.00																												
11.50								Medium to stiff,bluish grey clayey silt .Traces of fine sand observed occasionally.	to																				
12.00	DS	12.00-12.45	12.00	7																								
12.50	UDS	12.50-12.95								MI	0	7	73	20		29.0	1.850	1.43	2.65	41	29	12	TS	0.34	4.00		0.17	0.85
13.00																												
13.50	DS	13.50-13.95	13.50	7																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	11					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Core cutter sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Thinwall sampler(U.D.)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-4(ZONE-2&3)

Bore Hole No: 01(One)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 28.07.17.

Date of completion:28.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of Test	Cohesion (kg/cm²)	Φ (degree)		C_c	C_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00																												
17.50	UDS	17.50-17.95																										
18.00	DS	18.00-18.45	18.00	10				-do-		MI	0	6	73	21		27.0	1.890	1.49	2.69	43	29	12	TS	0.55	3.00		0.16	0.81
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Thin tube(UDS)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-4(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00 (Nearest Road Level 1.00m assumed)

Date of starting: 28.07.17.
Date of completion:28.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	TS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						L.L (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	Si
0.00								Filled up ground with brownish mourum,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	2					1.00																			
1.50																												
2.00	UDS	2.0-2.45																										
2.50	DS	2.50-2.95	2.50	0				Very soft greyish brown silty clay / clayey silt,Little semi decomposed wood observed scatterdly.	to	CI	0	0	73	27	26	35.5	1.700	1.25	2.68	47	23	24	TS	0.14	0.00	0.24	0.26	1.14
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	1						CI	0	3	68	29	25	-	-	-	-	46	23	23	-	-	-	-	-	-
4.50																												
5.00									5.50																			
5.50	DS	5.50-5.95	5.50	5					5.50																			
6.00									to																			
6.50																												
7.00	DS	7.00-7.45	7.00	6				Loose,bluish grey silty fine to medium sand.		SM	0	55	45			-	1.75	-	-	Non Plastic			DT	0.00	28.0	-	-	-
7.50									8.00																			
8.00									8.00																			
8.50	DS	8.50-8.95	8.50	6																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	7						MI	0	1	78	21		-	-	-	-	42	29	13	-	-	-	-	-	-
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	9				Medium to stiff,bluish grey clayey silt .Traces of fine sand observed occasionally.	to																			
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	10																								
13.50	UDS	13.50-13.95								MI	0	2	78	20		26.0	1.890	1.50	2.70	42	29	13	TS	0.50	4.00	0.90	0.16	0.80
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	10					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Core cutter sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slight	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	:Direct Shear test
K	:Coefficient of Permeability		

Site : IPS-4(ZONE-2&3)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 28.07.17.

Date of completion:28.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL

Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Rem	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	TS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content(WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	av
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	10				-do-		MI			79	21		-	-	-	-	40	29	11	-	-	-	-	-	-
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
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29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core Sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Sliped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
K	:Coefficient of Permeability		

Site : IPS-5(ZONE-2&3)
Bore Hole No: 01(One)
R.L. o BH (m): 100.00
(Nearest Reco Level 100m assumed)

Date of starting: 29.07.17.
Date of completion: 29.7 17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of Sampling	Depth of sample /Rock	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	Cv
0.00																												
0.50	DS	0.50						Filled up ground with brownish mooram,brick bats etc.	0.00 to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	2					1.50																			
2.00	UDS	2.0-2.45								CH	0	0	54	46	43	39.0	1.660	1.19	2.61	68	25	43	TS	0.14	0.00	0.16	0.27	1.19
2.50																												
3.00	DS	3.00-3.45	3.00	0																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	3				Very soft,greyish brown silty clay / clayey silt. Semi decomposed wood ,peat and muck observed scatterdly.	to																			
6.50										OH	0	0	44	56	44	--	-	-	-	65	48	17	-	-	-	-	-	-
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	2																								
9.50																												
10.00									10.50																			
10.50	DS	10.50-10.95	10.50	5					10.50																			
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	4				Medium stiff,dark grey to black,silty clay with some decomposed wood and peat observed.	to																			
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	5																								
14.00	UDS	14.0-14.45								CH	0	0	54	46	43	38.0	1.840	1.42	2.68	62	25	37	TS	0.30	0.00	0.55	0.19	0.89
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slotted	CR	:Core Recovery
TS	:Triaxial test (UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-5(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 29.07.17.
Date of completion: 29.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		C_c	a_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	9																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	8				-do-																				
18.50	UDS	18.50-18.95								CH	0	0	55	45		32.0	1.860	1.41	2.69	62	25	37	TS	0.48	0.00	0.85	0.19	0.91
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

EIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-5(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 29.07.17.
Date of completion: 29.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m):20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
K :Coefficient of Permeability
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test

Depth below EGL (m)	Type of sampling	Depth of sample (R.m)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free swell Index(%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	P_0
0.00																												
0.50	DS	0.50						Filled up ground with brownish	0.00	Fill																		
1.00	DS	1.00-1.45	1.00	2				topsoil,brick bats etc.	to																			
1.50									1.50																			
2.00																												
2.50	DS	2.50-2.95	2.50	1						CH	0	0	55	45	46	-	-	-	-	60	25	35	-	-	-	-	-	-
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	1																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2				Very soft,greyish brown silty																				
6.00								clay / clayey silt, Semi																				
6.50								decomposed wood ,peat and	to																			
7.00	DS	7.00-7.45	7.00	2				muck observed scatterdly.		OH	0	0	45	55	37	-	-	-	-	75	48	27	-	-	-	-	-	-
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	2																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4					10.50																			
10.50									10.50																			
11.00																												
11.50	DS	11.50-11.95	11.50	5						CH	0	0	58	42		-	-	-	-	65	26	39	-	-	-	-	-	-
12.00								Medium stiff,dark grey to																				
12.50								black,silty clay with some																				
13.00	DS	13.00-13.45	13.00	4				decomposed wood and peat	to	CH	0	0	55	45	30	-	-	-	-	61	25	36	-	-	-	-	-	-
13.50								observed.																				
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sliped	CR	Core Recovery
TS	Tractel tes(UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-5(ZONE-2&3)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 29.07.17.

Date of completion: 29.7.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL

Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Run)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free swell Index(%)	Natural Moisture Content(WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	8				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7						CH	0	0	60	40						65	26	39						
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
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25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CR:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SI.	:Slipped	CR:Core Recovery	
IS	:Tropical test(SI)	DT : Direct Shear test	
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00 (Nearest Road Level 00m assumed)

Date of starting: 30.07.17.
Date of completion: 30.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00								Filled up ground with medium type soil.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00							1.00																			
1.50	DS	1.50-1.95	1.50	3																								
2.00	UDS	2.0-2.45								CH	0	0	52	48	33	35.0	1.820	1.35	2.72	62	25	37	TS	0.16	0.00	0.30	0.25	1.02
2.50																												
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	3																								
6.50																												
7.00								Very soft to soft , grey to bluish grey, silty clay.	to																			
7.50	DS	7.50-7.95	7.50	2																								
8.00	UDS	8.0-8.45								CI	0	0	67	33	24	34.0	1.790	1.34	2.68	50	24	26	TS	0.15	0.00	0.30	0.22	1.01
8.50																												
9.00	DS	9.00-9.45	9.00	3																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	2																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	4						CI	0	1	64	35	24					49	24	25						
12.50																												
13.00									13.50																			
13.50	DS	13.50-13.95	13.50	5				Medium stiff,dark grey to bluish grey silty clay with decomposed vegetation.	13.50 to																			
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	4					20.45																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	Cb	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slip test	CR	Core Recovery
TS	Triaxial test (UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-3(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 30.07.17.
Date of completion: 30.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.60m BGL
Termination Depth (m): 20.0m

Depth below BGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	3																								
17.00	UDS	17.0-17.45								OH	0	0	40	60		52.0	1.620	1.07	2.56	68	48	20	TS	0.25	0.00	0.35	0.34	1.40
17.50																												
18.00	DS	18.00-18.45	18.00	4				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-3(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m reserved)

Date of starting 30.07.17.
Date of completion: 30.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m):20.0m

Notation
DS Disturbed Sample
UDS Undisturbed Sample
SPT Standard Penetration Test
CR Core Recovery
RQD Rock Quality Designation
K Coefficient of Permeability

Depth below EGL (m)	Type of Sampling	Depth of Sample Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/W.A (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristics			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	CR (%)	RQD (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
0.00									0.00																			
0.50	DS	0.50						Filled up ground with earth,rubbish,sand etc.	to	Fill																		
1.00	DS	1.50																										
1.50																												
2.00									2.50																			
2.50	DS	2.50-2.95	2.50	2					2.50																			
3.00	UDS	3.0-3.45								CI	0	0	70	30	39	35.0	1.820	1.35	2.69	48	23	25	TS	0.15	0.00	0.22	0.25	1.00
3.50																												
4.00	DS	4.00-4.45	4.00	1																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2				Very soft to soft , grey to bluish grey, silty clay.	to																			
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	3																								
9.00	UDS	9.0-9.45								CI	0	0	58	42	31	35.0	1.800	1.33	2.72	56	25	35	TS	0.17	0.00	0.35	0.26	1.04
9.50																												
10.00	DS	10.00-10.45	10.00	3																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	4					12.00																			
12.00									12.00																			
12.50																												
13.00	DS	13.00-13.45	13.00	6				Medium stiff,dark grey to bluish grey silty clay with decomposed vegetation.	to	OH	0	0	45	55	36	46.0	1.520	1.04	2.59	69	49	20	TS	0.30	0.00	0.39	0.40	1.49
13.50	UDS	13.50-13.95																										
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-3(ZONE-733)
Bore Hole No : 02(Two)
R.L. of BH (m): 100.00 (Assumed)

Date of starting 30.07.17.
Date of completion: 30.7.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m):20.0m

Notation

DS	Disturbed Sample	UDS	Undisturbed Sample
LDS	Disturbed Sample	RQD	Rock Quality Designation
SPT	Standard Penetration Test	CBR	California Bearing Ratio
TP	Trial Pit	DT	Dumpy Test
K	Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample (from - to)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kpa/cm²)	Consolidation Characteristic	
			Depth in meter	Observed N-value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of Test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	3															-	-	-	-	-	-	-	-	-	-
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	5				clay		CH	0	0	40	60						68	48	20						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	5																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-6(ZONE-2&3)

Bore Hole No: 01(One)

R.L. of BH (m): 100.00
(Nearest Road Level 0.0m assumed)

Date of starting: 31.07.17.
Date of completion: 31.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed N*Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
0.00								Filled up ground with soil,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50							1.00																			
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	4																								
2.00	UDS	2.0-2.45								Cl	0	0	69	31	29	30.5	1.810	1.39	2.69	48	22	26	TS	0.26	0.00	0.55	0.20	0.94
2.50																												
3.00	DS	3.00-3.45	3.00	3																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	3																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	2																								
6.50																												
7.00	UDS	7.0-7.45						Soft to medium stiff,grey silty clay / clayey silt. Semi decomposed wood ,peat and mark observed scatterdly.	to	OH	0	0	51	49	43	56.0	1.590	1.02	2.56	77	52	25	TS	0.13	0.00		0.37	1.51
7.50	DS	7.50-7.95	7.50	2																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	4																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	9																								
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	8																								
14.00	UDS	14.0-14.45								CH	0	0	54	46	36	30.0	1.870	1.44	2.71	60	25	35	TS	0.47	0.00	0.90	0.18	0.88
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

Mainly decomposed wood

RIGHT SITE SURVEY
New Town,Kajarhar,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation
DS :Disturbed Sample — CS:Block core sample
UDS :Undisturbed sample — RQD:Rock Quality Designation
SL :Slotted — CR:Core Recovery
IS :Material testing — DT - Direct Shear test
K :Co-efficient of Permeability

Site : IPS-6(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level Contassumed)

Date of starting: 31.07.17.
Date of completion: 31.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic				LCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)			Cc	φ
15.50																													
16.00																													
16.50	DS	16.50-16.95	16.50	7																									
17.00																													
17.50																													
18.00	DS	18.00-18.45	18.00	8				-do-		CH	0	0	60	40						61	25	36							
18.50																													
19.00																													
19.50																													
20.00	DS	20.00-20.45	20.00	10																									
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

EIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation
DS :Disturbed Sample — CS:Rock core sample
UDS :Undisturbed Sample — RQD:Rock Quality Designation
SL :Slipper — CR:Core Recovery
TS :Tri-axial test(UU) — DT :Direct Shear test
K :Coefficient of Permeability

Site : IPS-6(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of SH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 31.07.17.
Date of completion: 31.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.00m

Depth below EGL (m)	Type of sampling	Depth of sample/Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						L.L.(%)	P.L.(%)	P.I(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	ε_0
0.00								Filled up ground with soil,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	2					1.00																			
1.50																												
2.00	UDS	2.0-2.45								CH	0	0	56	44	40	35.0	1.830	1.36	2.68	60	26	34	TS	0.15	0.00	0.17	0.21	0.98
2.50	DS	2.50-2.95	2.50	3																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	3																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	3																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2				Soft to medium stiff,grey silty clay / clayey silt. Semi decomposed wood ,peat and muck observed scatterdly.																				
7.50																												
8.00									In																			
8.50	DS	8.50-8.95	8.50	4																								
9.00	UDS	9.0-9.45								OH	0	0	48	52	42	49.0	1.560	1.05	2.60	60	41	19	TS	0.20	0.00		0.36	1.48
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	7																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	8						CH	0	0	55	45						60	25	35						
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

FIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core Sample	
UDS	:Undisturbed sample	RQD: Rock Quality Designation	
SS	:Split	C.R:Core Recovery	
VS	:Vane shear test	DST - Direct Shear test	
K	:Co-efficient of Permeability		

Site : **IPS-6(ZONE-2&3)**
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 31.07.17.
Date of completion: 31.07.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.00m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						L.L (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	6																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-		OH	0	0	48	52						71	50	21						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town, Rajarhat, Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slotted	CR	:Core Recovery
TV	:Vane shear test	DP	:Dutch Sounding
K	:Co-efficient of Permeability		

Site : IPS-7(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 01.08.17.
Date of completion: 01.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Depth below RGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3																								
2.00	UDS	2.0-2.45								CI	0	0	69	31	24	33.2	1.790	1.34	2.68	48	23	25	TS	0.15	0.00	0.26	0.24	0.99
2.50																												
3.00	DS	3.00-3.45	3.00	3																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2				Top surface soil followed by soft ,brownish to bluish grey silty clay /clayey silt with traces of fine sand.																				
5.00									tn																			
5.50																												
6.00	DS	6.00-6.45	6.00	3																								
6.50	UDS	6.50-6.95								MI	0	3	77	20	20	28.0	1.770	1.38	2.65	42	28	14	TS	0.14	3.00		0.19	0.92
7.00																												
7.50	DS	7.50-7.95	7.50	4																								
8.00																												
8.50									9.00																			
9.00	DS	9.00-9.45	9.00	5					9.00																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	7																								
11.00	UDS	11.0-11.45								CI	0	1	73	26	27	28.0	1.840	1.44	2.68	45	23	22	TS	0.40	0.00	0.82	0.18	0.66
11.50																												
12.00	DS	12.00-12.45	12.00	6				Medium to stiff,bluish grey silty clay.	to																			
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	7																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-7(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 01.08.17.
Date of completion: 01.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SI	:Slitpet	CC: Core Recovery	
TV	:Triaxial test(UU)	DT : Direct Shear test	
K	:Coefficient of Permeability		

Depth below BGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00	UDS	17.0-17.45								CH	0	0	60	40		31.0	1.860	1.42	2.66	59	25	34	TS	0.42	0.00		0.49	0.87
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
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25.00																												
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26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SJ.	:Slipral	CR:Core Recovery	
TS	:Tri-axial test(UC)	VT :Vane Shear test	
K	:Co-efficient of Permeability		

Site : IPS-7(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 01.08.17.
Date of completion: 01.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	ε_0
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4						Cl	0	0	71	29		-	-	-	-	47	23	24	-	-	-	-	-	-
1.50																												
2.00																												
2.50	DS	2.50-2.95	2.50	3																								
3.00	UDS	3.0-3.45								MI	0	4	78	18	23	30.6	1.790	1.37	2.70	44	29	15	TS	0.16	3.00	0.29	0.21	0.97
3.50								Top surface soil followed by soft ,brownish to bluish grey silty clay /clayey silt with traces of fine sand.																				
4.00	DS	4.00-4.45	4.00	3					to																			
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	3																								
7.50																												
8.00									8.50																			
8.50	DS	8.50-8.95	8.50	7					8.50	CI	0	2	68	30	20	-	-	-	-	46	22	24	-	-	-	-	-	-
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	8																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	7				Medium to stiff,bluish grey silty clay.	to																			
12.00	UDS	12.0-12.45								CI	0	1	67	32		29.0	1.850	1.43	2.69	47	23	24	TS	0.40	0.00		0.18	0.88
12.50																												
13.00	DS	13.00-13.45	13.00	7																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	9					20.45																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-7(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 01.08.17.
Date of completion: 01.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m):20.0m

Depth below RGL (m)	Type of sampling	Depth of Sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/ WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of Test	Cohesion (kg/cm²)	ϕ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00	UDS	17.0-17.45								CH	0	0	62	38		32.0	1.880	1.42	2.68	61	26	35	TS	0.40	0.00		0.19	0.88
17.50																												
18.00	DS	18.00-18.45	18.00	9				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation
DS :Disturbed Sample CS Rock core sample
UDS :Undisturbed sample RQD:Rock Quality Designation
SL :Sliped CR:Core Recovery
TS :Triaxial test(UU) DT : Direct Shear test
K :Coefficient of Permeability

Site : IPS-8(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)
Date of starting: 02.08.17.
Date of completion: 02.08.17
Method of boring : Shell & Auger, Rotary mud circulation
Static Ground Water Table:2.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	1						MI	0	1	78	21						40	28	12						
2.00																												
2.50	UDS	2.50-2.95								MI	0	0	80	20	20	28.0	1.770	1.38	2.68	41	28	13	TS	0.18	4.00	0.22	0.17	0.94
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00								Top surface soil followed by very soft,brownish to bluish																					
4.50	DS	4.50-4.95	4.50	1				grey clayey silt /silty clay.	to																			
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	2						MI	0	0	79	21	16					41	29	12						
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00									8.50																			
8.50																												
9.00	DS	9.00-9.45	9.00	10				Loose,bluish grey to dark grey silty medium sand.	8.50 to 10.00	SM	0	56	←44→			-	-	-	-	Non Plastic			-	-	-	-	-	-
9.50																												
10.00									10.00																			
10.50	DS	10.50-10.95	10.50	9																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	11						CI	0	0	70	30						48	23	25						
12.50								Stiff grey silty clay.	to																			
13.00	UDS	12.50-12.95								CI	0	0	68	32		28.0	1.850	1.45	2.68	49	23	26	TS	0.55	2.00	1.20	0.15	0.85
13.50	DS	13.50-13.95	13.50	11																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	11					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Block core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SI.	:Sieved	CR:Core Recovery	
TS	:Triaxial test(CU)	DT : Direct Shear test	
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-2&3)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00 (Nearest Road Level = 00m assumed)

Date of starting: 02.08.17.
Date of completion: 02.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:2.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	10																								
17.00																												
17.50	UDS	17.50-17.95																										
18.00	DS	18.00-18.45	18.00	9				-do-		CI	0	0	66	34		32.2	1.830	1.38	2.68	50	24	26	TS	0.55	0.00	1.20	0.20	0.94
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-8(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Rose Level 100m assumed)

Date of starting: 02.08.17.
Date of completion: 02.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:2.50m BGL
Termination Depth (m):20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slump
TS :Triaxial test(UC)
K :Co-efficient of Permeability
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	ε_0
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	2																								
1.50																												
2.00	UDS	2.0-2.45								MI	0	1	78	21	18	30.2	1.780	1.37	2.66	43	28	15	TS	0.14	4.00	0.19	0.17	0.95
2.50	DS	2.50-2.95	2.50	1																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	1				Top surface soil followed by,very soft,brownish to bluish grey clayey silt /silty clay.	to																			
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2						MI	0	0	76	24	10	-	-	-	-	44	28	16	-	-	-	-	-	-
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2																								
7.50																												
8.00									8.50																			
8.50	DS	8.50-8.95	8.50	8				Loose ,bluish grey to dark grey silty medium sand.	8.50 to 10.50	SM	0	68	←--32--→			-	-	-	-	Non Plastic			-	-	-	-	-	-
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	10																								
10.50									10.50																			
11.00																												
11.50	DS	11.50-11.95	11.50	9																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	11				Stiff,grey silty clay.	to																			
13.50	UDS	13.50-13.95																										
14.00										CI	0	0	70	30		29.0	1.880	1.46	2.68	48	22	26	TS	0.50	2.00	1.10	0.15	0.84
14.50																												
15.00	DS	15.00-15.45	15.00	10					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation			
DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SI	Slipped	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-8(ZONE-2&3)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 02.08.17.
Date of completion: 02.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:2.50m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Allerberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	ϕ (degree)		Cc	σ_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50	UDS	17.50-17.95																										
18.00	DS	18.00-18.45	18.00	7				-do-		CI	0	0	70	30		29.0	1.820	1.41	2.67	47	23	24	TS	0.50	0.00	1.00	0.19	0.89
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-3(ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 03.08.17.
Date of completion: 3.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Notation

DS	Disturbed Sample	CS	Core cutter sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
Sr.	Sieved	CR	Core Recovery
TS	Triaxial test(UU)	DJ	Dead Shearwell
K	Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	ε
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	5																								
2.00	UDS	2.0-2.45								CI	0	0	65	35	24	29.0	1.840	1.43	2.69	49	24	25	TS	0.35	0.00	0.75	0.18	0.80
2.50																												
3.00	DS	3.00-3.45	3.00	5																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	3						CI	0	0	67	33	26					48	25	23						
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	3																								
6.50																												
7.00								Top surface soil followed by medium stiff blush grey silty clay /clayey silt.Traces of fine sand observed occasionally.																			
7.50	DS	7.50-7.95	7.50	4					to																			
8.00	UDS	8.0-8.45								CI	0	1	69	30	31	29.0	1.850	1.43	2.69	50	25	25	TS	0.30	0.00	0.65	0.18	0.88
8.50																												
9.00	DS	9.00-9.45	9.00	5																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	7						MI	0	5	75	20						41	28	13						
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	8																								
14.00	UDS	14.0-14.45								CI	0	2	68	30		27.0	1.850	1.46	2.70	47	23	24	TS	0.50	2.00	0.95	0.17	0.85
14.50																												
15.00	DS	15.00-15.45	15.00	9					15.50																			

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SI.	Slipped	CR	Core Recovery
TS	Tube sample(Thin)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : IPS-3(ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level '00' is assumed)

Date of starting: 03.08.17.
Date of completion: 3.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Allerberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50									15.50																			
16.00																												
16.50	DS	16.50-16.95	16.50	13																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	14				Stiff,brownish grey silty clay /clayey silt .Traces of fine sand and calcareous nodules observed occasionally.	to																			
18.50	UDS	18.50-18.95								CH	0	0	56	44		26.0	1.900	1.51	2.68	60	24	36	TS	0.77	2.00	1.50	0.15	0.78
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	16																								
20.50									20.45																			
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Samp e	CB:Bed. rock sample	
UDS	:Undisturbed samp'e	RQD-Rock Quality Designation	
SS.	:Slipped	CR Core Recovery	
TS	:Tri-axial test(UU)	DT: Direct Shear test	
K	:Coefficient of Permeability		

Site : IPS-3(ZONE-4)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100 m assumed)

Date of starting: 03.08.17.
Date of completion: 3.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	p_0
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4																								
1.50																												
2.00	UDS	2.0-2.45																										
2.50	DS	2.50-2.95	2.50	5						CI	0	1	70	29	32	30.0	1.840	1.42	2.69	45	22	23	TS	0.30	0.00	0.70	0.19	0.90
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	5																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	3				Top surface soil followed by medium stiff,bluish grey silty clay /clayey silt.Traces of fine sand observed occasionally.	to	CI	0	1	69	30	27					45	23	22							
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	3																								
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	3																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4						CI	0	0	66	34						50	23	27						
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	5					12.00																			
12.00									12.00																			
12.50																												
13.00	DS	13.00-13.45	13.00	9				Stiff,brownish grey silty clay /clayey silt .Traces of fine sand and calcareous nodule observed occasionally.	to	CH	2	3	49	46		29.0	1.880	1.46	2.72	58	23	35	TS	0.55	0.00	1.00	0.18	0.87
13.50	UDS	13.50-13.95																										
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	10					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **iPS-8(ZONE-4)**
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 03.08.17.
Date of completion: 3.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.50m BGL
Termination Depth (m):20.0m

Notation
DS :Disturbed Sample — CS:Rock core sample
UDS :Undisturbed sample — RQD:Rock Quality Designation
SL :Slurry — CR:Core Recovery
TS :Triaxial test(UU) — DT : Direct Shear test
K :Co-efficient of Permeability

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	Cv
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	13																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	11																								
18.50										CH	0	0	60	40		-	-	-	-	60	23	37	-	-	-	-	-	-
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	10																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

EIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	DS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Sloped	CR:Core Recovery	
TS	:Thinwall Sampler	DT : Direct Shear test	
K	:Coefficient of Permeability		

Site : MPS-2 (ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 04.08.17.
Date of completion: 04.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:1.20m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			LCCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	4																								
2.00	UDS	2.0-2.45								CH	0	0	50	50	38	34.0	1.810	1.35	2.72	65	25	40	TS	0.28	0.00	0.50	0.23	1.01
2.50																												
3.00	DS	3.00-3.45	3.00	4																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2				Top surface soil followed by soft /very soft,bluish grey silty clay.	to																			
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	2						CH	0	0	45	55	43					70	25	45						
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	3																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	3																								
9.50																												
10.00									10.50																			
10.50	DS	10.50-10.95	10.50	4					10.50	Pt	Peat																	
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	5				Medium stiff,dark grey peat,mixed with silty clay.	to																			
12.50																												
13.00																												
13.50	UDS	13.50-13.95								CH	0	0	60	40	41	38.0	1.860	1.35	2.65	65	25	40	TS	0.30	0.00	0.70	0.22	0.99
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : MPS-2 (ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 04.08.17.
Date of completion: 04.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:1.20m BGL
Termination Depth (m): 20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
K :Co-efficient of Permeability
CS:Crack sand sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test

Depth below BGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						L.L (%)	P.L (%)	P.I(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50	UDS	17.50-17.95								CH	0	0	55	45		35.0	1.840	1.36	2.68	66	26	40	TS	0.40	0.00	0.85	0.21	0.97
18.00	DS	18.00-18.45	18.00	6				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Township Project, Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
St.	:Slotted	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Coefficient of Permeability		

Site : MPS-2 (ZONE-4)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 04.08.17.
Date of completion: 04.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.20m BGL
Termination Depth (m): 20.0m

Depth below RGL (m)	Type of sampling	Depth of sample/Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4						CH	0	0	65	35						52	22	30						
1.50																												
2.00																												
2.50	DS	2.50-2.95	2.50	2																								
3.00	UDS	3.0-3.45								CH	0	0	59	41	40	35.2	1.800	1.33	2.69	59	24	35	TS	0.14	0.00	0.25	0.24	1.02
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2				Top surface soil followed by soft /very soft,bluish grey silty clay.	to																			
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	3																								
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	3						CH	0	0	45	55	46					70	25	45						
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50									11.00																			
11.00									11.00																			
11.50	DS	11.50-11.95	11.50	3						Pt																		
12.00																												
12.50																												
13.00	UDS	13.00-13.45						Medium stiff,dark grey peat,muck with silty clay.	to	CH	0	0	51	49		35.0	1.820	1.35	2.71	65	26	39	TS	0.26	0.00		0.22	1.01
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

Peat

RIGHT SITE SURVEY New Town,Rajarhat, Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock Core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slipped	CR	:Core Recovery
TS	:Triaxial test (CU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : **MPS-2 (ZONE-4)**

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 04.08.17.

Date of completion: 04.08.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.20m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell index (%)	Natural Moisture Content/WA (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	σ_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50	UDS	17.50-17.95								CH	0	0	54	46		30.0	1.840	1.42	2.71	60	25	35	TS	0.42	0.00		0.19	0.91
18.00	DS	18.00-18.45	18.00	7				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sloped	CR	Core Recovery
TS	Thin tube sample	D.S.	Direct Shear test
K	Co-efficient of Permeability		

Site : IPS-2(ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m considered)

Date of starting: 05.08.17.
Date of completion: 5.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
0.00								Filled up ground with earth	0.00 to1.0	Fill																		
0.50	DS	0.50							1.00																			
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3																								
2.00																												
2.50	UDS	2.50-2.95								OH	0	0	40	60	44	52.0	1.560	1.03	2.55	78	51	27	TS	0.20	0.00	0.42	0.36	1.48
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	1				DECOMPOSED WOOD																				
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	1				DECOMPOSED WOOD																				
6.50																												
7.00								Very soft to soft ,dark grey to black, silty clay with decomposed vegetation.Peat/muck observed closely throughout.	to																		
7.50	DS	7.50-7.95	7.50	1																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	4																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00	UDS	11.0-11.45								OH	0	0	55	45	42	56.0	1.550	0.99	2.52	66	46	20	TS	0.19	0.00	0.35	0.45	1.54
11.50																												
12.00	DS	12.00-12.45	12.00	4																								
12.50																												
13.00									13.50																			
13.50	DS	13.50-13.95	13.50	5				Medium to stiff ,dark grey to black, silty clay with decomposed vegetation.	13.50 to 20.45																			
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5																								

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SPT	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UC)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-2(ZONE-4)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 05.08.17.
Date of completion: 5.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below BGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	6																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	9				-do-																				
18.50	UDS	18.50-18.45								CH	0	0	42	58		33.0	1.880	1.41	2.74	60	25	35	TS	0.50	0.00	1.00	0.20	0.04
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation
DS : Disturbed Sample; UDS : Undisturbed sample; SL : Slipped; TS : Triaxial test (U.U); K : Coefficient of Permeability
CS Rock core sample; RQD:Rock Quality Designation; CR:Core Recovery; DT : Direct Shear test

Site : IPS-2(ZONE-4)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 06.08.17.
Date of completion: 5.8.17
Method of boring : Shelf & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT: Depth in meter	SPT: Observed "N" Value	Rock Sample: C.R (%)	Rock Sample: R.Q.D (%)	Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution: % Gravel	% Sand	% Silt	% clay	Differential Free Swell Index (%)	Natural Moisture Content(W.A.) (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits: LL (%)	PL (%)	PI(%)	Shearing Strength characteristic: Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic: Cc	e_0
0.00								Filled up ground with earth	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4					1.00																			
1.50																												
2.00	UDS	2.0-2.45								CI	0	0	65	35	26	34.0	1.800	1.34	2.69	49	23	26	TS	0.22	0.00	0.50	0.22	1.00
2.50	DS	2.50-2.95	2.50	2																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2						OH	0	0	38	62	46					82	52	30						
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2				Very soft to soft ,dark grey to black, silty clay with decomposed vegetation.Peat/muck observed closely throughout.	to																			
7.50	UDS	7.50-7.95								CI	0	0	65	35	25	33.0	1.770	1.33	2.70	50	25	25	TS	0.20	0.00	0.45	0.23	1.03
8.00																												
8.50	DS	8.50-8.95	8.50	3																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	2																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	4																								
12.00																												
12.50									13.00																			
13.00	DS	13.00-13.45	13.00	5					13.00																			
13.50	UDS	13.50-13.95						Medium stiff , grey , silty clay with decomposed vegetation.		CI	0	0	69	31	30	31.0	1.840	1.40	2.70	50	23	27	TS	0.35	0.00	0.80	0.20	0.92
14.00									to																			
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-2(ZONE-4)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 05.08.17.
Date of completion: 5.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SI. :Slope
IS :Immediate(UU)
K :Co-efficient of Permeability
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT :Direct Shear Test

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	6																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-																				
18.50	UDS	18.50-18.45								CH	0	0	59	41		33.0	-	-	-	60	25	35	-	-	-	-	-	-
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI	:Slitpit	CR	:Core Recovery
UC	:Unconfined test(UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-1(ZONE-4)

Bore Hole No: 01(One)

R.L. of BH (m): 100.00

(Nearest Road Level 100 is assumed)

Date of starting: 06.08.17.

Date of completion: 6.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (Kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (Kg/cm^2)	Φ (degree)		Cc	e_0
0.00																												
0.50	DS	0.50						Filled up ground with brown murram	0.00 to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3					1.50	CI	0	0	62	38		-	-	-	-	49	24	25	-	-	-	-	-	-
2.00																												
2.50	UDS	2.50-2.95								CH	0	0	52	48	44	33.5	1.750	1.31	2.68	60	25	35	TS	0.23	0.00	0.50	0.23	1.04
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2				Very soft,dark grey to black, silty clay with decomposed vegetation.Peat observed closely throughout.																				
5.00																												
5.50									to																			
6.00	DS	6.00-6.45	6.00	1						Pt																		
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	0						Pt																		
8.00																												
8.50									9.00																			
9.00	DS	9.00-9.45	9.00	2					9.00																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	3																								
11.00	UDS	11.0-11.45								CH	0	0	50	50	42	31.5	1.800	1.37	2.65	65	25	40	TS	0.20	0.00	0.42	0.25	0.94
11.50								Soft to medium stiff,bluish grey silty clay with some decomposed vegetation.																				
12.00	DS	12.00-12.45	12.00	4					to																			
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	7						CH	0	0	54	46	36					64	25	39						
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	4					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **IPS-1(ZONE-4)**
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 06.08.17.
Date of completion: 6.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL
Termination Depth (m): 20.0m

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sloped	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample (Run)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "n"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	ϕ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	4																								
17.00																												
17.50	UDS	17.50-1.95																										
18.00	DS	18.00-18.45	18.00	6				-do-		CH	0	0	48	52		32.0	1.820	1.38	2.66	65	26	39	TS	0.30	0.00	0.55	0.20	0.93
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-4)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 06.08.17.
Date of completion: 6.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL
Termination Depth (m):20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
K :Co-efficient of Permeability
CS:Rock core sample
RQD: Rock Quality Designation
CR:Core Recovery
DT :Direct Shear test

Depth below EGL (m)	Type of sampling	Depth of sample (Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed N-Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	εo
0.00								Filled up ground with brown	0.00	Fill																		
0.50	DS	0.50						rogorum	to 3.0																			
1.00	DS	1.00-1.45	1.00	3					1.00																			
1.50																												
2.00	UDS	2.0-2.45								OH	0	0	48	52	49	51.0	1.560	1.03	2.55	75	46	29	TS	0.19	0.00	0.35	0.36	1.47
2.50	DS	2.50-2.95	2.50	2																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2				Very soft,dark grey to black,		OH	0	0	44	56	42	-	-	-	-	78	45	33	-	-	-	-	-	-
4.50								silty clay with decomposed																				
5.00								vegetation.Peat observed closely	to																			
5.50	DS	5.50-5.95	5.50	1				throughout.		Pt																		
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2						Pt																		
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	2					9.00																			
9.00									9.00																			
9.50																												
10.00	DS	10.00-10.45	10.00	2						CH	0	0	44	56	39	-	-	-	-	66	26	40	-	-	-	-	-	-
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	4				Very soft to medium stiff,bluish																				
12.00	UDS	12.0-12.45						grey silty clay with some	to	CH	0	0	48	52	42	36.0	1.810	1.33	2.64	62	25	37	TS	0.25	0.00	0.55	0.21	0.98
12.50								decomposed vegetation.																				
13.00	DS	13.00-13.45	13.00	5																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial Test(UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : **IPS-1(ZONE-4)**
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 06.08.17.
Date of completion: 6.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50										CH	0	0	50	50		-	-	-	-	61	25	36	-	-	-	-	-	-
18.00	DS	18.00-18.45	18.00	5				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City Manipur.

Site : IPS-6(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 07.08.17.
Date of completion: 07.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m): 20.0m

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipout	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristics			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	6																								
17.00	UDS	17.0-17.45								OH	0	0	53	47		55.0	1.610	1.04	2.61	74	45	29	TS	0.29	0.00	-	0.34	.42
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	9						CH	0	0	45	55		-	-	-	-	70	28	42	-	-	-	-	-	-
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
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24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City Manipur.

Site : IPS-6(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 07.08.17.
Date of completion: 07.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At SGL
Termination Depth (m):20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI	:Slight	CR	:Core Recovery
IN	:Initial test(UU)	DT	: Direct Shear test
K	:Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(g/cc)	Dry Density (g/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristics			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	5						CI	0	0	72	28						45	23	22						
1.50																												
2.00																												
2.50	DS	2.50-2.95	2.50	5																								
3.00	UDS	3.0-3.45								CI	0	0	69	31	25	30.0	1.830	1.41	2.68	48	23	25	TS	0.28	0.00	0.50	0.20	0.90
3.50																												
4.00	DS	4.00-4.45	4.00	4																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2																								
7.50	UDS	7.50-7.95								CH	0	0	56	44	40	34.5	1.770	1.32	2.71	60	25	35	TS	0.12	0.00		0.24	1.06
8.00																												
8.50	DS	8.50-8.95	8.50	1																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50																												
11.00									11.50																			
11.50	DS	11.50-11.95	11.50	5					11.50																			
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	6																								
13.50	UDS	13.50-13.95								CH	0	0	64	36	40	36.0	1.850	1.34	2.71	60	26	34	TS	0.36	0.00		0.23	1.02
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

Top surface soil followed by soft,greyish brown to bluish grey silty clay / clayey silt.Traces of fine sand observed occasionally.

Medium to stiff,bluish grey to dark grey silty clay with decomposed vegetation,peat and muck.

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SI	Slitysil	CR	Core Recovery
TV	Triaxial test(UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-6(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 07.08.17.
Date of completion: 07.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: At EGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Ram	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/W.A (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00	UDS	17.0-17.45								OH	0	0	44	56		61.0	1.590	0.99	2.51	74	51	23	TS	0.18	0.00	-	0.38	1.54
17.50																												
18.00	DS	18.00-18.45	18.00	8				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7						CH	0	0	45	55		-	-	-	-	70	28	42	-	-	-	-	-	-
20.50																												
21.00																												
21.50																												
22.00																												
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29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **MPS-3 (ZONE-5)**
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 08.06.17.
Date of completion: 08.06.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:1.00m BGL
Termination Depth (m): 20.0m

Notation
DS :Disturbed Sample — CS:Rock core sample
UDS :Undisturbed sample — RQD:Rock Quality Designation
SL :Slipped — CR:Core Recovery
TS :Undisturbed(UC) — DT : Direct Shear Test
K :Co-efficient of Permeability

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			IICC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	av
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3						CI	0	0	65	35						49	24	25						
2.00																												
2.50	UDS	2.50-295								CI	0	0	69	31	24	34.2	1.810	1.35	2.68	50	24	26	TS	0.15	0.00	0.25	0.24	0.99
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	4																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	5																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	7				Top surface soil followed by soft to medium stiff,bluish grey silty clay. Traces of fine sand observed occasionally.	to																				
8.00	UDS	8.0-8.45								CI	0	1	66	33	24	31.1	1.850	1.41	2.70	50	25	25	TS	0.40	0.00		0.19	0.91
8.50																												
9.00	DS	9.00-9.45	9.00	5																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00																												
11.50																												
12.00	UDS	12.00-12.45								CI	0	0	72	28		30.2	1.850	1.42	2.68	43	23	20	TS	0.30	0.00	0.85	0.18	0.89
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	9						CH	0	0	60	40	31					59	25	34						
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core Sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slipped	CR	:Core Recovery
TS	:Tripod set (SPT)	DT	: Dead Stretched
K	:Co-efficient of Permeability		

Site : MPS-3 (ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 08.08.17.
Date of completion: 08.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table:1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			LoC.C (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	ε
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-																				
18.50	UDS	18.50-18.95								CI	0	0	68	32		29.0	1.840	1.43	2.68	48	23	25	TS	0.40	0.00	0.85	0.18	0.88
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	8																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : MPS-3 (ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Rued Level 100m assumed)

Date of starting: 08.08.17.
Date of completion: 08.8.17
Method of boring : Shell & Auger. Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	SQD:Rock Quality Designation	
SI.	:Slight	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
K	:Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	φ
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4																								
1.50																												
2.00	UDS	2.0-2.45								CI	0	0	69	31	25	30.0	1.840	1.42	2.69	49	23	26	TS	0.30	0.00	0.62	0.19	0.90
2.50	DS	2.50-2.95	2.50	4																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	3																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	6																								
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	6				Top surface soil followed by soft to medium stiff,bluish grey silty clay.Traces of fine sand observed occasionally.																					
7.50	UDS	7.50-7.95							to	CI	0	0	67	33	29	32.5	1.850	1.40	2.70	50	23	27	TS	0.34	0.00	0.75	0.20	0.93
8.00																												
8.50	DS	8.50-8.95	8.50	4																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	6																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	7						CH	0	1	58	41	34					60	25	35						
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	7					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SS	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UC)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : MPS-3 (ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 08.08.17.
Date of completion: 08.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	ϕ (degree)		Cc	e_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	8																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	8				-do-																				
18.50	UDS	18.50-18.95								CI	0	0	65	35		30.0	1.8-40	1.42	2.68	48	23	25	TS	0.46	10.00	0.90	0.19	0.89
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sliced	CR	Core Recovery
TS	Triaxial test (UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-5(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 09.08.17.
Date of completion: 9.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	c_v
0.00								Filled up ground with moorum.	0.00 to 0.5	Fill																		
0.50	DS	0.50							0.50																			
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	2																								
2.00																												
2.50	UDS	2.50-2.95								CH	0	1	57	42	46	35.0	1.820	1.35	2.65	60	25	35	TS	0.20	0.00	0.42	0.21	0.97
3.00	DS	3.00-3.45	3.00	5																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	4																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	4																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	4				Soft to medium stiff,grey, silty clay / clayey silt. Semi decomposed wood , observed scattordly.	to	CI	0	0	69	31	29					50	23	27						
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	5																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	2																								
12.50	UDS	12.50-12.95								CI	0	0	68	32	25	34.0	1.790	1.34	2.68	50	23	27	TS	0.14	0.00	0.19	0.22	1.01
13.00																												
13.50	DS	13.50-13.95	13.50	2																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	4					20.45																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-5(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Data of starting: 09.08.17.
Date of completion: 9.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Notation
DS Disturbed Sample — CS Rock core Sample
UDS Undisturbed sample — RQD:Rock Quality Designation
SL Slitgrd — Cir:Core Recovery
UCS Uniaxial test(UC) — DT : Direct Shear Test
K Co-efficient of Permeability

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	4																								
17.00																												
17.50	UDS	17.50-17.95																										
18.00	DS	18.00-18.45	18.00	5				-do-		CI	0	0	69	31		30.0	1.820	1.41	2.69	50	22	28	TS	0.30	0.00		0.19	0.91
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-5(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 09.08.17.
Date of completion: 09.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Run)	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	σ_0
0.00																												
0.50	DS	0.50						Filled up ground with macrum.	0.0to 1.0	Fill																		
1.00	DS	1.00-1.45	1.00	3					1.00																			
1.50																												
2.00	UDS	2.0-2.45								Cl	0	0	71	29	29	34.0	1.800	1.34	2.66	49	24	25	TS	0.24	0.00	0.25	0.21	0.98
2.50	DS	2.50-2.95	2.50	4																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	4																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	4						CH	0	0	54	46	42					62	25	37						
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	5																								
7.50																												
8.00								Soft to medium ,grey, silty clay / clayey silt. Semi decomposed wood , observed scatterdly.	7m																		
8.50	DS	8.50-8.95	8.50	4																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50	UDS	10.50-10.95								Cl	0	0	67	33	26	30.0	1.800	1.38	2.68	50	24	26	TS	0.25	0.00	0.55	0.20	0.94
11.00																												
11.50	DS	11.50-11.95	11.50	2																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	3																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	4					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat, Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Undisturbed core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-5(ZONE-5)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 09.08.17.

Date of completion: 09.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL

Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	σ_0
15.50																												
16.00																												
16.50	DS	(16.50-16.95	16.50	4																								
17.00																												
17.50										CI	0	0	72	28		-	-	-	-	46	23	23	-	-	-	-	-	-
18.00	DS	18.00-18.45	18.00	5				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Core cutter sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
VS	:Pravitorse/UCC	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-4(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 10.08.17.
Date of completion:10.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 3.30m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of Test	Cohesion (kg/cm²)	φ (degree)		Cc	φ
0.00								Filled up ground with brownish moorum,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00						Very soft,greyish brown silty clay / clayey silt.Traces of semi decomposed wood observed scatterdly.	1.00 to 4.00	CI	0	0	70	30	25	35.0	1.800	1.33	2.68	48	23	25	TS	0.15	0.00	0.28	0.22	1.01
1.50	DS	1.50-1.95	1.50	3																								
2.00	UDS	2.0-2.45																										
2.50																												
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00								Very loose,bluish grey silty fine to medium sand.	4.00 to 5.50	SM	0	61	← 39 →			-	-	-	-	Non Plastic			-	-	-	-	-
4.50	DS	4.50-4.95	4.50	4																								
5.00																												
5.50									5.50																			
6.00	DS	6.00-6.45	6.00	2																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	3																								
9.50	UDS	9.50-9.95						Very soft to medium stiff,dark grey silty clay / clayey silt.Decomposed wood observed closely.	to	OH	0	0	40	60	39	61.0	1.620	1.01	2.55	78	48	30	TS	0.10	0.00	0.14	0.40	1.53
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	5																								
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	7																								
14.00	UDS	14.0-14.45								OH	0	0	55	45	41	49.0	1.580	1.06	2.58	65	45	20	TS	0.28	0.00		0.35	1.43
14.50																												
15.00	DS	15.00-15.45	15.00	7					16.50																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TX	:Triaxial test(UU,	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-4(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Reduced Level 100m assumed)

Date of starting: 10.08.17.
Date of completion:10.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.30m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample/Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
15.50								-do-																				
16.00																												
16.50	DS	16.50-16.95	16.50	9					16.50																			
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	8																								
18.50	UDS	18.50-18.95						Medium stiff,bluish grey silty clay.	tn	CH	0	0	51	49		31.0	1.880	1.44	2.68	59	24	35	TS	0.45	0.00		0.18	0.87
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50									20.45																			
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Tube sample,UCC
K :Co-efficient of Permeability
CS Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT :Direct Shear test

Site : IPS-4(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Read Level 100m assumed)

Date of starting: 10.08.17.
Date of completion:10.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.30m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion kg/cm²	Φ (degree)		Cc	c_v
0.00								Filled up ground with brownish moorum,brick bats etc.	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4					1.00																			
1.50																												
2.00	UDS	2.0-2.45																										
2.50	DS	2.50-2.95	2.50	4				Very soft,greyish brown silty clay / clayey silt.Traces of fine sand observed occasionally.	to	CI	0	1	71	28	26	31.0	1.800	.37	2.68	49	25	24	TS	0.28	0.00	0.50	0.20	0.95
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50									5.00																			
5.00								Very loose,bluish grey silty fine to medium sand.	5.00 to 6.0	SM	0	72	◄	28	►	-	-	-	-	Non Plastic			-	-	-	-	-
5.50	DS	5.50-5.95	5.50	4																								
6.00									6.00																			
6.50																												
7.00	DS	7.00-7.45	7.00	2																								
7.50																												
8.00	UDS	8.0-8.45								OH	0	0	64	36	40	55.0	1.590	.03	2.54	79	50	29	TS	0.31	0.00	0.15	0.36	1.48
8.50	DS	8.50-8.95	8.50	2																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	6				Very soft to medium stiff dark grey silty clay / clayey silt.Decomposed wood observed closely.	to																			
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	7																								
12.00	UDS	12.0-12.45								CH	0	0	56	44	36	33.0	1.850	.39	2.68	62	26	36	TS	0.44	0.00		0.20	0.93
12.50																												
13.00	DS	13.00-13.45	13.00	4																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					16.50																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CR	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI	:Sieved	CR	:Core Recovery
TS	:Triaxial test(UU)	DS	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-4(ZONE-S)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 50m eastward)

Date of starting: 10.08.17.
Date of completion:10.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.30m BGL
Termination Depth (m):20.0m

Depth below RGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay Differential Free Swell Index (%)					LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	σc
15.50								-do-																			
16.00																											
16.50	DS	16.50-16.95	16.50	7					16.50																		
17.00																											
17.50																											
18.00	DS	18.00-18.45	18.00	6				Medium stiff,bluish grey silty clay.		CH	0	0	58	42					60	26	34						
18.50									tn																		
19.00																											
19.50																											
20.00	DS	20.00-20.45	20.00	6																							
20.50									20.45																		
21.00																											
21.50																											
22.00																											
22.50																											
23.00																											
23.50																											
24.00																											
24.50																											
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27.50																											
28.00																											
28.50																											
29.00																											
29.50																											
30.00																											

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SV	:Shipgel	CR	:Core Recovery
TS	:Triaxial test(UC)	D/T	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 11.08.17.
Date of completion: 11.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	e_0
0.00																												
0.50	DS	0.50						Filled up ground with soil,brick bats etc.	0.00 to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3					1.50																			
2.00	UDS	2.0-2.45								CI	0	1	63	36	24	29.0	1.800	1.40	2.69	50	23	27	TS	0.16	0.00	0.30	0.20	0.93
2.50																												
3.00	DS	3.00-3.45	3.00	2				Very soft to soft ,dark grey silty clay	to																			
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2					6.00																			
5.00																												
5.50									6.00																			
6.00	DS	6.00-6.45	6.00	2																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00	UDS	8.0-8.45						Very soft to soft ,dark grey to black, silty clay with decomposed vegetation.Peat/mack observed closely throughout.		OH	0	0	45	55	47	52.0	1.560	1.03	2.56	78	49	29	TS	0.18	0.00	0.30	0.37	1.49
8.50																												
9.00	DS	9.00-9.45	9.00	7					to																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	9																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	4						CH	0	0	55	45	32					62	25	37						
12.50									13.00																			
13.00									13.00																			
13.50	DS	13.50-13.95	13.50	5				Medium still,bluish grey silty clay.	to	CI	0	0	69	31						48	24	24						
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Sieve	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-5)

Bore Hole No: 01(One)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 11.08.17.

Date of completion: 11.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	σ0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	4																								
17.00	UDS	17.0-17.45								CI	0	0	67	33		30.0	1.820	1.40	2.70	48	24	24	TS	0.35	0.00	0.78	0.20	0.93
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slipped	CR	:Core Recovery
TS	:Tri-axial test (UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 11.08.17.
Date of completion: 11.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00																												
0.50	DS	0.50						Filled up ground with soil,brick bats etc.	0.00 to 1.0	Fill																		
1.00	DS	1.00-1.45	1.00	2					1.00																			
1.50																												
2.00	UDS	2.0-2.45								CH	0	0	55	45	40	38.0	1.830	1.33	2.71	60	25	35	TS	0.15	0.00	0.28	0.23	1.04
2.50	DS	2.50-2.95	2.50	3																								
3.00																												
3.50								Very soft to soft ,dark grey silty clay	to																				
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2						Cl	0	0	71	29	29					45	22	23						
6.00																												
6.50									7.00																			
7.00	DS	7.00-7.45	7.00	2					7.00																			
7.50																												
8.00								Very soft ,dark grey to black, silty clay with decomposed vegetation.Peat/muck observed closely throughout.	to																			
8.50	DS	8.50-8.95	8.50	2						OH	0	0	44	56	45					75	52	23						
9.00																												
9.50									10.00																			
10.00	DS	10.00-10.45	10.00	7					10.00																			
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	6																								
12.00	UDS	12.0-12.45						Medium stiff,bluish grey silty clay.	to	Cl	0	0	66	34	28	30.0	1.850	1.42	2.69	48	23	25	TS	0.35	0.00	0.72	0.39	0.89
12.50																												
13.00	DS	13.00-13.45	13.00	4																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CR	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Silpaul	CR	:Core Recovery
TS	:Triaxial test (UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Site : IPS-3(ZONE-5)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00
(Nearest Reduced Level 100m is assumed)

Date of starting: 11.08.17.

Date of completion: 11.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 2.00m BGL

Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cv	mv
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-		CI	0	0	70	30						49	23	26						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	5																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Chunk core sample
UDS	Undisturbed Sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
TS	Triaxial Test (UU)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-2(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 12.08.17.
Date of completion: 12.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	av
0.00																												
0.50	DS	0.50						Filled up ground with reddish moorum.	0.00 to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3					1.50																			
2.00																												
2.50	UDS	2.50-2.95								CI	0	0	65	35	24	34.0	1.770	1.32	2.71	49	25	26	TS	0.16	0.00	0.30	0.25	1.05
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	3						CH	0	0	55	45	42					56	25	32						
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00								Very soft to soft ,grey to bluish grey, silty clay with decomposed vegetation.	to																			
8.50																												
9.00	DS	9.00-9.45	9.00	3																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00	UDS	11.0-11.45								CH	0	0	44	56	37	35.0	1.800	1.33	2.70	60	25	35	TS	0.25	0.00	0.55	0.23	1.03
11.50																												
12.00	DS	12.00-12.45	12.00	4																								
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	5																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					15.50																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slitpit	CR	Core Recovery
TS	Triaxial test (UC)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : IPS-2(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 12.08.17.
Date of completion: 12.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		C_c	e_0
15.50									15.00																			
16.00																												
16.50	DS	16.50-16.95	16.50	4						CH	0	0	45	55	35					62	25	37						
17.00																												
17.50								Soft to medium stiff ,dark grey to black, silty clay with decomposed vegetation.																				
18.00	DS	18.00-18.45	18.00	6					to																			
18.50	UDS	18.50-18.95								CH	0	0	45	55		31.0	1.820	1.39	2.71	60	26	34	TS	0.50	0.00	0.90	0.20	0.95
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50									20.45																			
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Tri-axial test(UU)	DT	:Direct Shear test
K	:Coefficient of Permeability		

Site : IPS-2(ZONE-6)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 12.08.17.
Date of completion: 13.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample/Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	Cv
0.00								Filled up ground with reddish	0.00	Fill																		
0.50	DS	0.50						mooram.	to 1.0																			
1.00	DS	1.00-1.45	1.00	3					1.00																			
1.50																												
2.00	UDS	2.0-2.45								CI	0	0	64	36	24	34.0	1.760	1.31	2.69	50	24	26	TS	0.18	0.00	0.35	0.23	1.05
2.50	DS	2.50-2.95	2.50	2																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	3						CI	0	0	68	32	25	–	-	-	-	50	24	26	-	-	-	-	-	-
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	3																								
7.50																												
8.00								Very soft to soft ,grey to bluish																				
8.50	DS	8.50-8.95	8.50	4				grey, silty clay with decomposed	to																			
9.00								vegetation.																				
9.50																												
10.00	DS	10.00-10.45	10.00	2																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	4																								
12.00	UDS	12.0-12.45								CH	0	0	44	56	35	36.0	1.840	1.35	2.72	65	26	39	TS	0.28	0.00	0.50	0.22	1.01
12.50																												
13.00	DS	13.00-13.45	13.00	4																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					15.00																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-2(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m estimated)

Date of starting: 12.08.17.
Date of completion: 12.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m):20.0m

Notation

DS	:Disturbed Sample	CS	:Block core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Tri-axial test(UU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	σ_0
15.50									15.00																			
16.00																												
16.50	DS	16.50-16.95	16.50	4						CH	0	0	51	49						61	25	36						
17.00																												
17.50								Soft to medium stiff, dark grey to black, silty clay with decomposed vegetation.																				
18.00	DS	18.00-18.45	18.00	7					to																			
18.50										CH	0	0	50	50		-	-	-	2.71	65	25	40	-	-	-	-	-	-
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50									20.45																			
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Sieve	CR	Core Recovery
TS	Triaxial test(CU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : IPS-1(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 18.08.17.
Date of completion: 13.8.17
Method of boring : Shelf & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	P_0
0.00									0.00																			
0.50	DS	0.50						Filled up ground with brown moorum	to 1.50	Fill																		
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	3					1.50																			
2.00																												
2.50	UDS	2.30-2.95								CH	0	0	52	48	38	34.5	1.800	1.34	2.75	68	35	43	TS	0.20	0.00	0.43	0.26	1.05
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	1																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	4																								
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	4				Soft to medium,dark grey to bluish grey, silty clay with decomposed vegetation.Peat observed closely throughout.	10	CH	0	0	44	56	38	35.0	1.820	1.35	2.72	65	25	40	TS	0.25	0.00	0.56	0.25	1.02
8.00	UDS	8.0-8.45																										
8.50																												
9.00	DS	9.00-9.45	9.00	5																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	3						OH	0	0	50	50	41					78	45	33						
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	4																								
12.50																												
13.00																												
13.50	DS	13.50-13.95	13.50	5																								
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					18.00	OH	0	0	44	56	41					81	52	29						

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-5)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 13.08.17.
Date of completion: 13.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Sliped	CR	:Core Recovery
TS	:Tri-axial test(CU)	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/W.A (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		C_c	e_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5				-do-																				
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7					18.00																			
18.50	UDS	18.50-18.95																										
19.00								Medium stiff,bluish grey silty clay	to	CI	0	0	65	35		30.0	1.830	1.41	2.66	47	23	24	TS	0.40	0.00	0.82	0.19	0.89
19.50																												
20.00	DS	20.00-20.45	20.00	8					20.45																			
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Sliped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
K	:Co-efficient of Permeability		

Site : IPS-1(ZONE-5)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 13.08.17.
Date of completion: 13.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: AT BGL
Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	σ_0
0.00								Filled up ground with brown moorum	0.00 to 1.0	Fill																		
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4					1.00																			
1.50																												
2.00	UDS	2.0-2.45								CI	0	0	68	32	24	32.0	1.830	1.39	2.68	48	23	25	TS	0.28	0.00	0.60	0.22	0.93
2.50	DS	2.50-2.95	2.50	5																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	3						CH	0	0	45	55	33					65	25	40						
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	3				Soft to medium,dark grey to bluish grey, silty clay with decomposed vegetation.Peat observed closely throughout.																					
7.50																												
8.00									to\																			
8.50	DS	8.50-8.95	8.50	4																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	5																								
10.50	UDS	10.50-10.95								CH	0	0	48	52	32	35.0	1.800	1.33	2.74	69	23	46	TS	0.40	0.00	0.85	0.24	1.06
11.00																												
11.50	DS	11.50-11.95	11.50	4																								
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	4																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					18.00																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SI	:Signal	CR:Core Recovery	
Ts	:Unconsolidated U;	D.S :Direct Shear test	
K	:Co-efficient of Permeability		

Site : IPS-1(ZONE-5)

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 13.08.17.

Date of completion: 13.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: AT BGL

Termination Depth (m):20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	Pg
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5				-do-																				
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7					18.00																			
18.50										CI	0	0	70	30		-	-	-	-	49	24	25	-	-	-	-	-	-
19.00								Medium stiff,bluish grey silty clay	to																			
19.50																												
20.00	DS	20.00-20.45	20.00	7					20.45																			
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : IPS-1(ZONE-6)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 16.08.17.
Date of completion: 17.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Range	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	ε
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	2																								
2.00	UDS	2.0-2.45								CI	2	1	64	33	29	32.5	1.750	1.32	2.70	48	24	24	TS	0.18	0.00	0.33	0.23	1.04
2.50																												
3.00	DS	3.00-3.45	3.00	2																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2																								
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	3				Very soft,bluish grey , silty clay .Little kankar observed intermittently.	to	CI	3	3	64	30	24					45	23	22						
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	2																								
9.50	UDS	9.50-9.95								MI	0	3	74	23	21	29.0	1.900	1.39	2.65	42	28	14	TS	0.16	4.00	0.26	0.19	0.91
10.00																												
10.50	DS	10.50-10.95	10.50	3																								
11.00																												
11.50									12.00																			
12.00	DS	12.00-12.45	12.00	5					12.00																			
12.50																												
13.00								Loose,grey sandy silt /silty fine sand.Clay pockets observed occasionally.																					
13.50	DS	13.50-13.95	13.50	5					to	SM	0	62	←38→				1.72			Non Plastic			DT	0.00	28.0			
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-6)
Bore Hole No: 01(One)
R.L. of BH (m): 100.00 (Nearest Road Level (100m assumed))

Date of starting: 16.08.17.
Date of completion: 17.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed Sample	RQD: Rock Quality Designation	
SL	:Slipped	C&R:Core Recovery	
TS	:Triaxial test(UU)	SPT : Penetration Test	
K	:Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C.R (%)	R.Q.D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	ϕ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	7																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-		ML	0	31	←69→							Non Plastic								
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-6)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level :100m assumed)

Date of starting: 16.08.17.
Date of completion: 16.8.17
Method of boring : Shelf & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m):20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Sliped	CR	:Core Recovery
TS	:Tri-axial test(UU)	DT	:Direct Shear test
K	:Coefficient of Permeability		

Depth below (GL (m)	Type of sampling	Depth of sample/Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	φ (degree)		Cc	α_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	4						CH	0	0	55	45						60	24	36						
1.50																												
2.00																												
2.50	DS	2.50-2.95	2.50	3																								
3.00	UDS	3.0-3.45								CI	3	1	62	34	24	30.0	1.760	1.35	2.69	49	23	26	TS	0.19	0.00	0.40	0.22	0.99
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00																												
5.50	DS	5.50-5.95	5.50	2				Very soft,brownish grey , silty clay .Little kankar observed intermittently,Rusty brown patches observed.	to																			
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	1						CI	0	2	68	30	21					46	23	23						
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	2																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	4																								
10.50									11.00																			
11.00									11.00																			
11.50	DS	11.50-11.95	11.50	5						ML	0	15	76	9						30	28	2						
12.00																												
12.50																												
13.00	DS	13.00-13.45	13.00	6				Loose,grey sandy silt /silty fine sand.Clay pockets observed occasionally.	to	ML	0	18	←82→							31	26	5						
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : IPS-1(ZONE-6)
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00 (Normal Road Level 100m assumed)

Date of starting: 16.08.17.
Date of completion: 16.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m):20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SI.	:Slipped	CR	:Core Recovery
TS	:Tube sample(UD)	DT	: Direct Shear test
K	:Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	e_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	5				-do-		ML	0	29	←71→							Non Plastic								
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **Prop STP-2 at Manipur University**

Bore Hole No: 01(One)

R.L. at BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 17.08.17.

Date of completion: 17.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 3.00m BGL

Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Sliped	CR:Core Recovery	
TS	:Triaxial test (UU)	DT :Direct Shear test	
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Sylubol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content(WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50						Filled up ground with moorum.	to	Fill																		
1.00	DS	1.00							1.50																			
1.50	DS	1.50-1.95	1.50	4					1.50																			
2.00	UDS	2.0-2.45								CI	0	0	66	34	24	34.1	1.790	1.33	2.69	50	24	26	TS	0.25	0.00	0.50	0.23	1.02
2.50																												
3.00	DS	3.00-3.45	3.00	3				Soft to very soft,brownish grey silty clay.	to																			
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	2						CH	0	0	58	42	44					60	26	34						
5.00																												
5.50									6.00																			
6.00	DS	6.00-6.45	6.00	2					6.00																			
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	1						OH	0	0	49	51	45					82	45	37						
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	0				Very soft,dark grey organic silty clay.Decomposed wood and peat observed closely.	to																			
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	1																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	2																								
12.50	UDS	12.50-12.95								CH	0	0	52	48	36	35.0	1.790	1.33	2.69	65	26	39	TS	0.14	0.00	0.20	0.23	1.03
13.00									13.50																			
13.50	DS	13.50-13.95	13.50	4				Soft to medium stiff,bluish grey silty clay.	13.50																			
14.00									to																			
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

RIGHT SITE SURVEY
New Town,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : Prop STP-2 at Manipur University

Bore Hole No: 01(One)
R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 17.08.17.
Date of completion: 17.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 3.00m BGL
Termination Depth (m): 20.0m

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
K :Co-efficient of Permeability
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT :Direct Shear test

Depth below NGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Θ (degree)		Cc	ε_0
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50	UDS	17.50-17.95								CH	0	0	54	46	36	31.0	1.840	1.40	2.71	65	25	40	TS	0.35	0.00		0.22	0.93
18.00	DS	18.00-18.45	18.00	6				-do-																				
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY
New Patna,Rajarhat,Kolkata

Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : Prop STP-2 at Manipur University
Bore Hole No: 02(Two)
R.L. of BH (m): 100.00
(Nearest Road Level/100m assumed)

Date of starting: 17.06.17.
Date of completion: 17.8.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	UCS	:Unconfined compression
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Sieved	CR	:Core Recovery
LS	:Grain size analysis	DT	:Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	Av
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	2																								
1.50																												
2.00	UDS	2.0-2.45																										
2.50	DS	2.50-2.95	2.50	2				Very soft,brownish grey silty clay.	to	CI	0	0	71	29	21	32.6	1.810	1.37	2.69	49	23	26	TS	0.14	0.00	0.22	0.21	0.97
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	2																								
4.50																												
5.00									5.50																			
5.50	DS	5.50-5.95	5.50	0					5.50		Mainly decomposed wood																	
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	1																								
7.50																												
8.00																												
8.50	DS	8.50-8.95	8.50	2				Very soft,dark grey organic silty clay.Decomposed wood and peat observed closely.	to	OH	0	0	44	56	38					83	49	34						
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	2																								
10.50																												
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	2																								
12.50	UDS	12.50-12.95								CH	0	0	55	45	43	33.0	1.750	1.32	2.69	69	25	44	TS	0.15	0.00	0.22	0.23	1.04
13.00									13.50																			
13.50	DS	13.50-13.95	13.50	4				Soft to medium stiff,bluish grey silty clay.	13.50 to																			
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	5					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **Prop STP-2 at Manipur University**

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00
(Mystical Road Level 100m assumed)

Date of starting: 17.08.17.

Date of completion: 17.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL

Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	US	:Undisturbed Sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Sieved	CR	:Core Recovery
TS	:Triaxial test(UC)	VST	:Vane Shear test
K	:Coefficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample (Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	φ
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-																				
18.50	UDS	18.50-18.95								CH	0	0	59	41	34	33.0	1.850	1.39	2.70	65	24	41	TS	0.30	9.00		0.20	0.94
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	5																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS/UCS	:Unconfined compressive strength
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Sleeped	CR	:Core Recovery
TS	:Triaxial test(UU)	DST	:Direct Shear test
K	:Co-efficient of Permeability		

Site : Prop STP-2 at Manipur University

Bore Hole No: 03(Three)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 17.06.17.

Date of completion: 17.06.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	CR (%)	RQD (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50																												
2.00	DS	2.00-2.45	2.00	2																								
2.50								Very soft,brownish grey silty clay.	to																			
3.00	UDS	3.00-3.45																										
3.50	DS	3.50-3.95	3.50	2						CI	0	0	68	32	21	31.5	1.780	1.35	2.69	49	23	26	TS	0.14	0.00	0.25	0.22	0.99
4.00																												
4.50									5.00																			
5.00	DS	5.00-5.45	5.00	2					5.00																			
5.50																												
6.00																												
6.50	DS	6.50-6.95	6.50	2																								
7.00																												
7.50																												
8.00	DS	8.00-8.45	8.00	0																								
8.50																												
9.00								Very soft,dark grey organic silty clay.Decomposed wood and peat observed closely.	to	OH	0	0	44	56	41					79	51	28						
9.50																												
10.00	DS	10.00-10.45	10.00	1																								
10.50																												
11.00																												
11.50	DS	11.50-11.95	11.50	0																								
12.00																												
12.50																												
13.00	DS	13.0-13.45	13.00	2					13.50																			
13.50									13.50																			
14.00								Soft to medium stiff,bluish-grey silty clay.	to																			
14.50	UDS	14.50-14.95								CH	0	0	54	46	42	31.0	1.830	1.40	2.69	69	25	44	TS	0.30	0.00	0.65	0.20	0.93
15.00	DS	15.0-15.45	15.00	4					20.45																			

Mainly decomposed wood

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CBR:Check Bore sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Sieve	CR:Core Recovery
UU	:Triaxial test(UU)	DT :Direct Shear test
K	:Co-efficient of Permeability	

Site : **Prop STP-2 at Manipur University**

Bore Hole No: 03(Three)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 17.08.17.

Date of completion: 17.08.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 0.50m BGL

Termination Depth (m): 20.0m

Depth below RGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N"Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	av
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	5																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	6				-do-		CH	0	0	58	42						66	25	41						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	6																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
24.00																												
24.50																												
25.00																												
25.50																												
26.00																												
26.50																												
27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	DS(Bulk)	Bulk sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
UC	Unconfined(UCC)	DT	Direct Shear test
K	Coefficient of Permeability		

Site : Prop STP-3 at Irilbung

Bore Hole No: 01(One)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 18.08.17.

Date of completion: 18.08.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL

Termination Depth (m): 20.0m

Depth below NGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	φ (degree)		Cc	m_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	4																								
2.00	UDS	2.0-2.45						Top surface soil followed by Soft to medium stiff ,brownish grey clayey silt with traces of fine sand.		Ml	0	2	77	21	15	29.1	1.840	1.43	2.69	41	28	13	TS	0.26	3.00	0.49	0.19	0.89
2.50																												
3.00	DS	3.00-3.45	3.00	6					to																			
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	5						Ml	0	4	76	20						42	28	14						
5.00																												
5.50																												
6.00	DS	6.00-6.45	6.00	4					6.50																			
6.50									6.50																			
7.00																												
7.50	DS	7.50-7.95	7.50	6																								
8.00																												
8.50																												
9.00	DS	9.00-9.45	9.00	7																								
9.50	UDS	9.50-9.95						Medium stiff ,dark grey silty clay.Decomposed wood and peat observed closely.	to	OH	0	0	39	61	44	46.0	1.580	1.08	2.59	71	49	22	TS	0.30	0.00		0.24	1.39
10.00																												
10.50	DS	10.50-10.95	10.50	5																								
11.00																												
11.50																												
12.00	DS	12.00-12.45	12.00	6						CH	0	0	50	50	43					70	26	44						
12.50																												
13.00									13.50																			
13.50	DS	13.50-13.95	13.50	7				Medium stiff,bluish grey silty clay.	13.50 to																			
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	6					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : Prop STP-3 at Irilbung

Bore Hole No: 01(One)

R.L. of BH (m): 100.00
(Nearest Road Level 100m assumed)

Date of starting: 18.08.17.
Date of completion: 18.08.17
Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 1.00m BGL
Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Triaxial test(UU)	DT	: Direct Shear test
K	:Co-efficient of Permeability		

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N' Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	e_0
15.50																												
16.00	UDS	16.0-16.45								CH	0	0	54	46	42	30.5	1.850	1.42	2.69	65	25	40	TS	0.50	0.00	5.10	0.19	0.90
16.50	DS	16.50-16.95	16.50	8																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	7				-do-		CH	0	0	54	46						68	25	43						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	7																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
23.50																												
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28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
TS	Triaxial test(UU)	DT	Direct Shear test
K	Co-efficient of Permeability		

Site : Prop STP-3 at Iribung

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 19.08.17.

Date of completion: 19.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 3.00m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm^2)	Consolidation Characteristic	
			Depth in meter	Observed N/Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00																										
1.50	DS	1.50-1.95	1.50	5																								
2.00	UDS	2.0-2.45						Top surface soil followed by medium stiff ,brownish grey clayey silt with traces of fine sand.	to	Ml	0	3	76	21	15	29.3	1.850	1.43	2.68	44	29	15	TS	0.28	4.00	0.50	0.18	0.87
2.50																												
3.00	DS	3.00-3.45	3.00	4																								
3.50																												
4.00																												
4.50	DS	4.50-4.95	4.50	5					.	Ml	0	6	74	20						42	29	13						
5.00																												
5.50									6.00																			
6.00	DS	6.00-6.45	6.00	1					6.00																			
6.50																												
7.00																												
7.50	DS	7.50-7.95	7.50	2																								
8.00	UDS	8.0-8.45						Very soft ,dark grey silty clay.Decomposed wood and peat observed closely.	to	OH	0	0	54	46	36	52.0	1.630	1.07	2.55	79	56	23	TS	0.11	0.00		0.34	1.39
8.50																												
9.00	DS	9.00-9.45	9.00	2																								
9.50																												
10.00																												
10.50	DS	10.50-10.95	10.50	4																								
11.00									11.50																			
11.50									11.50																			
12.00	DS	12.00-12.45	12.00	14																								
12.50																												
13.00								Completely weathered shale converted to very stiff residual soil comprising clayey silt with fine sand.	to																				
13.50	DS	13.50-13.95	13.50	18																								
14.00	UDS	14.0-14.45								Ml	0	11	60	29		24.0	1.930	1.56	2.72	44	28	16	TS	0.66	9.00		0.14	0.75
14.50																												
15.00	DS	15.00-15.45	15.00	23					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	Disturbed Sample	CS	Rock core sample
UDS	Undisturbed sample	RQD	Rock Quality Designation
SL	Slipped	CR	Core Recovery
TS	Triaxial test (UU)	DST	Direct Shear test
K	Coefficient of Permeability		

Site : Prop STP-3 at Iritaung

Bore Hole No: 02(Two)

R.L. of BH (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 19.08.17.

Date of completion: 19.8.17

Method of boring : Shell & Auger, Rotary mud circulation

Static Ground Water Table: 3.00m SGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample (Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed "N" Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	25																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	31				-do-		MI	0	16	63	21						45	28	17						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	22																								
20.50																												
21.00																												
21.50																												
22.00																												
22.50																												
23.00																												
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27.00																												
27.50																												
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test (UU)	DT : Direct Shear test	
K	:Co-efficient of Permeability		

Site : Prop STP-3 at Iribung

Bore Hole No: 03(Three)

R.L. of BH (m): 100.00 (Nearest Road Level 100m established)

Date of starting: 19.08.17.

Date of completion: 19.8.17

Method of boring : Shell &.Auger, Rotary mud circulation

Static Ground Water Table: 2.50m BGL

Termination Depth (m): 20.0m

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed 'N'Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
0.00									0.00																			
0.50	DS	0.50																										
1.00	DS	1.00-1.45	1.00	6																								
1.50								Top surface soil followed by medium stiff ,brownish grey clayey silt with traces of fine sand.	to																			
2.00	UDS	2.0-2.45								MI	0	6	73	21	15	29.1	1.850	1.43	2.69	44	28	16	TS	0.28	4.00	0.50	0.18	0.88
2.50	DS	2.50-2.95	2.50	6																								
3.00																												
3.50																												
4.00	DS	4.00-4.45	4.00	3																								
4.50									5.00																			
5.00									5.00																			
5.50	DS	5.50-5.95	5.50	1						OH	0	0	44	56	46					82	49	33						
6.00																												
6.50																												
7.00	DS	7.00-7.45	7.00	2																								
7.50								Very soft ,dark grey silty clay.Decomposed wood and peat observed closely.	to																			
8.00																												
8.50	DS	8.50-8.95	8.50	2																								
9.00																												
9.50																												
10.00	DS	10.00-10.45	10.00	3																								
10.50	UDS	10.50-10.95								OH	0	0	45	55	36	51.0	1.620	1.07	2.55	78	50	28	TS	0.11	0.00	0.16	0.33	1.38
11.00									12.50																			
11.50	DS	11.50-11.95	11.50	15					11.50																			
12.00																												
12.50	UDS	12.50-12.95						Completely weathered shale converted to very stiff residual soil comprising clayey silt with fine sand.	to	MI	0	8	63	29		24.0	1.930	1.56	2.72	45	29	16	TS	0.80	7.00		0.14	0.75
13.00	DS	13.00-13.45	13.00	18																								
13.50																												
14.00																												
14.50																												
15.00	DS	15.00-15.45	15.00	21					20.45																			

RIGHT SITE SURVEY New Town,Rajarhat,Kolkata		Log of Boring & Test Result

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site : **Prop STP-3 at Irilbung**

Bore Hole No: 03(Three)

R.L. of Bit (m): 100.00 (Nearest Road Level 100m assumed)

Date of starting: 19.08.17.

Date of completion: 19.8.17

Method of boring : Shell &Auger. Rotary mud circulation

Static Ground Water Table: 2.50m BGL

Termination Depth (m): 20.0m

Notation

DS	:Disturbed Sample	CS	:Rock core sample
UDS	:Undisturbed sample	RQD	:Rock Quality Designation
SL	:Slipped	CR	:Core Recovery
TS	:Tri-axial test(UU)	DT	:Direct Shear test
K	:Coefficient of Permeability		

Depth below BGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Thickness (m)	IS classification	Grain Size Distribution				Differential Free Swell Index (%)	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits			Shearing Strength characteristic			UCC (kg/cm²)	Consolidation Characteristic	
			Depth in meter	Observed N Value	C R (%)	R Q D (%)					% Gravel	% Sand	% Silt	% clay						LL (%)	PL (%)	PI(%)	Type of test	Cohesion (kg/cm²)	Φ (degree)		Cc	c_v
15.50																												
16.00																												
16.50	DS	16.50-16.95	16.50	28																								
17.00																												
17.50																												
18.00	DS	18.00-18.45	18.00	22				-do-		MI	0	19	63	18						44	29	15						
18.50																												
19.00																												
19.50																												
20.00	DS	20.00-20.45	20.00	27																								
20.50																												
21.00																												
21.50																												
22.00																												
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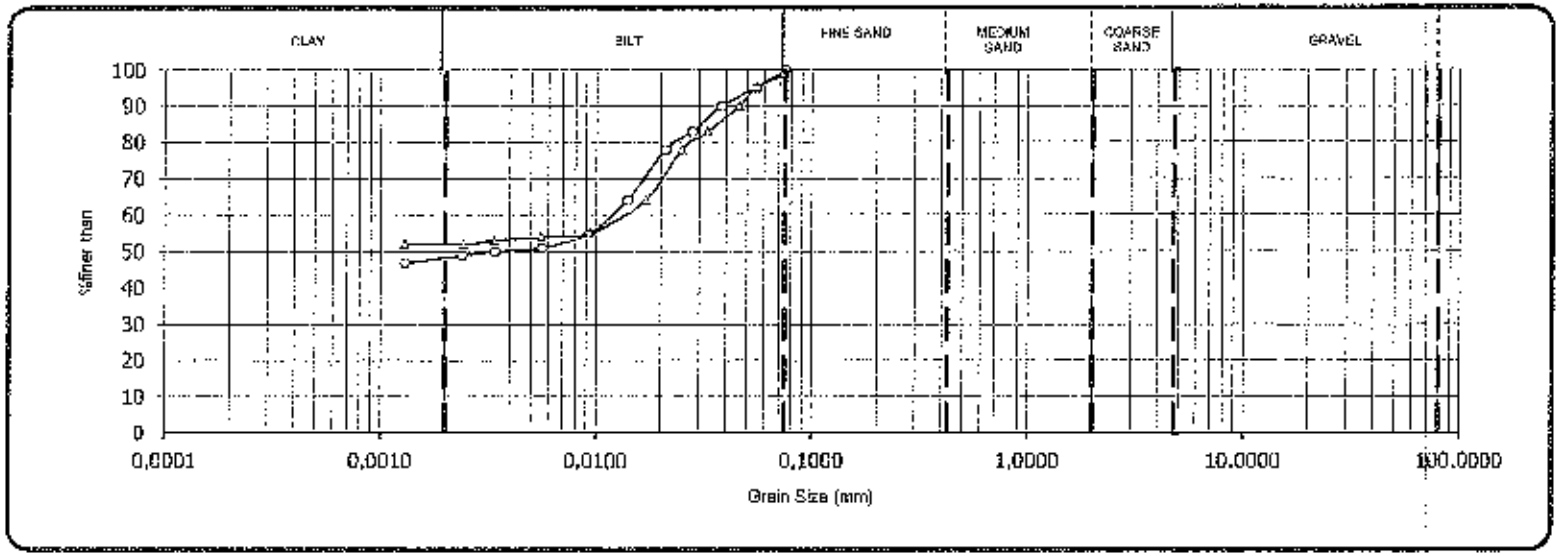
28.00																												
28.50																												
29.00																												
29.50																												
30.00																												

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

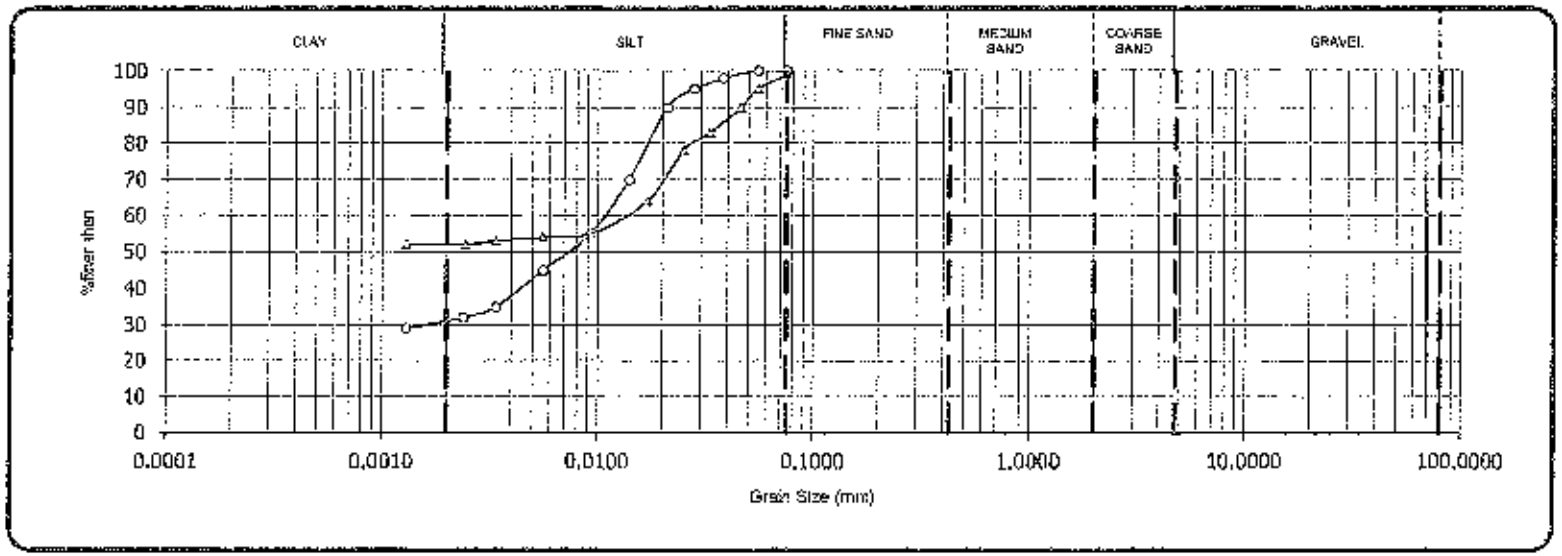


Location	Symbol	BH NO	Depth (m)
MPS-1 ZONE-1	○	1	2.50
EXIS STP-1	△	2	10.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

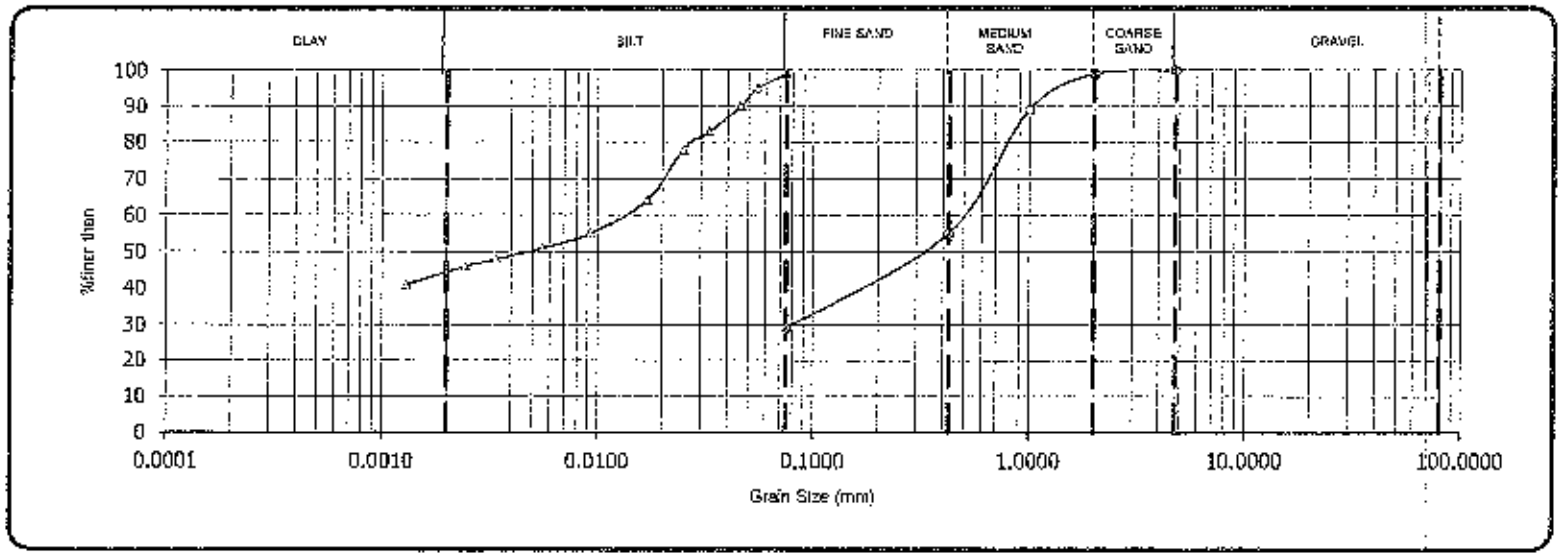


Location	Symbol	BH NO	Depth (m)
IPS 2-ZONE 2& 3	○	1	6.50
IPS-1 ZONE 2 &3	△	2	18.00

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

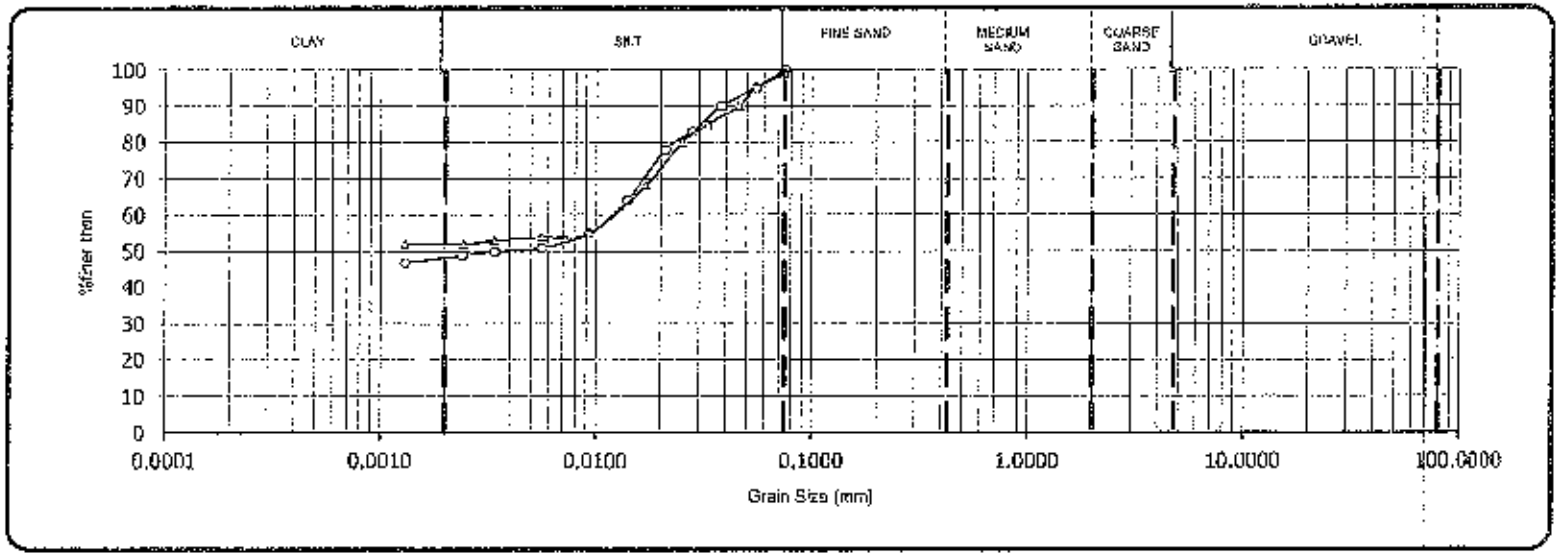


Location	Symbol	BH NO	Depth (m)
IPS-4 ZONE 2&3	O	1	6.00
IPS 5-ZONE 2&3	A	2	13.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

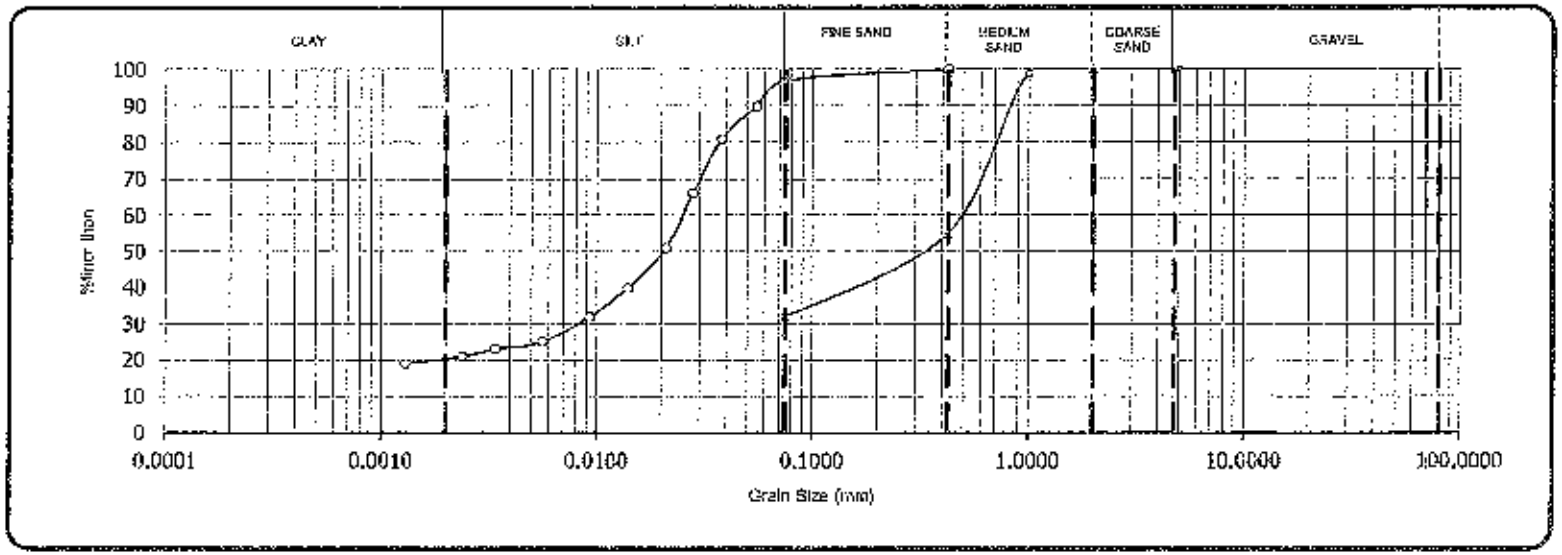


Location	Symbol	BH NO	Depth (m)
IPS-3 ZONE 2&3	○	1	2.00
IPS 6-ZONE-2&3	△	2	18.00

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

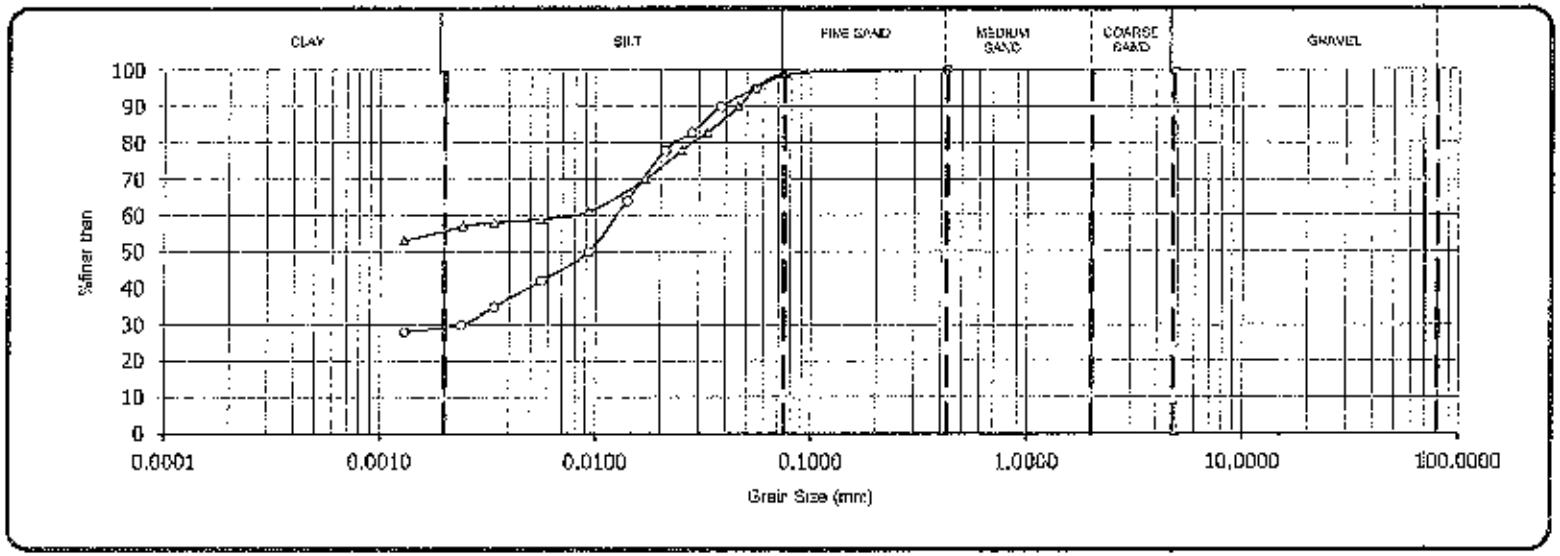


Location	Symbol	BH NO	Depth (m)
IPS-7 ZONE 2&3	O	1	6.50
IPS-8 ZONE 2&3	Δ	2	6.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

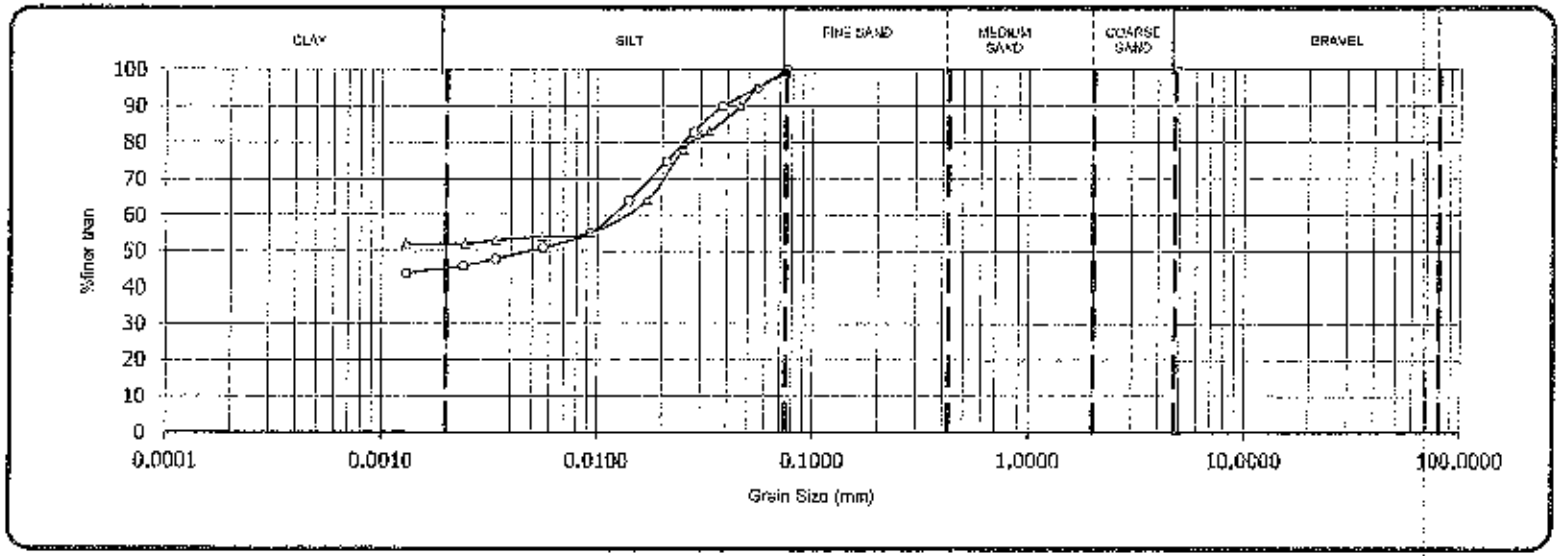


Location	Symbol	BH NO	Depth (m)
IPS 3-ZONE 4	O	2	2.00
MPS 2-ZONE-4	Δ	1	6.00

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

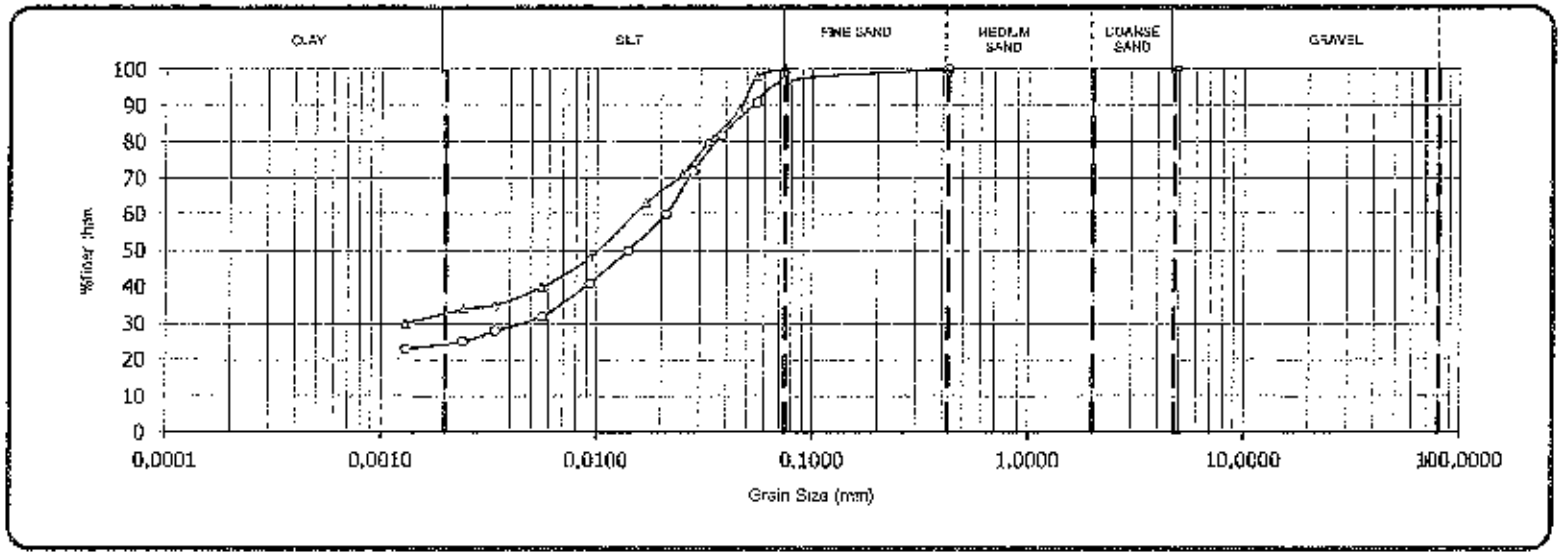


Location	Symbol	BH NO	Depth (m)
IPS 2-ZONE 4	○	1	11.00
IPS-1 ZONE 4	△	2	12.00

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

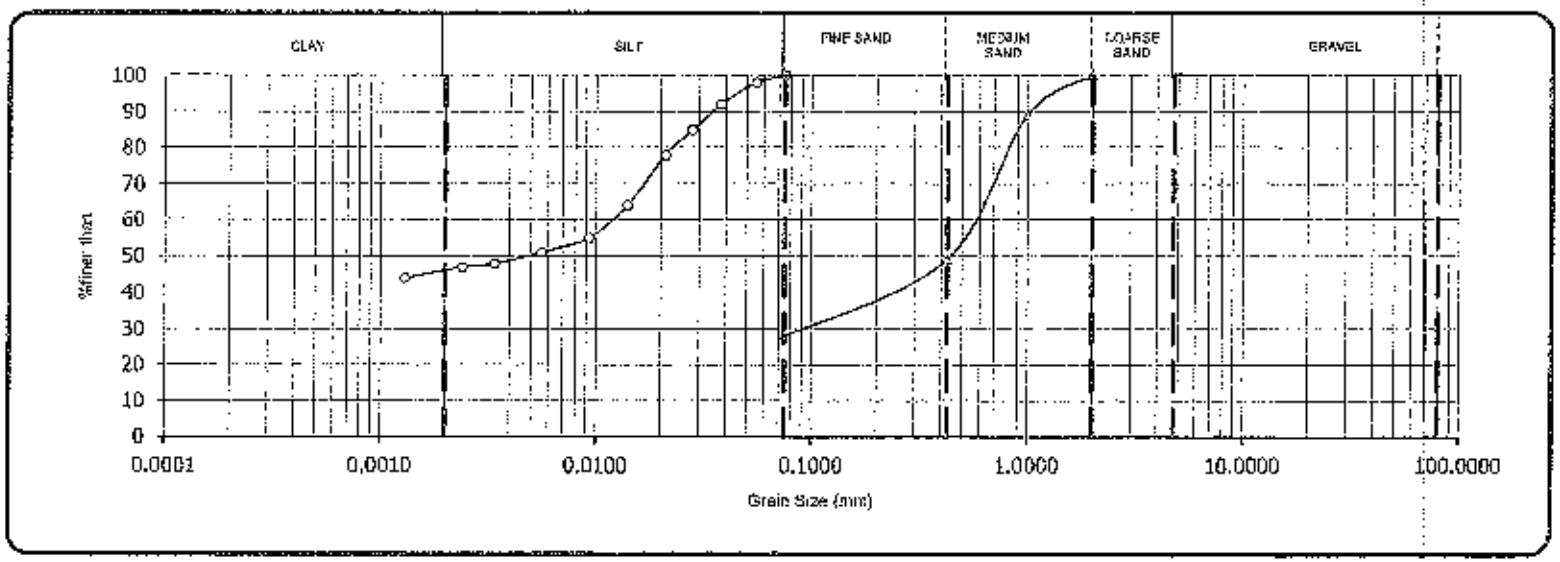


Location	Symbol	BH NO	Depth (m)
IPS-6-ZONE 5	O	1	4.50
MPS 3-ZONE-5	Δ	2	7.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

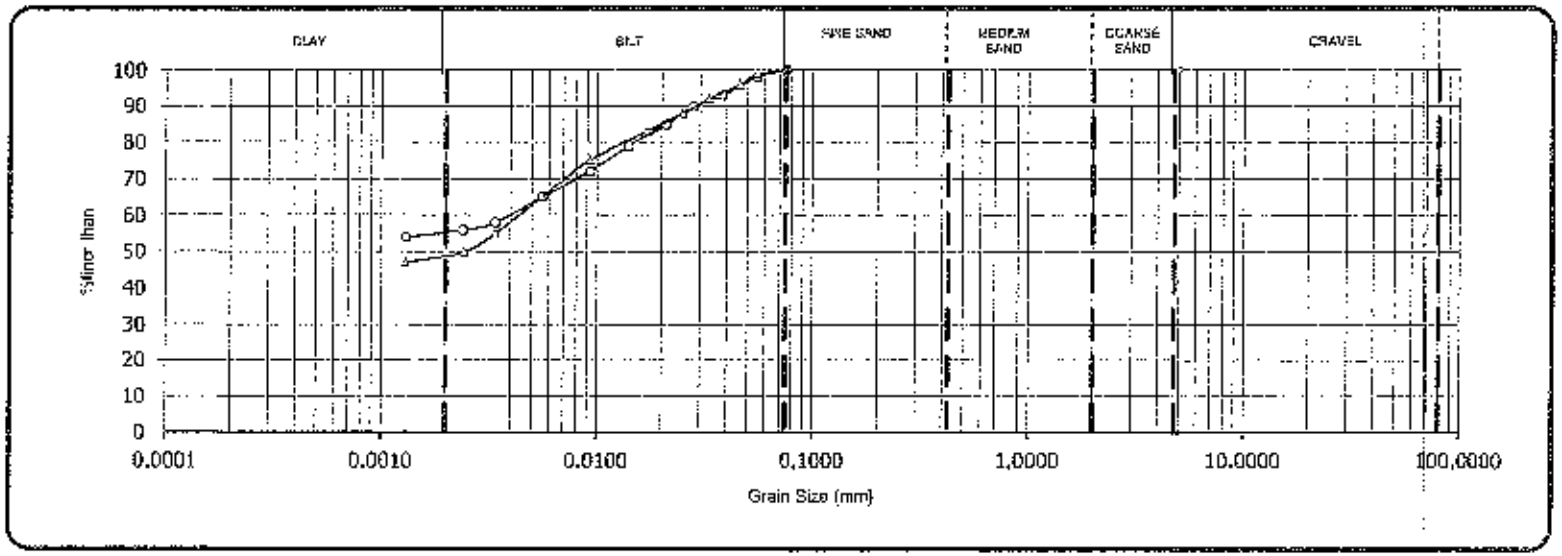


Location	Symbol	BH NO	Depth (m)
IPS 5-ZONE 5	O	2	5.50
IPS-4 ZONE-5	Δ	2	5.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

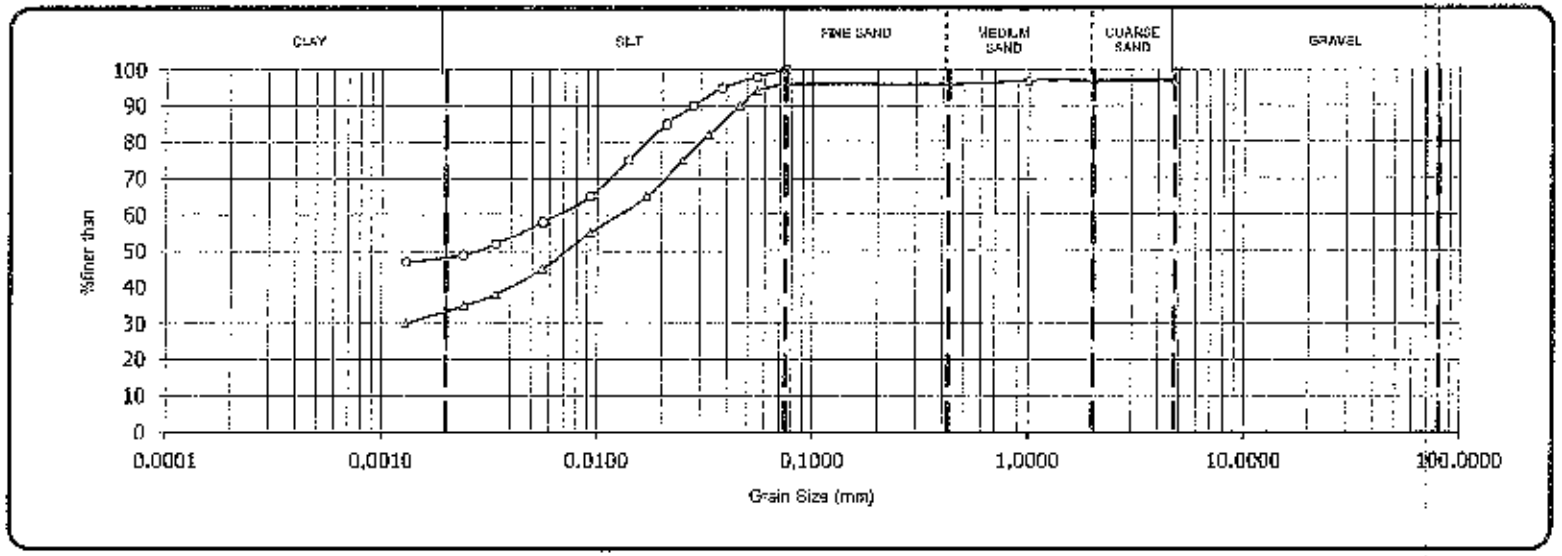


Location	Symbol	BH NO	Depth (m)
IPS3-ZONE-5	○	1	8.50
IPS 2-ZONE-5	△	2	16.50

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

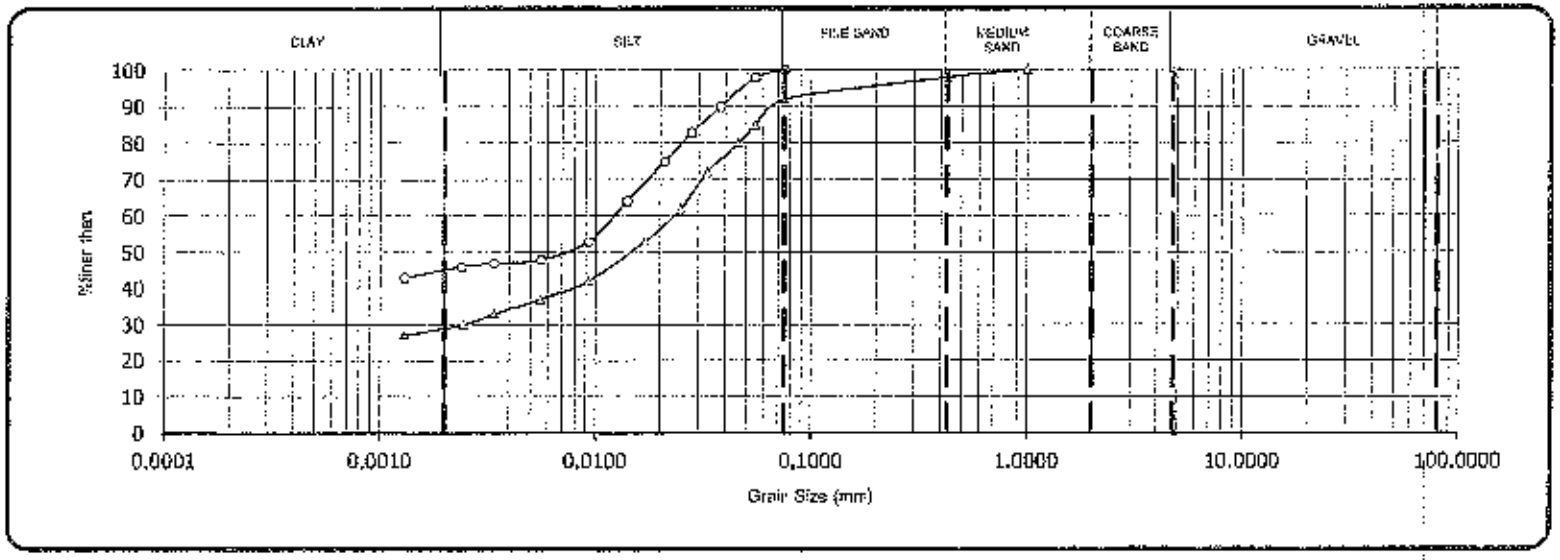


Location	Symbol	BH NO	Depth (m)
IPS-1 ZONE-5	O	1	2.50
IPS-1 ZONE 6	Δ	2	3.00

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

GRAIN SIZE DISTRIBUTION CURVE

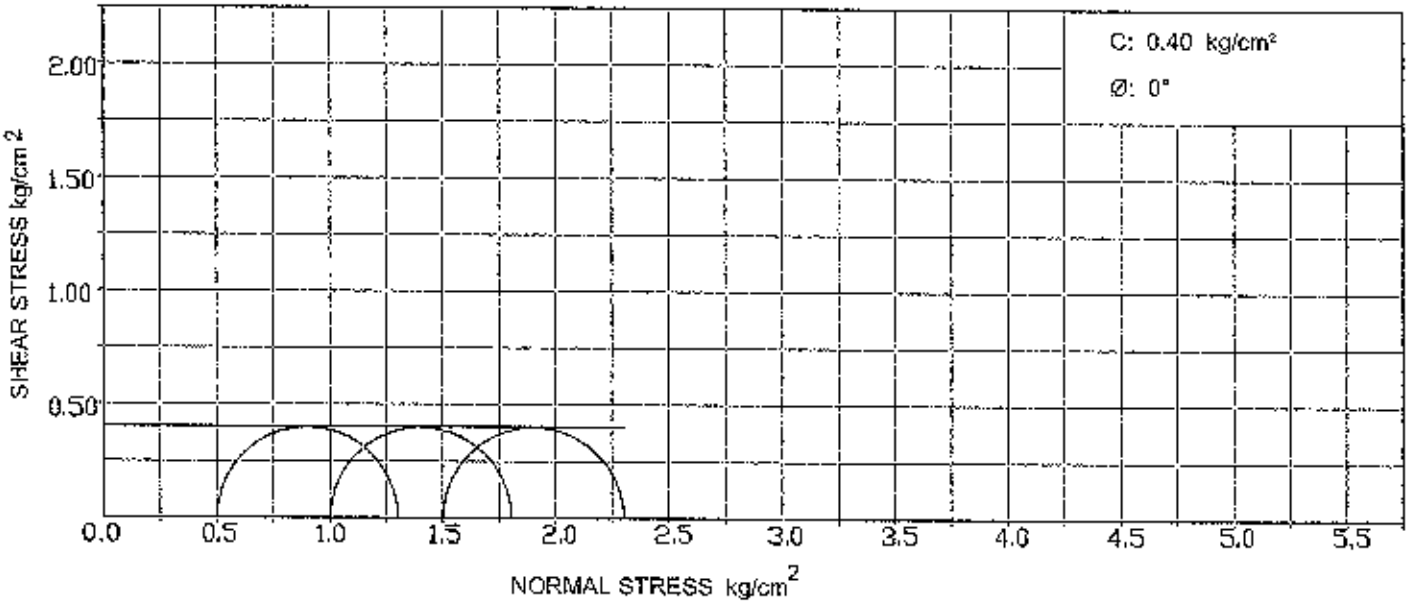


Location	Symbol	BH NO	Depth (m)
PROP STP-2	○	2	12.50
PROP-STP-3	△	3	12.50

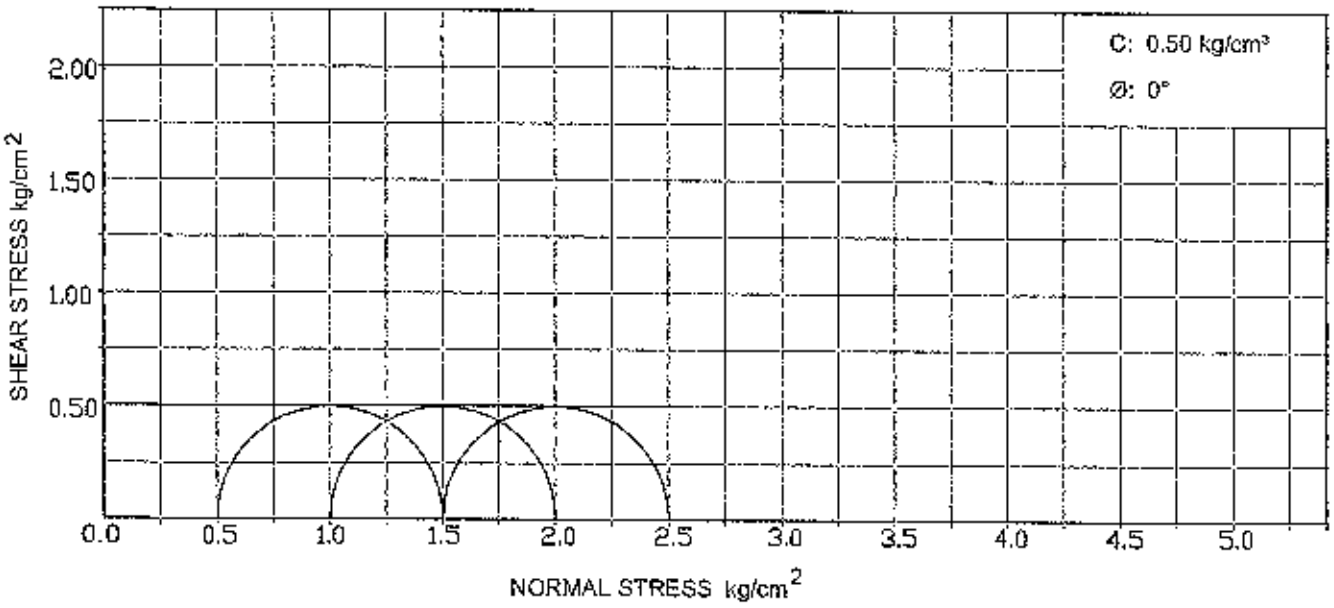
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:MPS1 ZONE 1 BOREHOLE NO:1 DEPTH (m): 11.0



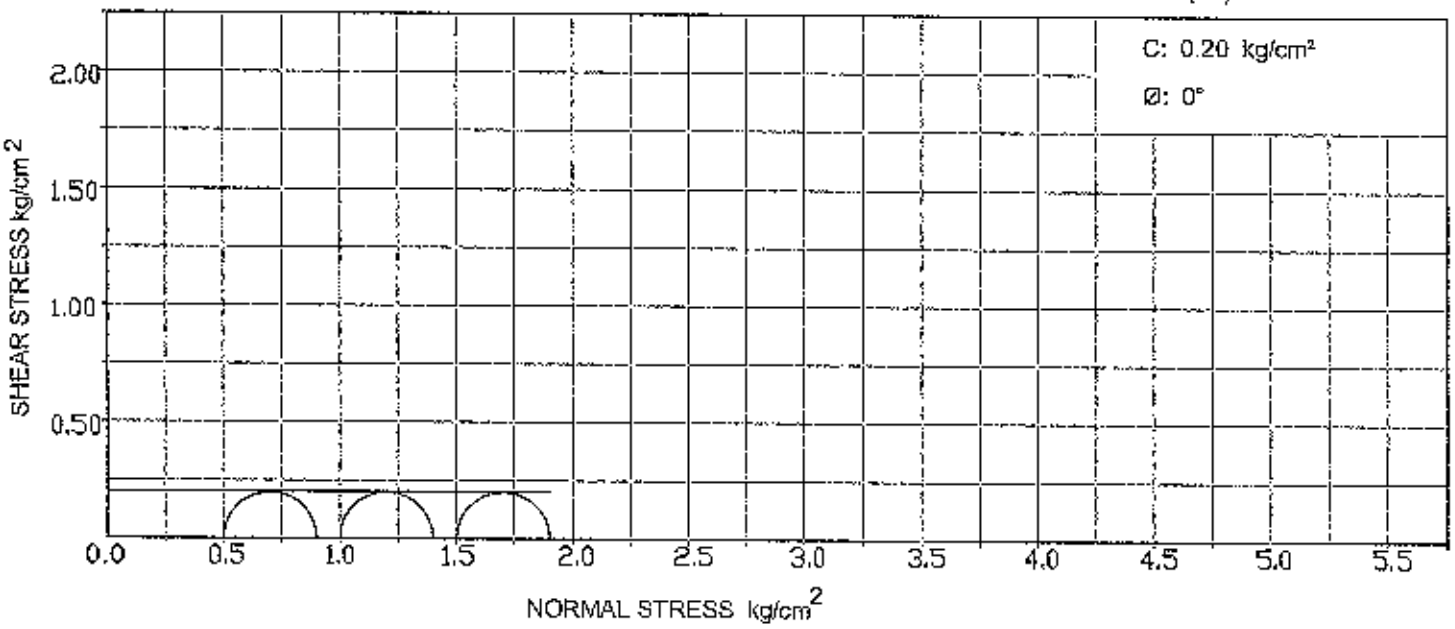
LOCATION:EXIS STP-1 BOREHOLE NO:1 DEPTH (m): 9.50



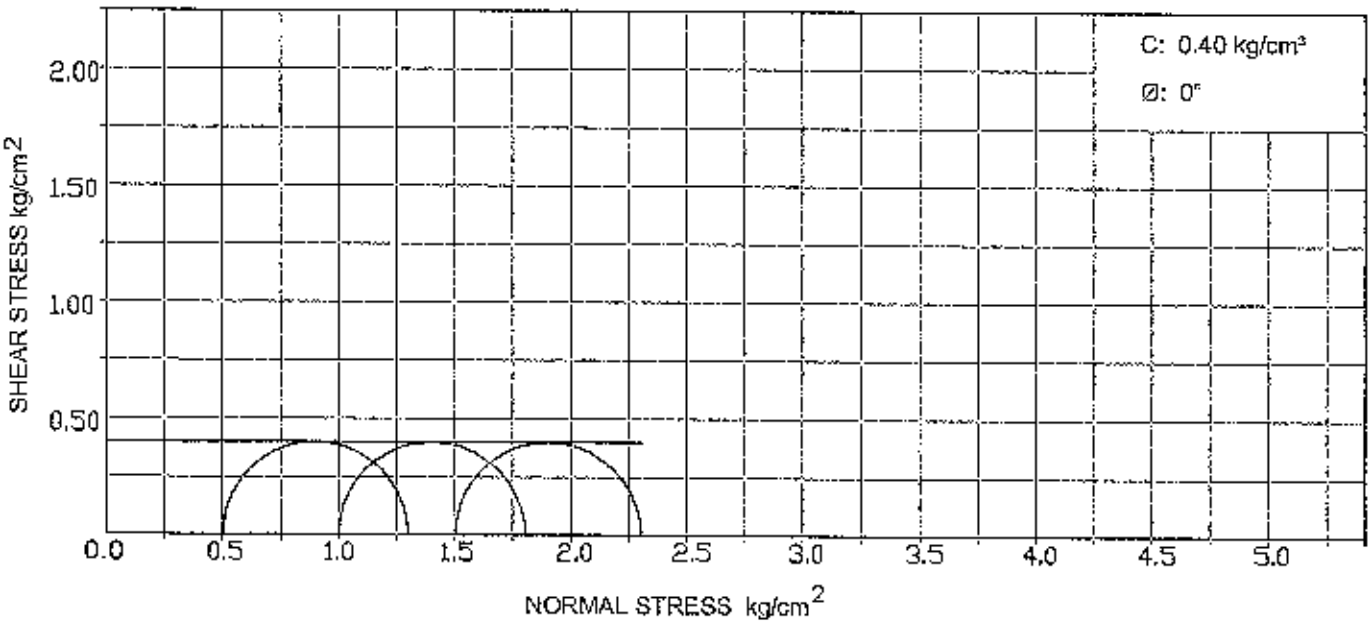
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:IPS 2 ZONE 2 & 3 BOREHOLE NO:1 DEPTH (m): 6.50



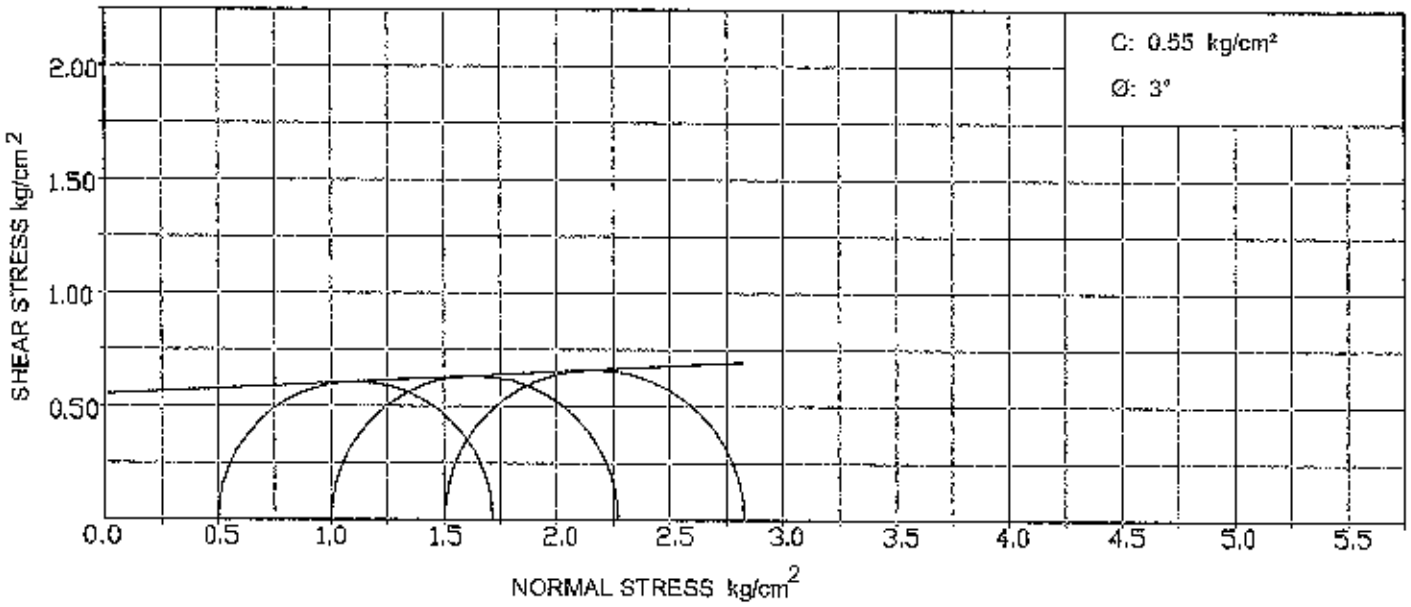
LOCATION:IPS 1 ZONE 2&3 BOREHOLE NO:2 DEPTH (m): 10.50



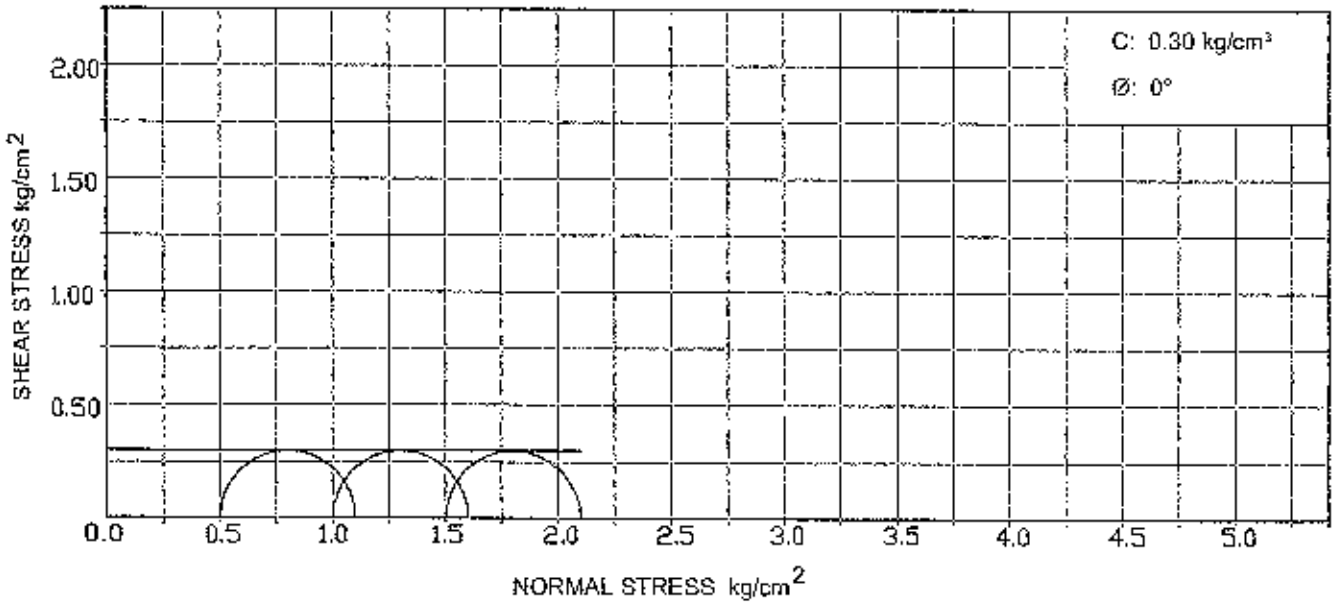
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:IPS 4 ZONE 2&3 BOREHOLE NO:1 DEPTH (m): 17.50



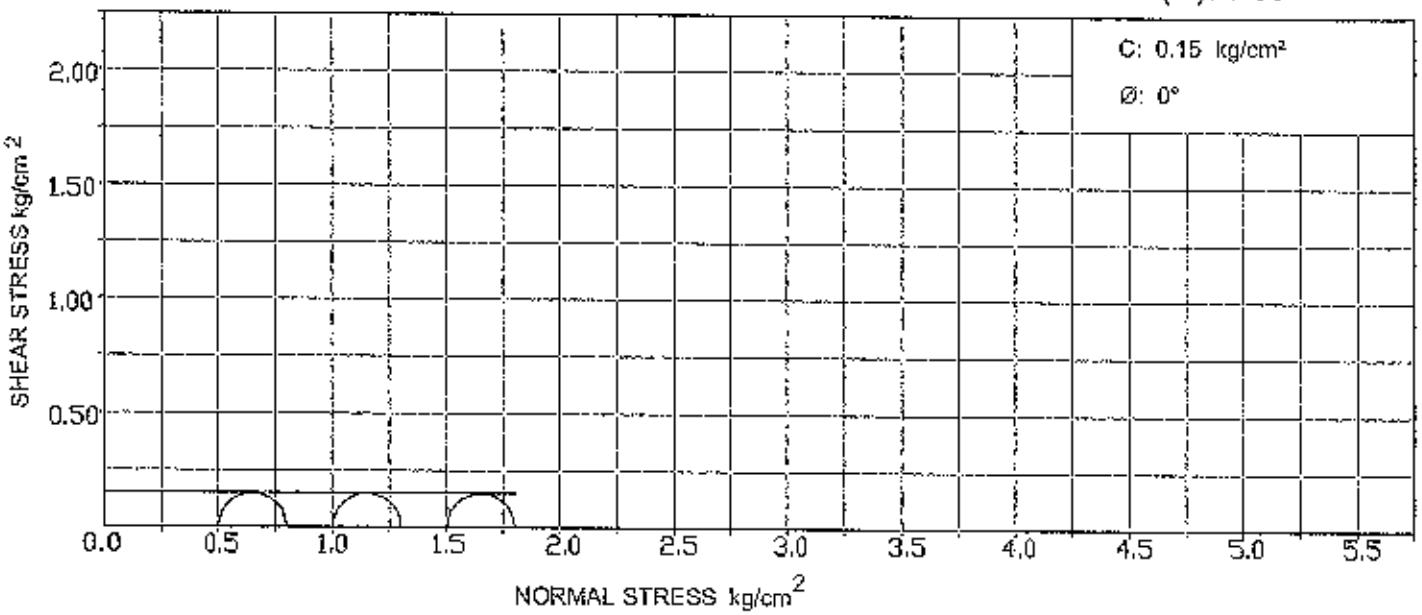
LOCATION:IPS 5 ZONE 2 &3 BOREHOLE NO:1 DEPTH (m): 14.0



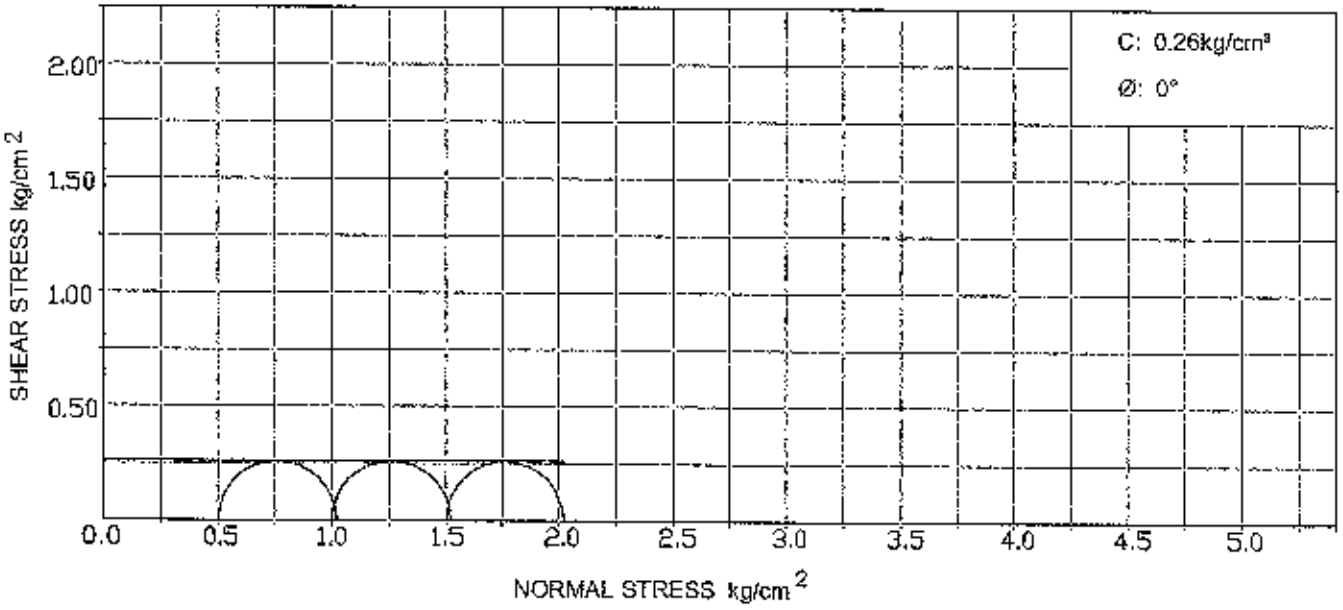
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:IPS 3 ZONE 2 & 3 BOREHOLE NO:1 DEPTH (m): 8.00



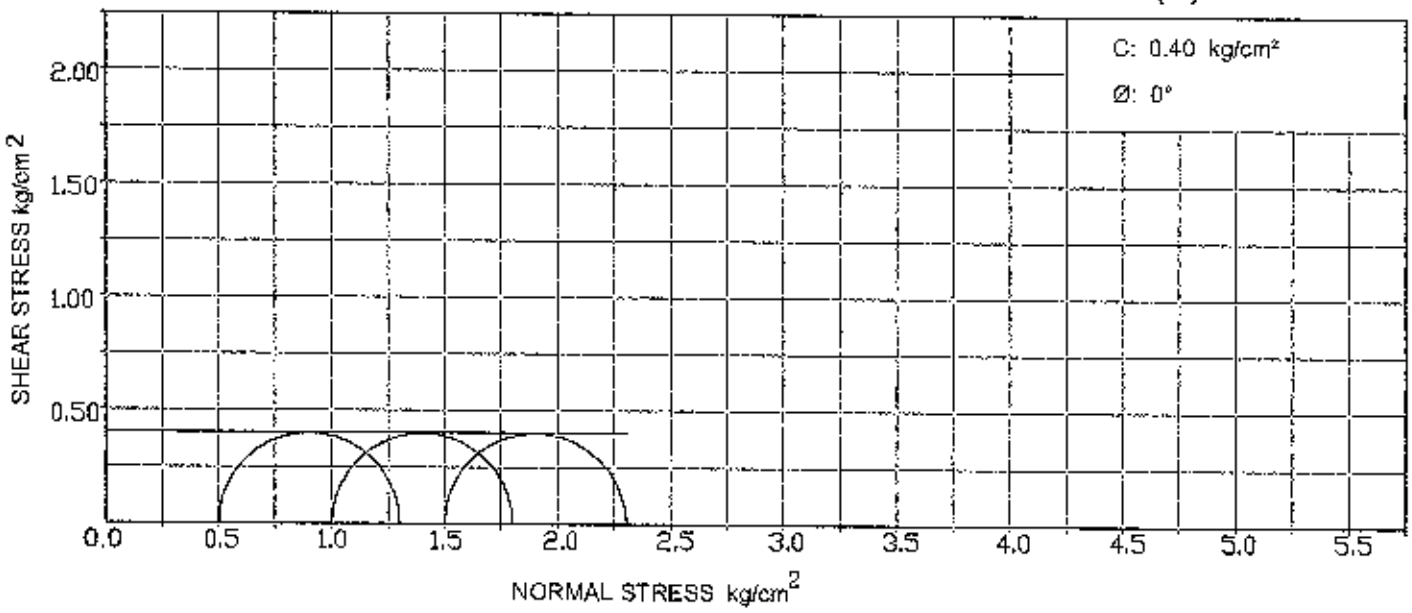
LOCATION:IPS 6 ZONE 2 & 3 BOREHOLE NO:2 DEPTH (m): 9.0



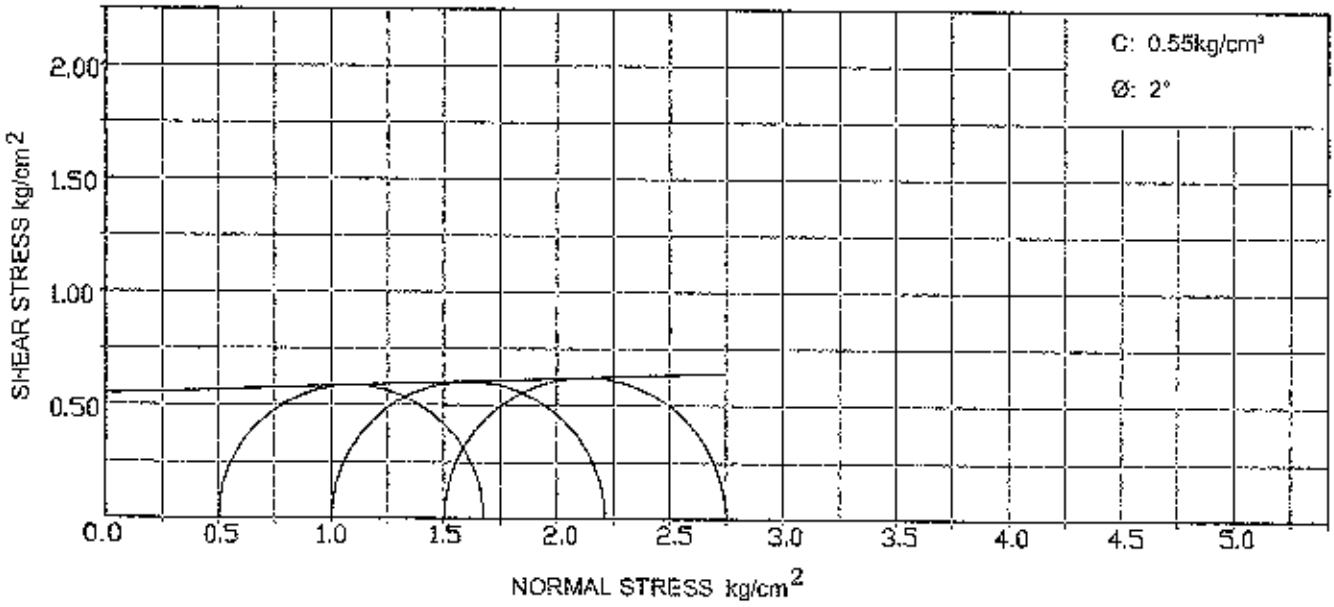
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:IPS 7 ZONE 2 & 3 BOREHOLE NO:1 DEPTH (m): 11.0



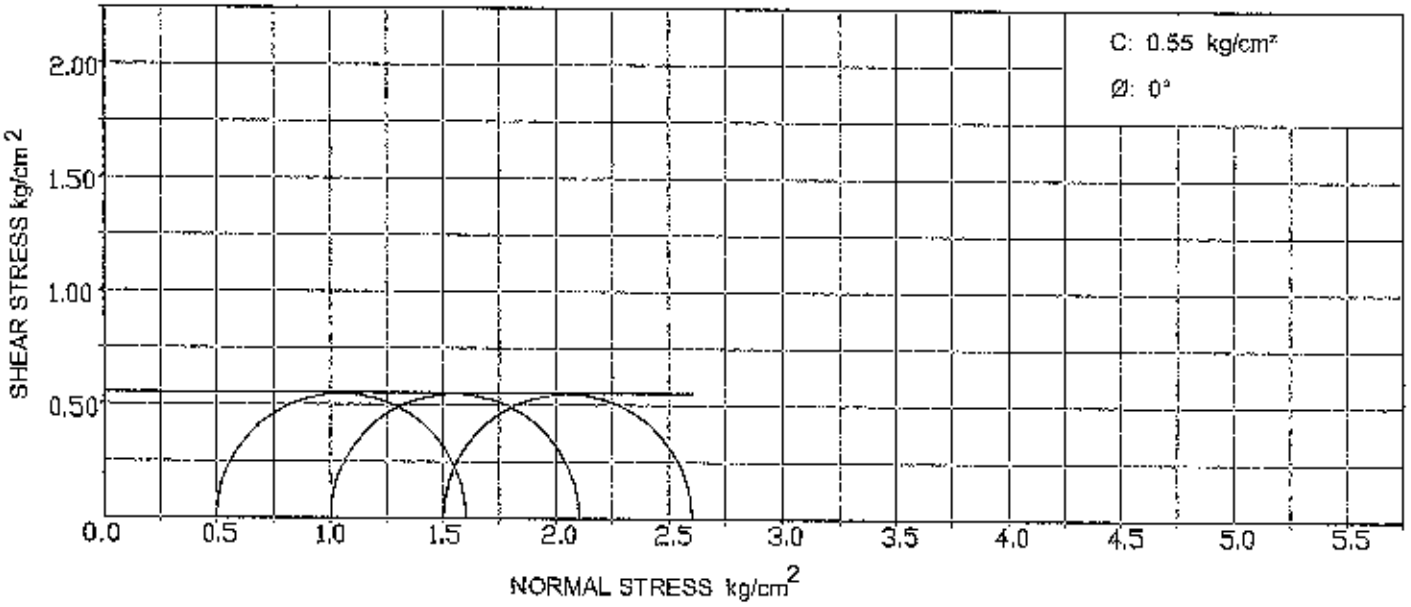
LOCATION:IPS 8 ZONE 2 & 3 BOREHOLE NO:1 DEPTH (m): 12.50



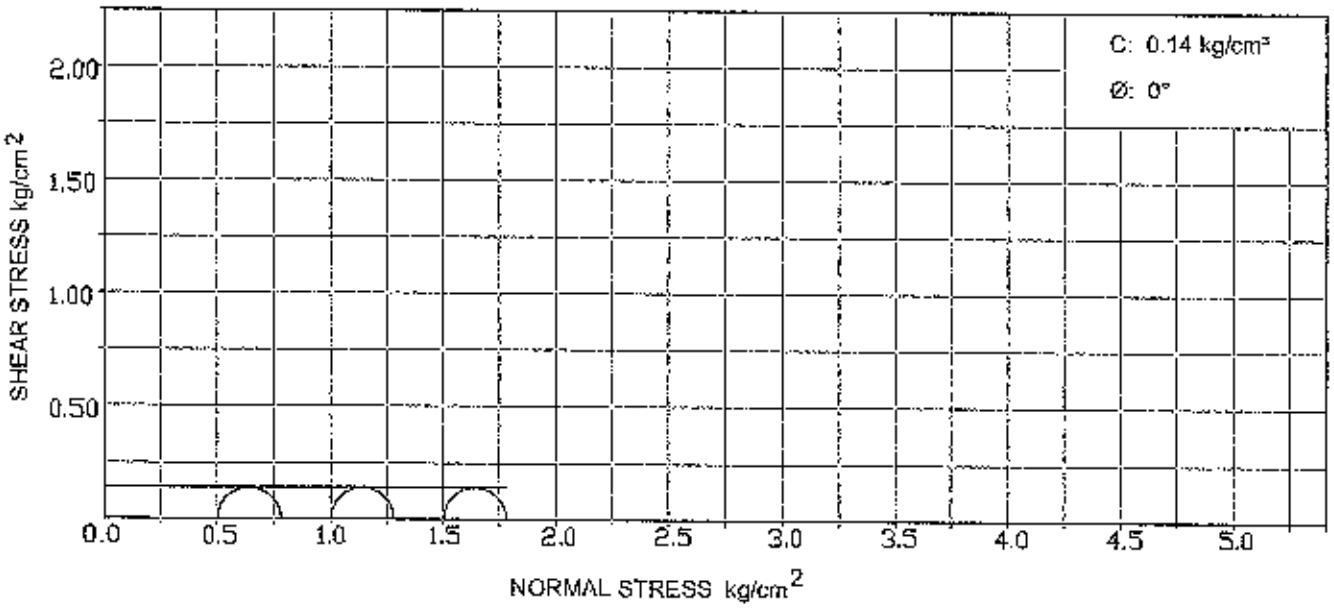
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:IPS 3 ZONE 4 BOREHOLE NO:2 DEPTH (m): 13.50



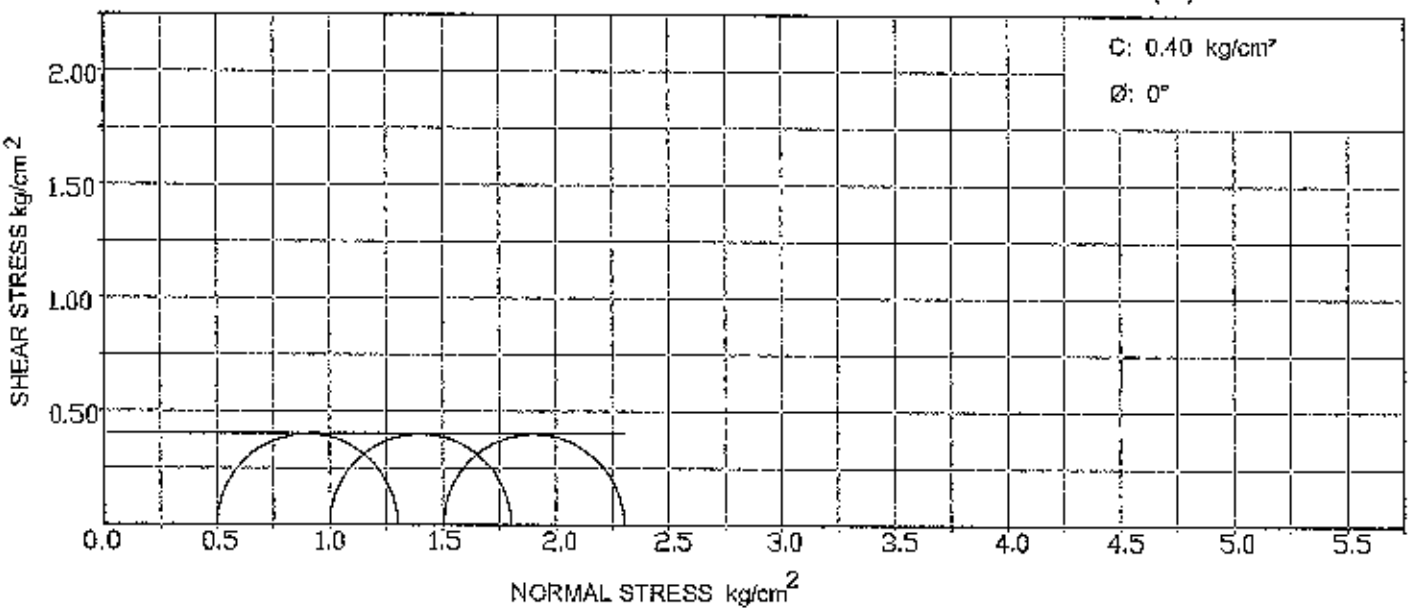
LOCATION:MPS 2 ZONE 4 BOREHOLE NO:2 DEPTH (m): 3.0



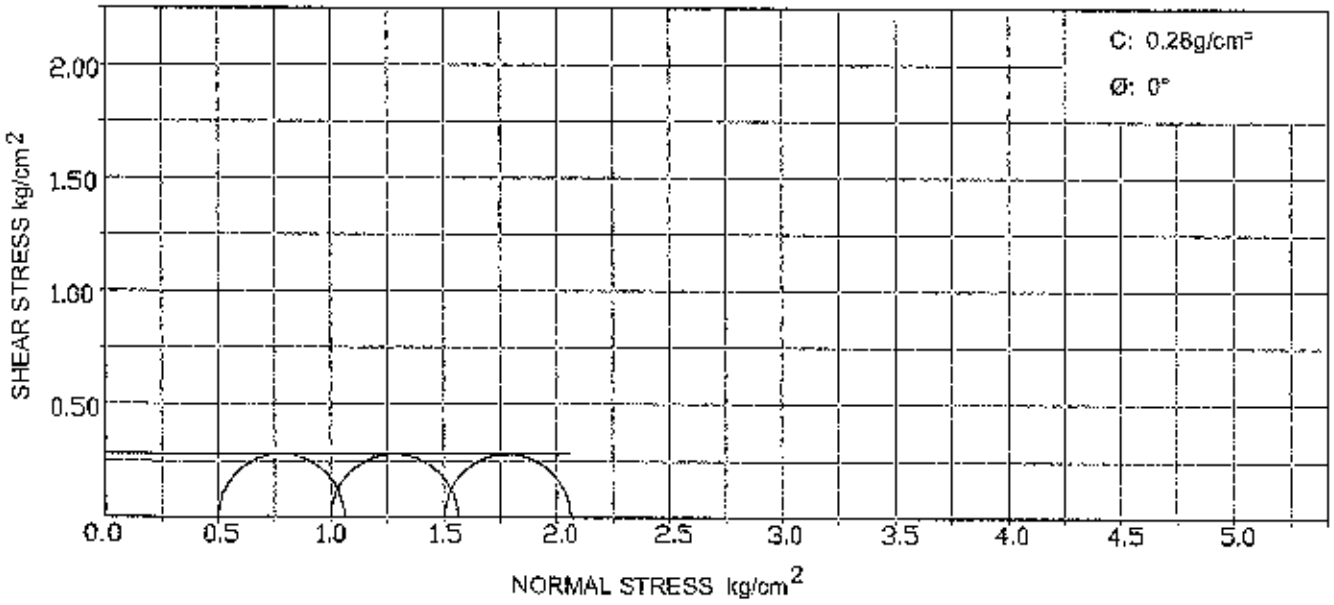
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:MPS 3 ZONE 5 BOREHOLE NO:1 DEPTH (m): 8.00



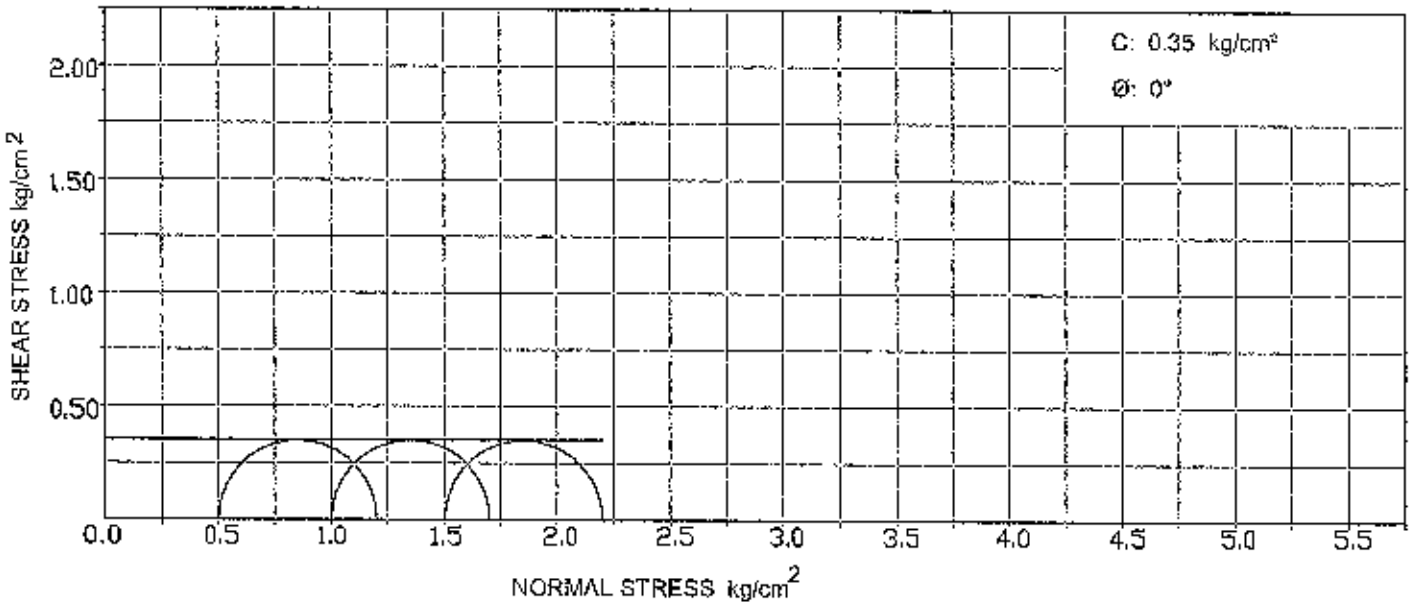
LOCATION:ISP 4 ZONE 5 BOREHOLE NO:12 DEPTH (m): 2.0



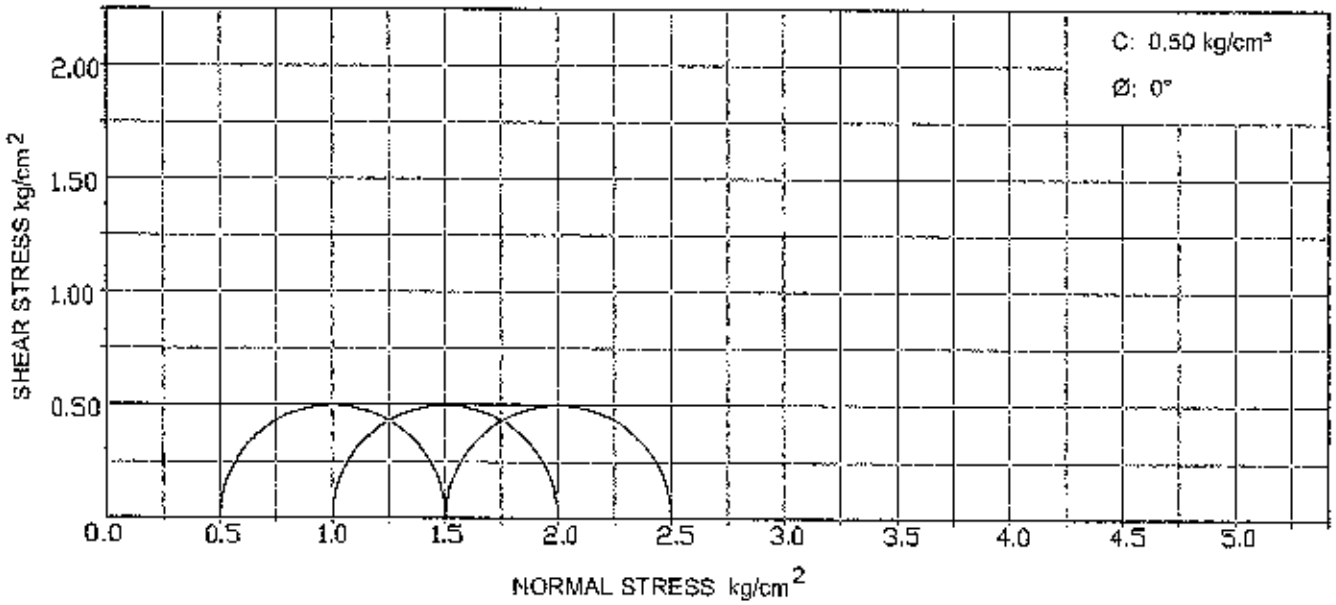
Project:Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

MOHR-COULOMB FAILURE ENVELOPE

LOCATION:PROP STP-2 BOREHOLE NO:1 DEPTH (m): 17.50



LOCATION:PROP STP 3 BOREHOLE NO:1 DEPTH (m): 16.0

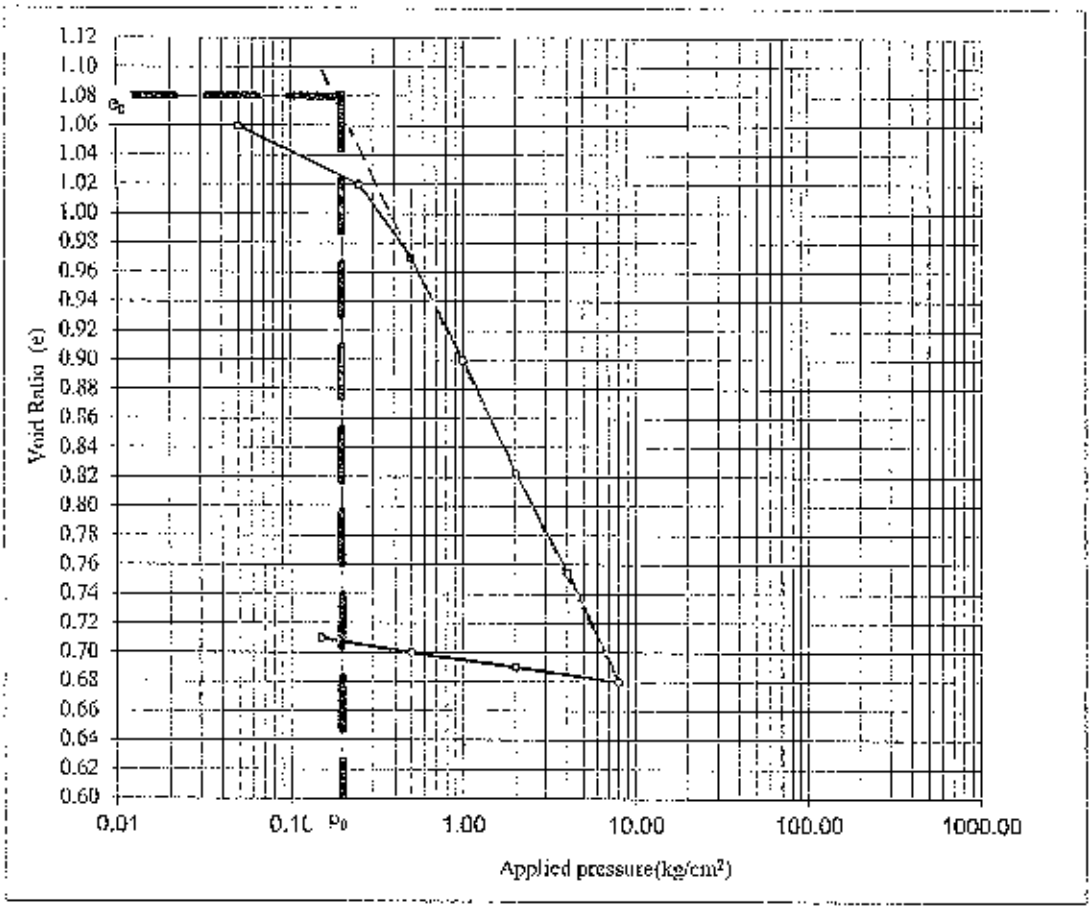


RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :EXIS STP 1 ZONE-1
BH No :3
Depth(m) : 2.50
Compression Index (Cc) = 0.24
Initial void ratio (e0) = 1.08



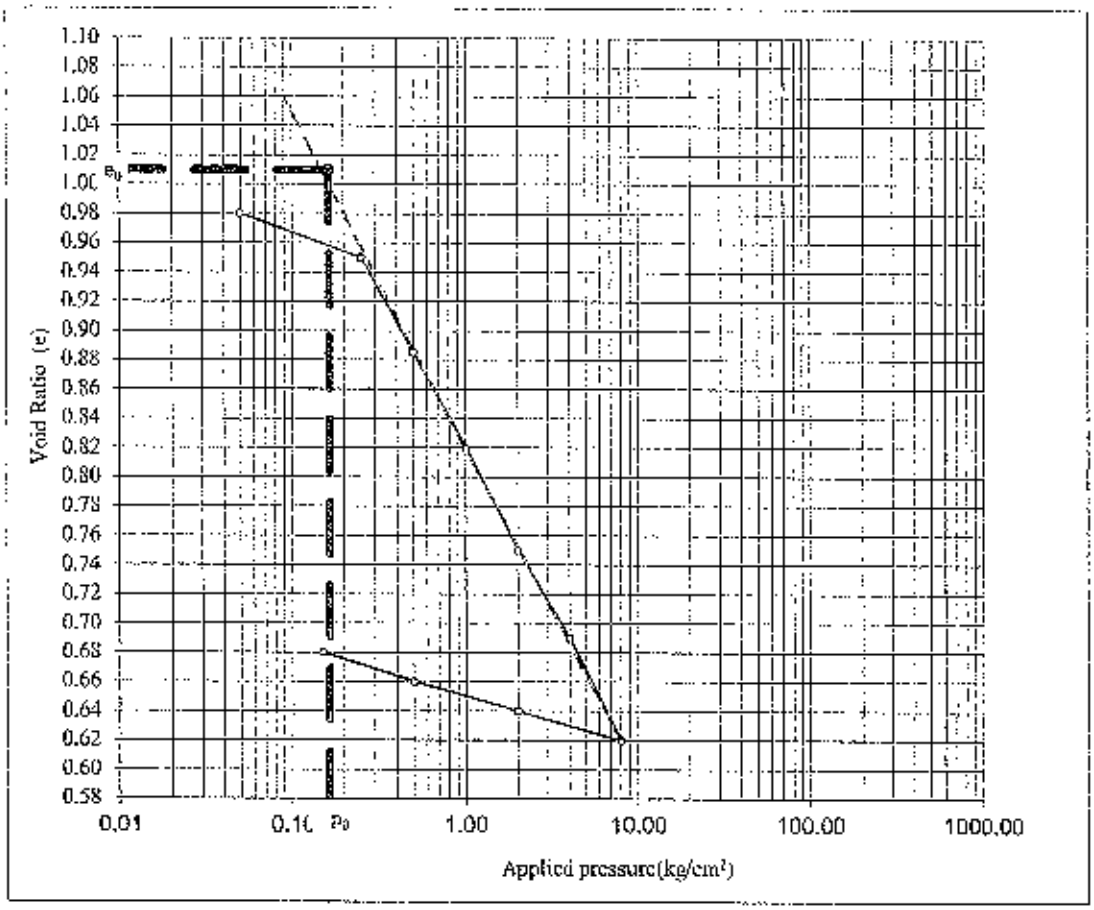
PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.099
0.50-1.0	0.071
1.0-2.0	0.041
2.0-4.0	0.019
4.0-8.0	0.011

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :IPS1 ZONE 2&3
BH No :1
Depth(m) : 2.00
Compression Index (Cc) = 0.22
Initial void ratio (e0) = 1.01

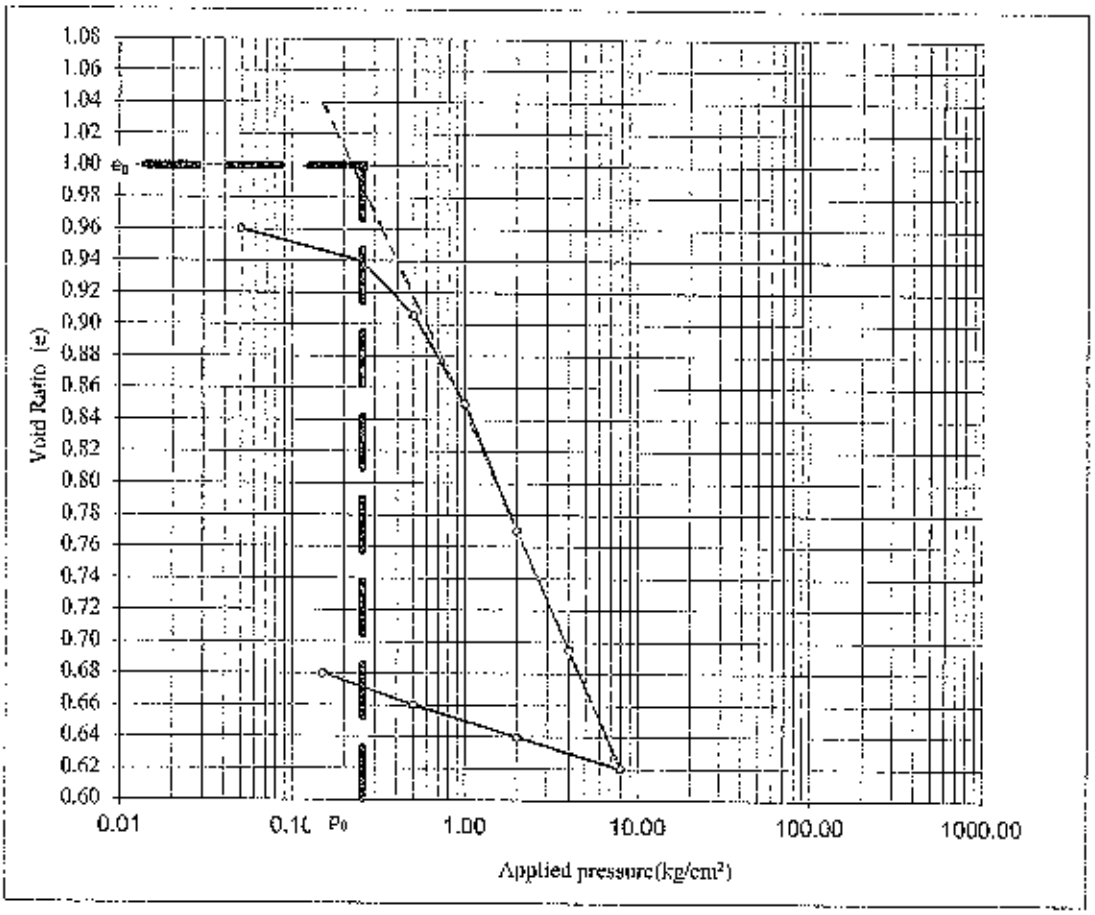


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.133
0.50-1.0	0.069
1.0-2.0	0.038
2.0-4.0	0.017
4.0-8.0	0.010

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :IPS 3 ZONE 2&3
BH No :2
Depth(m) : 3.00
Compression Index (Cc) = 0.25
Initial void ratio (e0) = 1.00

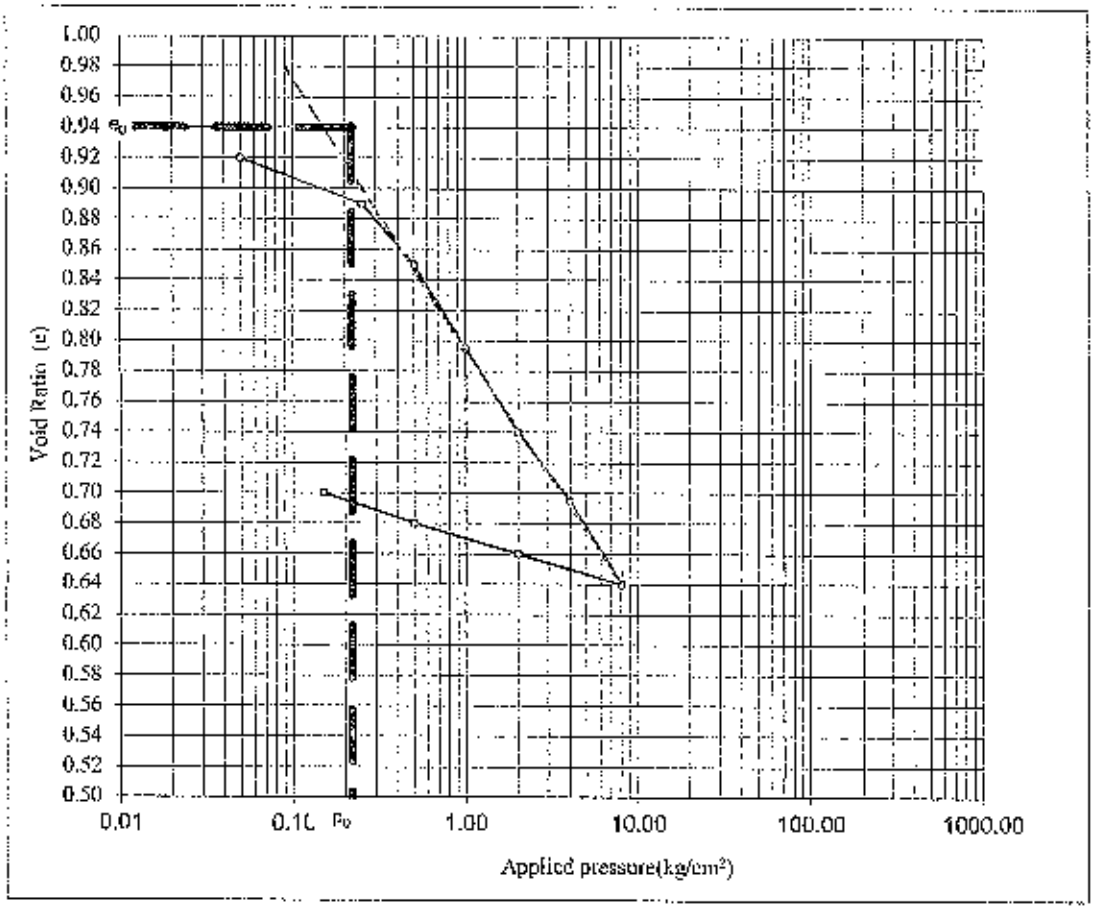


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.070
0.50-1.0	0.059
1.0-2.0	0.043
2.0-4.0	0.021
4.0-8.0	0.011

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :IPS 8 ZONE 2 & 3
BH No :1
Depth(m) : 2.50
Compression Index (Ce) = 0.17
Initial void ratio (e0) = 0.94

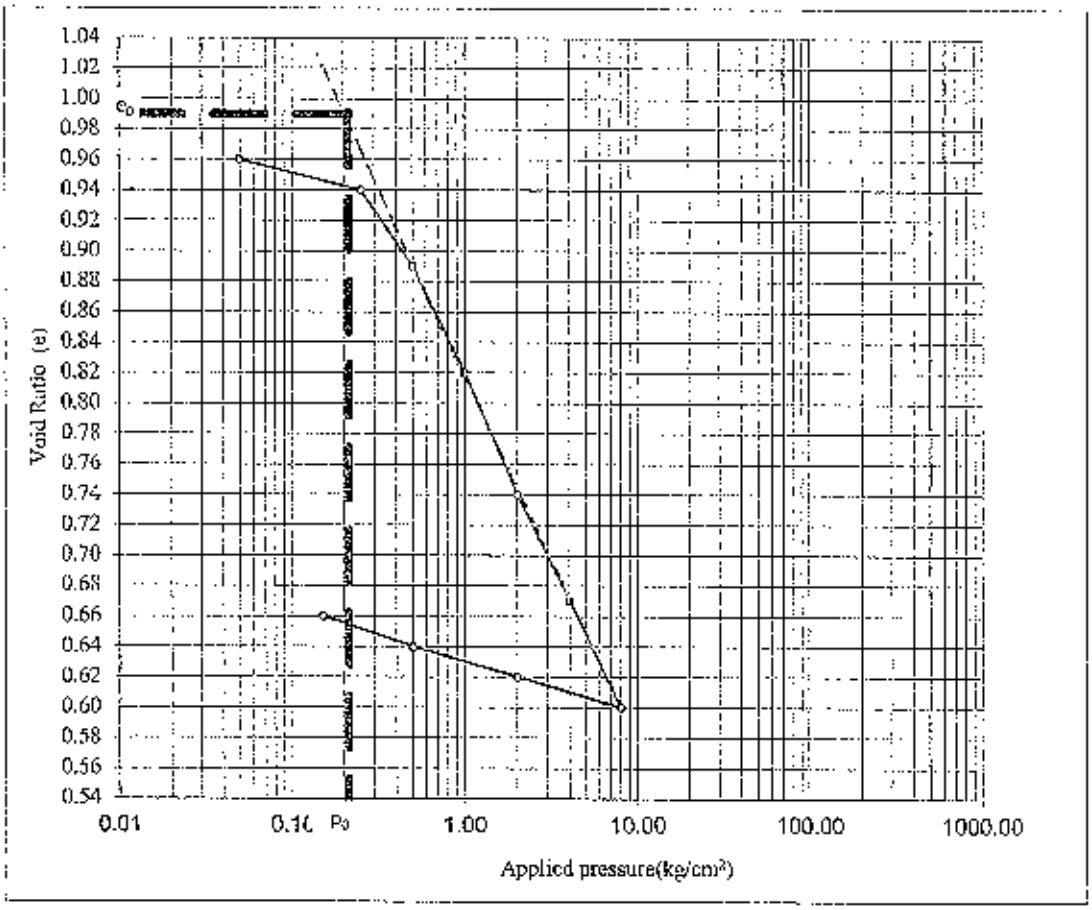


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.085
0.50-1.0	0.059
1.0-2.0	0.031
2.0-4.0	0.013
4.0-8.0	0.008

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :MPS3 ZONE 5
BH No :I
Depth(m) : 2.50
Compression Index (Cc) = 0.24
Initial void ratio (e0) = 0.99



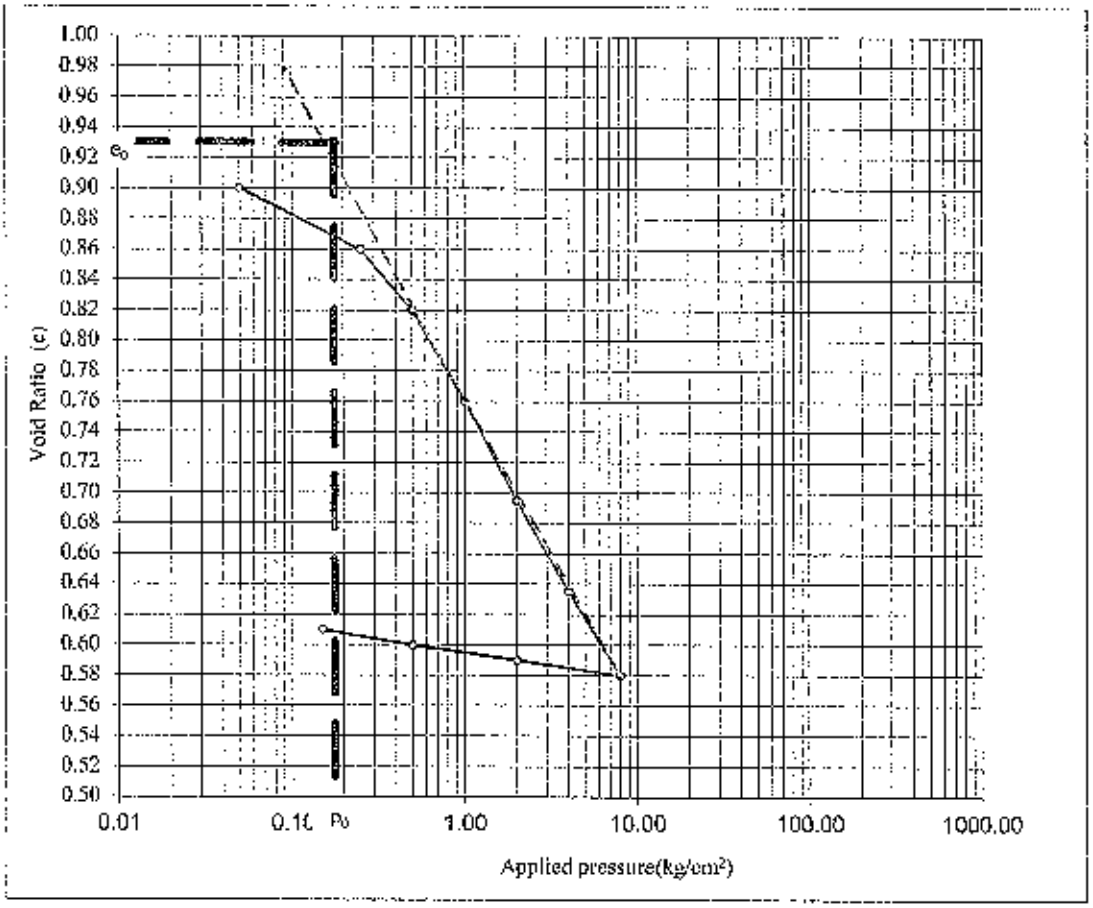
PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.103
0.50-1.0	0.074
1.0-2.0	0.044
2.0-4.0	0.020
4.0-8.0	0.010

RIGHT SITE SURVEY

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :IPS 3-ZONE 5
BH No :1
Depth(m) : 2.00
Compression Index (Cc) = 0.20
Initial void ratio (e0) = 0.93

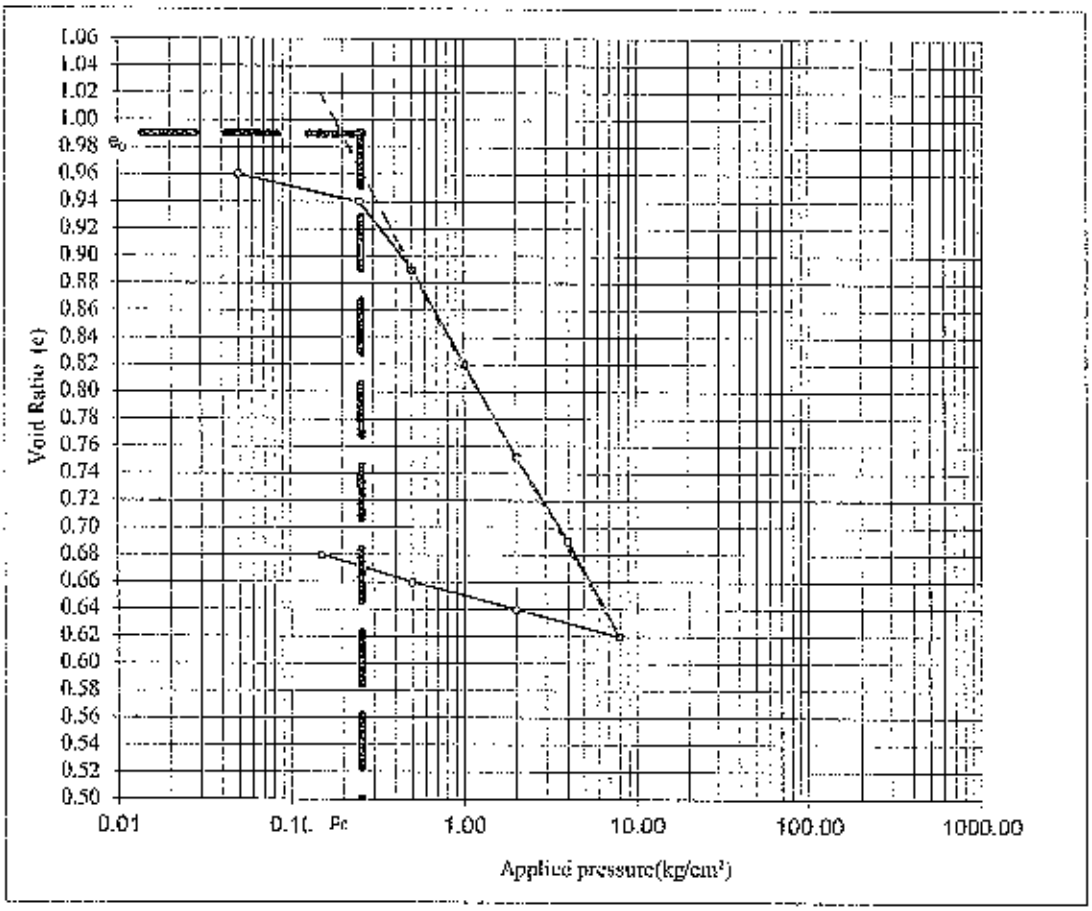


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.086
0.50-1.0	0.066
1.0-2.0	0.037
2.0-4.0	0.018
4.0-8.0	0.008

Project :Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

e log p curve

Location :Prop STP-2 at Manipur University
BH No :3
Depth(m) : 3.00
Compression Index (Cc) = 0.22
Initial void ratio (e0) = 0.99



PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.103
0.50-1.0	0.074
1.0-2.0	0.037
2.0-4.0	0.018
4.0-8.0	0.010

ANNEXURE-3

⇒ CALCULATION OF LOAD CARRYING CAPACITY OF SOIL

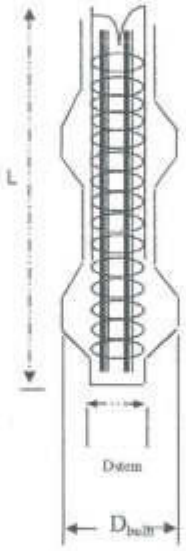
RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :MPS-1 (ZONE-1)

Frictional Resistance of Piles in Cohesive soil :		Total shaft length 12.0m Cut off 1.5.0m from EGL.	
D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	2.60	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	1.00	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	11.75	



Tip Resistance of Piles:		
D_{bulb}	Under- reamed bulbs diameter in m	0.75
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07
Aa	$0.785 \times (D_b^2 - D^2)$ m^2	0.37
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	1.00
C_p	Average cohesion at pile tip in t/m^2	4.20
N_c	Bearing Capacity factor	9.0
Q_{tip}	Tip resistance of the pile in tonnes	6.01
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	7.1
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	5.0

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

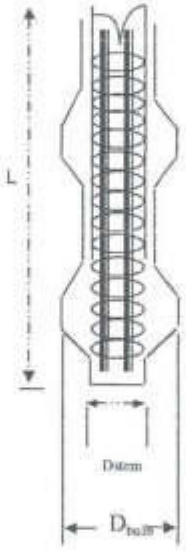
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :STP-1-Existing Site

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	3.00	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	3.00	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	13.88	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_b^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	3.00	
C_p	Average cohesion at pile tip in t/m^2	5.00	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	13.19	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	10.8	
Quift	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	8.0	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

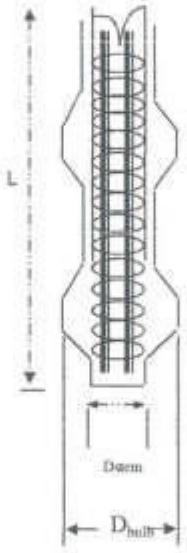
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :IPS-1 (ZONE 4)

Total shaft length 12.0m
Cut off 1.5.0m from EGL

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	2.20	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	2.70	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	10.27	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_u^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	2.70	
C_p	Average cohesion at pile tip in t/m^2	3.00	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	10.92	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	8.5	
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	6.4	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

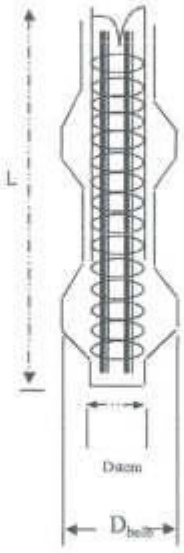
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :IPS-6(ZONE-2&3)

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	2.00	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	2.00	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	9.26	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_u^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	2.00	
C_p	Average cohesion at pile tip in t/m^2	4.70	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	9.66	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	7.6	
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	5.3	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

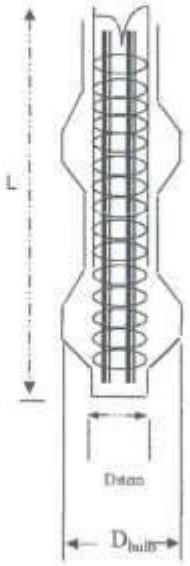
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :IPS-8(ZONE-2&3)

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	1.60	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	1.60	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	7.40	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_a^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	1.60	
C_p	Average cohesion at pile tip in t/m^2	5.20	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	8.65	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	6.4	
Quift	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	4.2	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

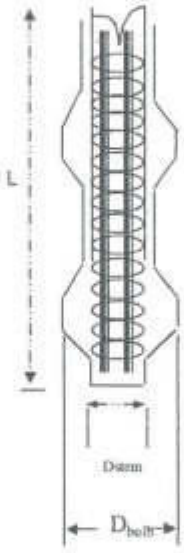
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :MPS-2 (ZONE-4)

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	2.50	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	1.60	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	11.41	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_a^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	1.60	
C_p	Average cohesion at pile tip in t/m^2	3.00	
N_c	Bearing Capacity factor	9.0	
Q_{tp}	Tip resistance of the pile in tonnes	7.25	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	7.5	
Quift	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	5.6	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

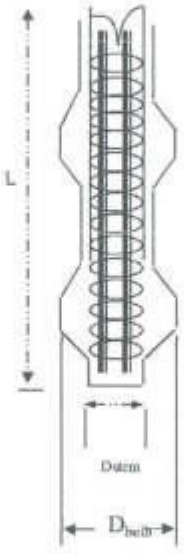
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :IPS-6(ZONE-5)

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	2.10	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	2.10	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	9.72	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_u^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	2.10	
C_p	Average cohesion at pile tip in t/m^2	3.60	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	9.30	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	7.6	
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	5.6	

RIGHT SITE SURVEY

COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

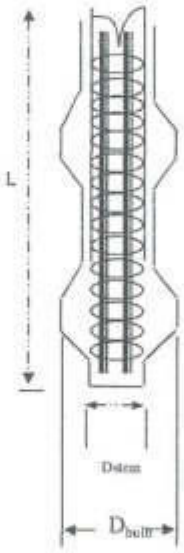
Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :STP-2 at Manipur University

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :

D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_a	Average cohesion for the strata along the pile stem in t/m^2	1.60	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	1.50	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	7.39	



Tip Resistance of Piles:

D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_u^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	1.50	
C_p	Average cohesion at pile tip in t/m^2	3.00	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	6.91	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	5.7	
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	4.1	

RIGHT SITE SURVEY

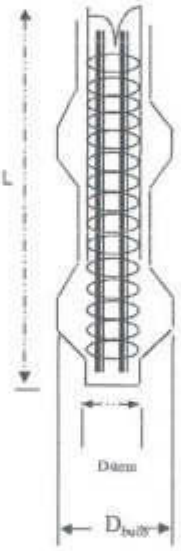
COMPUTATION OF LOAD CARRYING CAPACITY OF DOUBLE UNDER-REAMED PILE

Project : Preparation of Detailed Project Report for Integrated Sewerage System for Imphal City, Manipur.

Site :STP-3 at Irilbung

Total shaft length 12.0m
Cut off 1.5.0m from EGL.

Frictional Resistance of Piles in Cohesive soil :			
D_{stem}	Stem diameter of the pile in m	0.30	
L	Effective Length of the pile in m	10.50	(layer 1.50- 12.0 m)
As	Surface area of pile stem in m^2	8.90	
A's	Surface area of the cylinder circuscribing the under-reamed bulbs m^2	0.18	
C_u	Average cohesion for the strata along the pile stem in t/m^2	3.40	
Ca'	Average cohesion for the soil around the under reamed bulbs in t/m^2	1.70	
α	Reduction factor	0.50	
Q_f	Frictional resistance of the pile in tonnes	15.43	
Tip Resistance of Piles:			
D_{bulb}	Under- reamed bulbs diameter in m	0.75	
Ap	Cross-sectional area of pile stem a toe level in m^2	0.07	
Aa	$0.785 \times (D_u^2 - D^2)$ m^2	0.37	
C'a	Average cohesion of soil around the under reamed bulbs (t/m^2)	1.70	
C_p	Average cohesion at pile tip in t/m^2	6.50	
N_c	Bearing Capacity factor	9.0	
Q_{tip}	Tip resistance of the pile in tonnes	9.81	
Qsafe	Safe Load carrying capacity of the pile in tonnes (Factor of safety = 2.50)	10.1	
Qulft	Safe up lift capacity of pile in tonnes (Factor of safety = 3.0)	7.0	



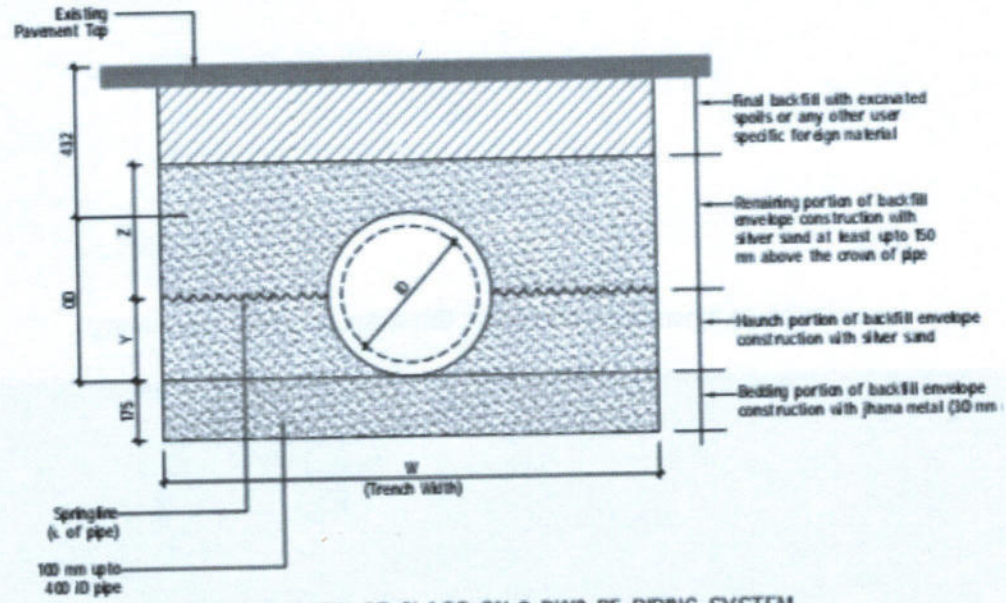
ANNEXURE-IV

S No	Parameters	Units	
1	pH	-	5.5 to 9.0
2	Biochemical OxygenDemand (BOD5)	mg/l	250
3	Chemical Oxygen Demand(COD)	mg/l	425
4	Total Suspended Solids(TSS)	mg/l	375
5	Total Kjeldahl Nitrogen(TKN)	mg/l	45
6	Total Phosphorous (TP)	mg/l	7
7	Feacal Coliform	MPN/100 ml	1×10^6
8	Total Coliform	MPN/100 ml	1×10^7

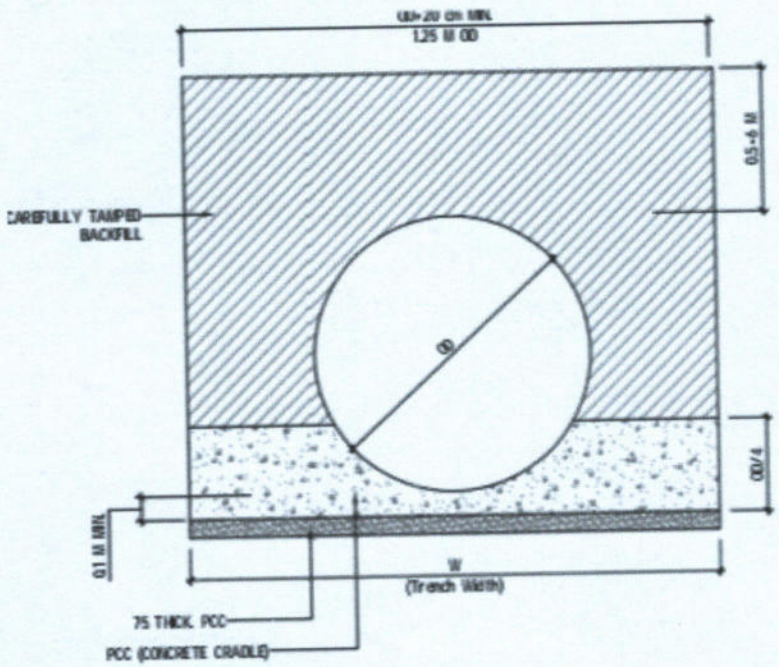
ANNEXURE-V

Zone	PS/STP	Plot area	Location
Zone 1	MPS 1	0.03 Ha	Lat- 24.824063 Long- 93.923384
Zone 6	IPS 1	0.03 Ha	Lat- 24.834570 Long- 93.942769
Left-out of Imphal Sewerage phase-I	PS 6	0.03 Ha	Lat- 24°49'30" Long- 93°56'49"
	PS 7	0.03 Ha	Lat- 24.785769 Long- 93.935705
	PS 8	0.03 Ha	Lat- 24°49'32" Long- 93°56'58"
6 STP at Lamphelpat		2 Ha	24º49'43" N 93º54'54" E
27 MLD at Langthabal Kunja		2 Ha	Lat- 24.746433 Long- 93.926905

ANNEXURE-VI



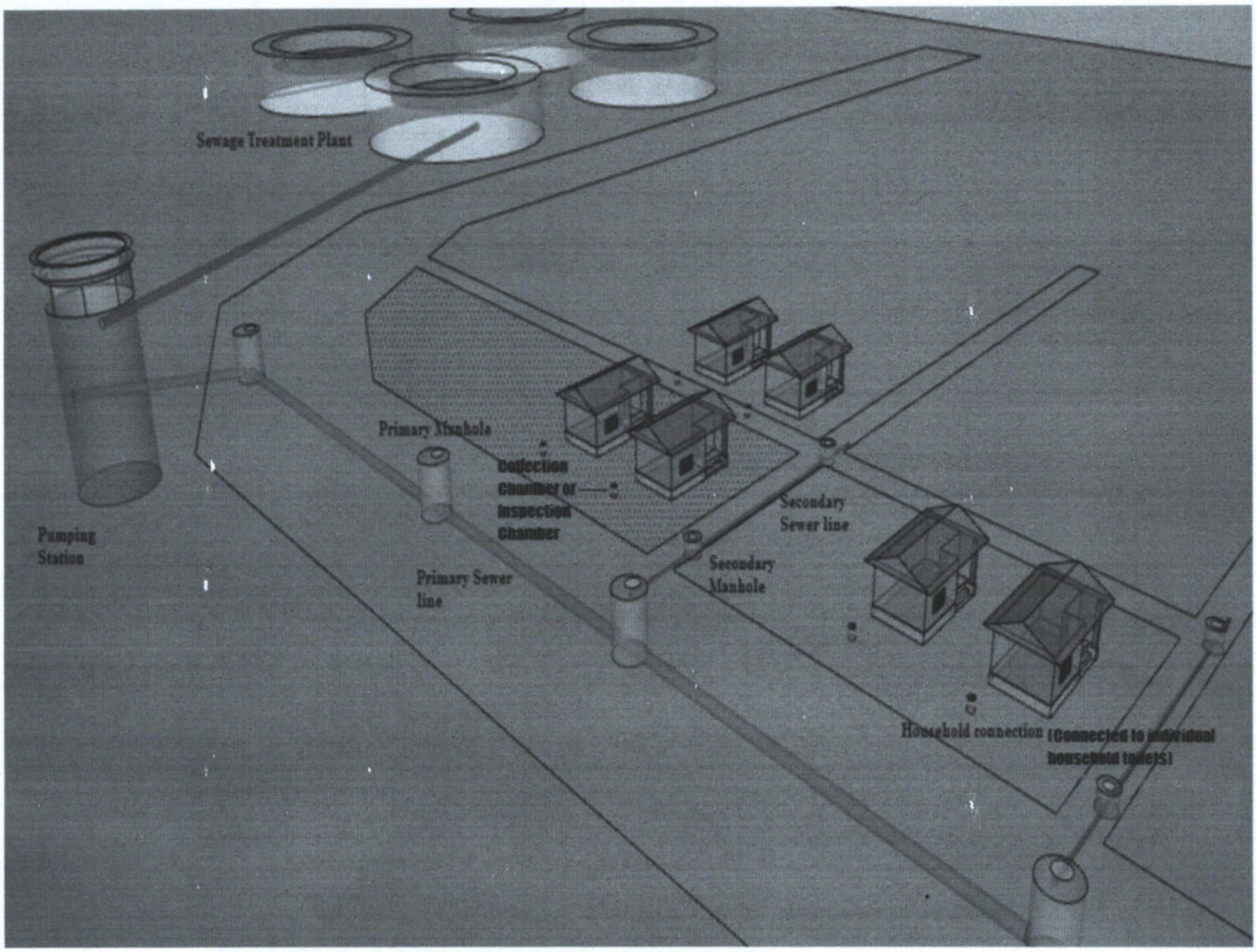
SECTIONAL VIEW OF CLASS SN 8 DWC PE PIPING SYSTEM AS PER IS 16098 (PART 2)



SECTIONAL VIEW OF DI PIPING SYSTEM FOR >400 DIA

Bedding profile of DWC and DI pipes

ANNEXURE-VII



Schematic diagram showing the scope of household connection