Name of Work: ""RFP for Appointment of EPC Contractor for construction of Group VIII Projects comprising of multistorey hostel blocks, academic building, faculty offices & apartments and other associated Infrastructure at IIM Indore."

NIT No. : IIMI / Project / 09/ 2023 / 144 File No. 492

RESPONSE OF PRE-BID QUERIES

Sl. No.	Clause No. mentioned in communications of prospective bidders	Page No. mentioned in communications of prospective bidders	Subject mentioned in communications of prospective bidders	Prospective Bidder's Querry	Clarification/ Response by IIM Indore
1	C. Other Information and terms & conditions/ C.23	Page 20 of 1352	Joint Venture and Consortium is not permitted.	We request to allow Joint Venrure of Maximum Two numbers of partner's anda any one of the partner in Joint Venture must satisy Requirement of CHAPTER 5- Eligibility Criteria, Evaluation and Selection of EPC Contractoreria. We would request to consider the above to enable the participation of more national level organisation in the competition, have most competitive price, have more technically & financially sound companies on board, mobilisation of better resources enabling the faster delivery of project.	No Change in the stipulation of the RFP
2	Note: General Information and bid submission	Page 13 of 1352	The eligible EPC Contractor firms/ agency/ enterprise having experience in executing works for a similar project during the last 5 years ending the previous day of last date of submission of RFP are requested to participate in the tendering process. A similar project here means "Execution including Design/Engineering, Procurement and Construction / development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses.	We request to consider similar project means "Construction of Hospitals & Residential Buildings including Civil, Finishes, Elecrtical, Plumbing & Sanitary, HVAC, Firefighting & Lifts Work during last 7 years ending the previous day of last date of submission of RFP.	No Change in the stipulation of the RFP
3	CHAPTER 5 - Eligibility Criteria, Evaluation and Selection of EPC Contractor/ 1. Eligibility Criteria:/ b. Project Specific Eligibility Criteria	Page 31 of 1352	The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr.	We request to consider Two similar works of Rs. 320 Cr.	No Change in the stipulation of the RFP
4	CHAPTER 5 - Eligibility Criteria, Evaluation and Selection of EPC Contractor/ 1. Eligibility Criteria:/ b. Project Specific Eligibility Criteria	Page 31 of 1352	The bidder shall have experience of executing G+14 structure with a min. height of 45 meter and shear wall technology.	We request to consider experience of executing G+10 structure with a min. height of 35 meter.	No Change in the stipulation of the RFP
5	CHAPTER 5 - Eligibility Criteria, Evaluation and Selection of EPC Contractor/ 1. Eligibility Criteria:/ b. Project Specific Eligibility Criteria	Page 31 of 1352	Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold rating for a project having construction area not less than 45000 sqm.	We request to consider "Contactor should have executed Green Building project and as certified, IGBC Platinum rating for a project having construction area not less than 15000 sqm.	No Change in the stipulation of the RFP
6	A.3.3/ Mode of payment of Bid Security	Page 12 of 1352	Bidders will have to deposit the Bid Security through NEFT or RTGS only.	We request to consider Bank gaurantee for Bid Security from any Bank.	Bank guarantee from any scheduled commercial banks subject to verification from issuing bank by the Institute in the approved format shall be acceptable. The validity period would be 45 days beyond the final bid validity period.
7	General Conditions Of Contracts		Advances: No Plant & Machinary Advance	We request you to provide Plant & Machinery Advance for an amount equal to 90% of value of Plant & Machinery brought to site. Recovery of Plant & Machinery advance may be made on pro rata basis.	No Change in the stipulation of the RFP
8	General Conditions Of Contracts		Advances : No Material Advance/Secured Advance	We request you to provide secured advance for an amount equal to 90% of value of material brought to site.Recovery of secured advance may be made in proportion of the consumption of materials.	No Change in the stipulation of the RFP
9	General	Technical Specifications, Page No 215, 839, 1339,	1. All concrete work will be strictly done by automatic computerized batching plant of suitable capacity installed at site or RMC as per approval of IIM Indore/ Engineer-in- Charge, 2. Labour Camp, Stores, Godowns etc	We understand that land for temporary facilities like installation of Batching Plant, Establishment of Labour Camp, Stores, Godowns etc will be provided to contractor at free of Cost. Kindly Confirm	EPC Contractor with prior approval may use the land allocated for Group VIII Projects appropriately without affecting the layout of the Project buildings & services, for the establishment of their Batching plant, site offices, godowns, etc. on their cost and risk. However, no labor camp or overnight stay for any of the contractor's labor, manpower, staff, etc will be allowed inside the campus. Only security personal for guarding will be allowed. The above said land is provided without any charges/ rent, during the project execution. The connected clauses given in the RFP should be strictly followed.
10	Liquidated Damages	Chapter 2, IRB, Page No. 8	Liquidated Damages - Max. 10% of Contract Price.1% per week of contract price	As per CPWD Conditions, It is 1 % per Month of Contract price with maximum ceiling of 10 % of contract price.	No Change in the stipulation of the RFP
11	Bonus	Chapter 8, GCC, Page No. 144	Bonus - Maximum 3 % of Contract Price 0.03% of the Contract Price for each day	As per accepted practice, Incentive clause may be modified with a maximum ceiling of 5%	No Change in the stipulation of the RFP

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12	Eligibility Criteria	Chapter 5, Eligibility Criteria, Evaluation and Selection of EPC Contractor, Page No. 31	Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like.	Kindly let us know if work executed for private companies will also be considered for Eligibility?	RFP stipulation vide Clause No. 3.1 - (i) shall be referred in this regard.
13	Escalation/Price Variation	Cl No 17.8, Page No. 132	Deleted	As we are aware the commodity prices are very volitile these days & therefore it is not possible to workout the impact of these rate variations on the contract price throughout the tenure of the contract. In absence of provision of escalation in the tender, bidders may resort to speculative bidding which may result in unreasonable prices. Therefore, We request you to kindly consider incorporation of clause reguarding escalation as per CPWD norms.	RFP stipulation vide Clause No. - C.3 - III(ii) shall be referred in this regard.
14	EMD	Chapter 2, IRB, Page No. 11, 12	Rs. 10.538 Crores /- by NEFT or RTGS	We request you to kindly accept BG for EMD instead of online payment.	Bank guarantee from any scheduled commercial banks subject to verification from issuing bank by the Institute in the approved format shall be acceptable. The validity period would be 45 days beyond the final bid validity period.
15	Value Engineering		General Condition	It is an accepted practice that for EPC Projects there is scope for further improvement by giving value addition suggestions. This will help in improved product &/or economy in costs.otherwise be of benefit to the Employer. In such case, the monetary benefit may be shared in the ratio of 50:50 between Contractor and Employer.	No Change in the stipulation of the RFP
16	General		Basic Rates of Ceramic Tiles, Glass Mosaic Tiles, Anti Skid Tiles, Glazed Vitrified Tiles, Heat Resistant Terrace Tiles, Kota Stone, Granite Stone, Marble Stone for Price Variation.	Kindly Provide the basic rates for Ceramic Tiles, Glass Mosaic Tiles, Anti Skid Tiles, Glazed Vittrified Tiles, Heat Resistant Terrace Tiles, Kota Stone, Granite Stone, Marble Stone & the price variation may be paid based on the difference between actual purchase price & base rate given.	RFP stipulation vide SCC Clause No. - 9.7.1 page no. 217 shall be referred in this regard.
17	General		BMS IO Summary	Kindly provide the IO Summary for BMS Works as it is required for taking the competetive quotes for the same	RFP stipulation vide IBMS DBR page no. 454 shall be referred in this regard. Approved makes are as follows- BMS Software - HONEYWELL WEBS / CYPHER / TRENDS / SIEMENS BMS UNITARY DDC CONTROLLER - HONEYWELL WEBS/ALC/ABB/TRENDS / SIEMENS BMS SERVER PC/WORKSTATIONS -IBM/DELL/HP/WIPRO/LENOVO WEB BASED ROUTER / NETWORK AREA CONTROLLER - HONEYWELL WEBS/ALC/ABB/TRENDS / SIEMENS BMS SENSORS AND FIELD DEVICES - HONEYWELLEBS / ALC / ABB / HONEYWELL / OMICRON / SIEMENS BTU METER - QUALCOMM / SCHNEITECH / OMICRON / HONEYWELL / SIEMENS LONWORKS BASED COMMUNICATING THERMOSTATS FOR FCUS - HONEYWELL / JOHNSON / SIEMENS / OMICRON / SIEMENS VOLTAGE / CURRENT / POWER FACTOR TRANSDUCER - ENERCON / CONZERV / ELECTREX / RISHABH / OMICRON FREQUENCY TRANSDUCER - ENERCON / CONZERV / ELECTREX / RISHABH / OMICRON PRINTER - EPSON / NEC / TVSE ENERGY MANAGEMENT SYSTEM - ELMEASURE / CONZERVE WATER LEVEL CONTROLLER (4 PROBE TYPE) - MINILEC/ GALCO COMPUTER SYSTEM - LENOVO/ DELL / HCL/ HP

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18	Bid Capacity	Chapter 2, IOR & ITB, Page No. 13	Eligibility of bidding agencies shall be evaluated on the basis of their overall past performance, turnover, Bid capacity, solvency, past legal records, liasoning ability, timely completion of Projects, experience in executions of similar projects, availability of skilled and unskilled manpower, availability of advance plant and machinery, available technical manpower and their qualification and experience.	Kindly Provide the formula for Bid Capacity as it is required for Evaluation Purpose.	No Change in the stipulation of the RFP
19	General		Contract Period - 24 Calendar Months, including monsoon periods	Considering fasttrack nature of the project, it is advised that Buildings namely Girls & Boys Hostel, MDC accomodation & Type - V Residences may be made mandatory to be designed with shear wall system. This will lead to faster construction of the structure work & saving in time for finishing	No Change in the stipulation of the RFP
20	General		Approved Makes	In order to be competetive, bidders will choose most economical option from various approved make & therefore contractor has the right to select particular approved make during execution.	No Change in the stipulation of the RFP
21	Statutory Approvals	Chapter 6, Scope of Works, Page No.52	The EPC Contractor shall take all necessary statutory approvals from all the concerned authorities.	Employer may consider to obtain all the pre- construction statutory approvals & clearances before award of contract. This will save time during construction	RFP stipulation vide Clause No. - 6.6 page no. 62 shall be referred in this regard.
22	General		Furniture & White goods	It is requested that, items like Furnitures, White Goods etc be kept as provisional sum & paid for separatly. Alternatly product make & product codes may be provided as the price range of this products vary over a vide range based on the make, model number etc,	RFP stipulation vide Clause 9.8.4 page no. 219 and Furniture DBR page no. 618 shall be referred in this regard.
23	General		Annual Maintainance	Kindly allow us to quote separatly for annual maintainance works. Also please let us know if Water, Fuel, Electricity & other consumables will be provided free of cost	No Change in the stipulation of the RFP.
24	General	Chapter 4, List of Personnel, Plant & Machinery, Page No 29	Machinary Requirment	Please refer Clause No C of page No. 29, Minimum number of Plants & Equipments specified seems to be on higher side. Requirment of Tower Cranes may be reduced to 4 in lieu of 7, batching plants numbers may be reduced to 1 number of 15 Cum/Hour in lieu of 2 numbers of 60 Cum/Hour, Number of Transit Mixers may be reduced to 3 numbers in lieu of 6 numbers.	Please refer Chapter 4 Clause C. page no. 29 of the RFP.
25	General	Annexure No 1, Page No 285 & Chapter 4, List of Personnel, Plant & Machinery, Page No 27	Staff Requirment	Please refer Annexure No 1 of page No. 285 & Clause No A of Page No 27, Several Details of the staff to be deployed like Educational Information, Past Experience Certificates etc. have been asked to submit with the bid. It may be noted that requisite staff will be deployed at site based on the time of award of contract & completion of their assignment at other projects. In view of this it is requested that an Undertaking from the bidders be accepted for deploying staff in adequate quantity.	No Change in the stipulation of the Tender.
26	Design Criteria		High Yield Strength Deformed bars conforming to IS: 1786 with fy = 500 MPa is considered in the design calculations	Employer to confirm whether we can use Fe550 in this project or not along with Fe500.	As per the stipulation of RFP vide page no. 838 Clause 4.6
27	Modelling		As all walls and columns shall be supported on Raft and Isolated footings, Pin support shall be assigned in the analysis model for walls modeled as shell element and fixed support for columns	All applicable codes donot specify for pinned support at bases for shearwalls. Request to clarify if we can consider all the supports as fixed for shearwalls also.	No Change in the stipulation of the RFP.

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28	Chapter 4	page no. 29	list of plant and machinery, Machinery ewquirement	Minimum plants & equipment's specified seems to be on higher side.Requirement of tower crane is specified as 7, batching plant numbers are specified as 2 nos of 30 cum / hr and requirement of transit mixer is specified as 6 nos. As the average concrete consumption is expected to be about 125 Cum / day, a batching plant of 30 cum/hr is sufficient . We hereby submit that, We own these machineries and same can be mobilized as and when required with 30 days lead time. In view of this and site constraints it is requested that this clause may be modified suitably to help this project.	Please refer Chapter 4 Clause C. page no. 29 of the RFP.
29	clause A.3		Please refer wherein security deposit and performance guarantee are specified as 5% each further AMC is 3%, statutory approvals 2% are kept for occupancy readiness. This totals to 17% which in our opinion is on very higher side. These clauses will cause the cashflow to hamper and ultimately will impact the progress of the work negatively. In view of this,	we request you to kindly accept performance bank guarantee equivalent to 5% contract price with validity till Defects liability period without any other deductions/ security deposits.	No Change in the stipulation of the RFP.
30		Pg. no 32 point no 2	Bidding Process will be a two-bid system which comprises of technical bid and financial bid. Further the technical bid will be subdivided into two stages namely technical bid stage-1 and technical bid stage-2. The ratio of weightages for technical score and financial evaluation will be 30:70 (Thirty: Seventy). The Method of selection will be Quality and Cost Based Selection (QCBS). As is said earlier the technical bid will be evaluated in two stages.	In EPC Contracts there is no as such guideline of QCBS (30-70) in selection process. So, we are humbly request you to kindly removed the criteria.	No Change in the stipulation of the RFP.
31	Technical Bid Stage	Pg. no 16 "Technical Bi d Stage – 1 "Point 4	Average annual financial turnover of Minimum Rs. 2000 Cr. or more during the last 3- financial years 2019-20, 2020-21,2021-22 duly certified by a practicing Chartered Accountant with UDIN.	As per CVC guidelines Pg. no.34 Point no A) Civil/Electrical Work. (I) Average Annual financial turnover during the last 3 years, ending 31st Marchof the previous financial year should be at least 30% of the estimated cost. I.E 158.97 Cr.	No Change in the stipulation of the RFP.
32		Pg. no 16 Point no ix	Certificate(s) in respect of LEED/GRIHA certified projects	As EPC contracts are bought in practice from 2018. There are many in project which are currently ongoing as per GRIHA guideline and will also be designed as per the norm. So, we request you to taken going project in evaluation.	No Change in the stipulation of the RFP.
33		Pg.no 20 Point C.23	Joint Venture and Consortium is not permitted.	As per CVC guideline Joint Ventures should be allowed As per RPF Pg. no 34-point 3 Technical Bid	No Change in the stipulation of the RFP.
34			Experience of having successfully completed similar projects' EPC contract during last Five years ending on previous day of last day of submission of tender. 1. Similar works shall mean the works detailed at Sl.1 of this chapter 5. 2. Value of Rs. 526.9 Cr. mentioned above should not include cost of land.	As per CVC Guidelines "Experience of having successfully completed similar works during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following." Three similar completed works costing not less than the amount equal to 40% of the estimated cost. or Two similar completed works costing not less than the amount equal to 50% of the estimated cost. or One similar completed works costing not less than the amount equal to 80% of the estimated cost. As per RFP	No Change in the stipulation of the RFP.
35		Pg.no 12-point A.3.2	If the successful bidder, after being awarded, the EPC contractor fails to start the Mobilization of resources as per agreed schedule at site within 15 days as mentioned in this RFP or as directed by competent Authority of IIM Indore.	Looking at the magnitude of the project, we would request you to kindly give at 30 days' time to mobilize the cite.We kindly request your favorable consideration to ensure a competitive bidding process.	No Change in the stipulation of the RFP.
36	Mode of payment of bid security	Pg. no. 12	Bidder will have to deposit the Bid security through NEFT or RTGS	Kindly accept EMD in form of BG nad also provide the bg format	Bank guarantee from any scheduled commercial banks subject to verification from issuing bank by the Institute in the approved format shall be acceptable. The validity period would be 45 days beyond the final bid validity period.

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37		Pg.No.20	The bidder should not have been blacklisted or debarred by any Central/ State/ Autonomous/ Public Agency during the last five financial years. In case blacklisted/ debarred bidder fills/ submits the bid/ being successful in bidding process awarded the job or during the execution of job the fact of being blacklisted/ debarred surfaced then the	As per CVC guidelines page.no 28 (verification of local content), sub clause(F) false declarations will be in breach of the Code of Integrity under rules 175(1)(I)(H) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rules 151(III)of the General Financial Rules along with such other action as may be permissible under law	No Change in the stipulation of the RFP.
38			You have shared Drwaings in form of PDF	We require Drawing in auto CAD format for the calculation purpose. Kindly share the drawings inform of AutoCAD file.	No Change in the stipulation of the RFP.
39		Pg No.31	Value of Rs. 526.9 Cr. Mentioned above sould not include cost of land	Employer may consider to obtain all the pre- construction statutory approvals & clearances before award of contract. This will save time during construction Experience of having successfully completed similar works during last 7yr ending last day of month pervious to the one in which applications are invited should be either of the following: Three similar completed work costing not less than the amount to 40% of the estimated cost Or Two similar completed works costing not less than amount of equal to 50% of the estimated cost. Or One similar completed works costing not less than the amount equal to 80% of the estimated cost. We are requesting you kindly follow the CVC guidelines and amend the RFP	No Change in the stipulation of the RFP.
40			Last date of submission is 14.07.2023	We are requesting to kindly extend the date of submission from 14 july upto 30 july	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
41		Pg no. 11	As per RFP, Last of submission is 14 July 2023	It is very hard to prepare the documentation of technical submission in such the time duration provided to prepare the concept design is very less for such a highly prestigious project of this large magnitude.	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
42		Pg no.32	The ratio of weightages for technical score and financial evaluation will be 30:70 (Thirty-Seventy). The Method of selection will be Quality and Cost Based selection (QCBS).As is said earlier the technical bid will be evaluation in two stages.	In EPC Contracts there is no as such guideline of QCBS(30-70) in selection process. So we are humbly request you to kindly removed the critetia.	No Change in the stipulation of the RFP.
43		Pg. No. 16	"Technical Bid Stage-1 "Point 4 Average annual financial turnover of Minimum Rs. 2000 Cr. or more during the last 3-financial year 2019-20, 2020-21, 2021-22 duly certified by a practicing Chartered Accountant with UDIN.	According to CVC guidelines for Civil and Electrical works Financial turnover for last 3 years should be at least 30% of project cost.	No Change in the stipulation of the RFP.
44		Pg no. 20	As per RFP point C.23joint Venture and Consortium is not permitted.	As Engineering contractors face increasing uncertainty with EPC (Engineering, Procurement, Construction) projects because of increased project complexity and scale. Due to these circumstances, joint venture contracts should be allowed in EPC contractors to reduce risks and increase profits.	No Change in the stipulation of the RFP.
45		Pg No. 34	As per RFP Point 3 Technical Experience of having successfully compled similar project's EPC contract during last Five years ending on previousday of last day of submission of tender. 1. Similarworks shall mean the works detailed at Sl.1 of this chapter 5. 2. Value of Rs. 526.9 Cr. Mentioned above should not include cost of land.	CVC Guidelines "Experience of having successfully completed similar works during last 7Years ending last day of month previous to the one in which applications are invited should be either of the following."Three similar completed works costing not less than the amount equal to 40% of the estimated cost. OR Two similar completed works costing not less than the amount equal to 50% of the estimated cost. OR One similar completed works costing not less than the amount equal to 80% of the estimated cost.	No Change in the stipulation of the RFP.
46		Pgno.1193	As per RFP Approved Make list	As per GOI Specification in make list should follow Make in India products only.	No Change in the stipulation of the RFP.
47			Suggestion	Please provide drawing in Cade format.	No Change in the stipulation of the RFP.

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48	CHAPTER 5 Clause 1.b & Clause 3.1.ii	Page no. 31	Project Specific Eligibility criteria Experience of having successfully completed similar projects' EPC contract during last Five years ending on previous day of last day of submission of tender. The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr. EPC Contract ofsimilar scope means Design, Procurement, Engineering and Construction of Project Comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R & D) institutions and other such institutional campuses having facilities like: Institutional Buildings, Ancillary Buildings, Residential Facilities	Kindly request you to Modify/change the clause as per CPWD norms. "Experience of Following Having Substantially*/ Sucessfully Completed any InstitutionalProject/ Commercial Building/ITTowers/ Hospital Buildings/ Multi-storied Residential Buildings in India on Turn-key basis/ EPC/ item Rate during Last 7 years ending 31.05.2023. The value of Executed work shall be brought to Current actual value at simple Rate of 7% increase per annum Experienc of following having Successfully completed Contract: a) One Similar works of 80% (Rs. 421.52 Crores) of tender notice value. b) Two Similar work of 50% (Rs. 263.45 Crores) of tender notice value. (or) c) Three Similar work of 40% (Rs. 210.76 Crores) of tender notice value.	No Change in the stipulation of the RFP.
49	CHAPTER 5 Clause 1.b	Page no. 31	The bidder shall have experience of executing G+14 structure with a min. height of 45 meter and shear wall technology.	We request you to kindly consider RCC Framed structure with G+14 Floors. Consider Still floors/ Basement floors also as a floor.	Stilt/ Basement floors can be considered.
50	CHAPTER 5 Clause 1.b	Page no. 31	The following ISO certification shall be required with latest audited report as mandatory * ISO 45001 * OSHAS 18001 * ISO 27001	In general practice, ISO 9001, ISO 45001 and ISO 14001 are the most relevant Standards for the construction industry, which Contracting firms possess. With reference to the requirement asked in the tender, We request you to consider our proposal of availing the ISO 27001 Certificate once as a successful bidder.	No Change in the stipulation of the RFP. However, further breakup of marks under ISO compliance vide Clause no. 3.1 - ix. (ref. page no. 35) shall be considered as follows - Bidder should possess all ISO certificates and latest audited report mentioned underneath and valid as on date. - ISO 45001 - 2 marks - OSHAS 18001 - 2 marks - ISO 27001 - 1 mark Note - Having ISO 27001 for making oneself eligible is not mandatory.
51	CHAPTER 5 Clause 1.b	Page no. 32	Requirementof experience in 5D BIM Modelling with LOD 500 in an EPC contract.	Request you to consider completed/ ongoing EPC project experience in 5D BIM Modelling with LOD 500.	No Change in the stipulation of the RFP.
52	CHAPTER 5 Clause 2	Page no. 32	Experience in Executing Projects with more than 45-meter heights OR min criteria to execute G+14 Residential multi storied building and commercial/institutional building with Floor-to-Floor height more than 4.5 meters.	Request you to consider Experience in executing Residential multi storied building/ commercial/ institutional building Projects with more than 45-meter heights overall.	Project Executed with Building G+14 structure with a min. height of 45 meters shall be considered irrespective of the typology of the building and floor-to-floor height. Selection shall broadly be following the marking system stipulated from Clause 3 to Clause 5 vide page no. 34 to 37 of the RFP.
53	CHAPTER 5 Clause 3	Page no. 35	Average annual financial turnover of Minimum Rs. 2000 Cr. Or more during the last 3- financial years 2019-20, 2020-21, 2021-22 duly certified by a practicing chartered Accountant with UDIN.	Request you to consider Average annual financial turnover of Minimum Rs. 1000 Cr. Or more during the last 3- financial years 2029-20, 2020-21,2021-22 duly certified by a practicing Chartered Accountant with UDIN.	No Change in the stipulation of the RFP.
54	CHAPTER 5 Clause 3	Page no. 35	Bidder having previous Experience of executing an EPC project for IIT, IIM, AIIMS of similar scope having minimum value of Rs. 526.9 Cr. For a Single EPC Project.	Request you to consider Completed/Ongoing Project experience in executing an Institutional project for IIT, IIM, AIIMS without any monetary limit.	No Change in the stipulation of the RFP.
55	Financial Credential	Pg no. 35	Average annual financial turnover of Minimum Rs. 2000 Cr. Or more during the last 3- financial years 2019-20, 2020- 21, 2021-22.	The Average annual financial turnover is not in line with the CVC Guidelines. The CVC Guideline demands for Turnover equals (or less) to the estimated project value whereas criteria in the proposed projects demands turnover of more than 7 times. Also, proposed project estimate is Rs. 526.9 Cr which needs to be completed in 2 years. So it demands turnover of only Rs. 263.45 Cr per year. So comparing with project demand, the turnover criteria is almost 10 times. We request to consider Turnover Criteria equal to estimate cost.	No Change in the stipulation of the RFP.

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56	Eligibility Criteria:	Pg no31	Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like: I. Institutional Buildings • Academic/ Training/ Resource • Complex Library building • Administrative Block/ Office Complex/ Board rooms/ Seminar halls • Smart classrooms II. Ancillary Buildings • Laboratory/ Workshop/ Studios • Auditorium/ convention Centre • Sports/Recreational Complex/ Community Centre • Cafeteria/ Student Activity Centre/ Utility Complex. III. Residential Facilities • Residential Complex • Hostels/ Guest House Complex	We have experience of completing institutional projects like IIM Ahmedabad & other reputed institutional which demands highest quality. However, the proposed criteria will limit many prospective and capable bidders which will weaken the competition. We request for following amendments. Kindly allow project completion under EPC/Turnkey contract Kindly allow Commercial Building Experience for Qualification.	No Change in the stipulation of the RFP.
57	Eligibility Criteria:	Pg no. 31	b. Project Specific Eligibility Criteria The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr.	Kindly allow project completion under EPC/Turnkey contract	No Change in the stipulation of the RFP.
58	Eligibility Criteria:	Pg no. 31	b. Project Specific Eligibility Criteria The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr.	We understand that criteria mentioned under this clause can be fulfilled in similar projects or any other project too. Pls confirm.	No Change in the stipulation of the RFP.
59	Eligibility Criteria:	pg no. 32	Requirement of experience in 5D BIM Modelling with LOD 500 in an EPC contract.	We request you to accept experience in 5D BIM Modelling with LOD 300 or allow us to submit MOU with specialised agency for the qualification.	No Change in the stipulation of the RFP.
60	Eligibility Criteria:	Pg no. 31	The following ISO certification shall be required with latest audited report as mandatory – ➢ ISO 45001 ➢ OSHAS 18001 ➢ ISO 27001	ISO 45001, OSHAS 18001 is applicable for the construction companies, ISO 27001 is mainly for the IT Industry so we request you remove the same pls.	No Change in the stipulation of the RFP. However, further breakup of marks under ISO compliance vide Clause no. 3.1 - ix. (ref. page no. 35) shall be considered as follows - Bidder should possess all ISO certificates and latest audited report mentioned underneath and valid as on date. - ISO 45001 - 2 marks - OSHAS 18001 - 2 marks - ISO 27001 - 1 mark Note - Having ISO 27001 for making oneself eligible is not mandatory.
61	Chapter 2, Clause A.3.4	Page no. 12	the EPC Contractor will be selected through QCBS (Quality and Cost Based selection) system. As per CVC Guidelines (Manual for procurement of works) page no. 49, Clause no. 3.2.5, Point no. iv), selection of the contractor is based on open competitive bidding. All project parameters such as the contract period, price adjustments and technical parameters are to be clearly stated upfront, and short-listed bidders are required to specify only the lump sum price for the project	The selection method mentioned in RFP is not as per CVC guidelines, so we are requesting you kindly change the selection criteria from QCBS system to lowest price bid system.	No Change in the stipulation of the RFP.
62	Chapter 5, Clause 1 b	page no. 31	Project specific criteria or pre-qualification criteria: The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr.	As per CVC Circular office memorandum No. 12-02-1-CTE-6 (central vigilance commission) for prequalification criteria (PQ) Clause no. 05, Sub Clause of (ii), the following points must be kept in view while fixing the eligibility criteria: Experience of having successfully completed similar works during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following: Three Similar completed works costing not less than the amount equal to 40% of the estimated cost. Or Two similar completed works costing not less than the amount equal to 50% of the estimated cost. Or One similar completed works costing not less than the amount equal to 80% of the estimated cost. We are requesting you kindly follow the CVC guidelines and amend the RFP	No Change in the stipulation of the RFP.

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63		Page no. 16	Average annual financial turnover of minimum Rs. 2000 cr. Or more during the last 3- financial years 2019-20, 2020-21, 2021-22 duly certified by a practicing chartered accountant with UDIN	As per CVC guidelines the average annual turnover should be at least 30% of project cost. Kindly obey the CVC guidelines and amend the same.	No Change in the stipulation of the RFP.
64		Page no. 11	Last date of submission is 14 July 2023.	it is very hard to prepare the documentation of technical submission in such the time duration provided to prepare the concept design is very less for such a highly prestigious project of this large magnitude. The last date of submission to be extended up to 14 August 2023.	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
65		Page no. 34	Bidder having previous experiences of executing an EPC project for IIT, IIM, AIIMS of similar scope having minimum value of RS. 526.9 Cr. For a single EPC project.	Here it is pertinent to state that EPC contracts came into existence since 2016 and it is very difficult to produce complete certificate of a single project of such a large magnitude. Hence it is mandatory to amend the clause and allow bidders to produce completion certificates of non-EPC contracts and substantially or 80 % completed any EPC projects (building) without considering minimum value of RS. 526.9 Cr. For a single project also.	No Change in the stipulation of the RFP.
66		page no. 17	All those Bidders, who qualify in Technical Bid (Stage-I) will have to make a presentations before the jury constituted by IIMI as per the details/heading explained in chapter-5. The copy to presentation to be uploaded on the CPP portal while submission of technical bid (stage-2) envelope. The presentation by each bidder should be of a minimum of 30 minutes in duration. Bidders have to make their own arrangement for making the presentations.	This tender is not for Architect and consultant for which presentation of the project is mandatory.The presentation to be presented by the bidders is of project execution and not only for drawings and design.	No Change in the stipulation of the RFP.
67			After reviewing the RFP , it is found that the clause pertaining to “secured Advance” is not included.	As per standard practice. Secured advance is given to the contractor against materials delivered at site in all the EPC projects. Hence , it is mandatory to include “ Secured Advance” clause for assisting the contractor in maintaining the cash flow.	No Change in the stipulation of the RFP.
68	Clause no. 17.8	P-143	pertaining to “price Adjustment” has been deleted.	As per the standard practice, the above clause is included in all the EPC contracts having time period more than 12 months.Hence looking to the magnitude of the project, it is mandatory to include “price Adjustment” clause to facilitate legitimate changes in costs.	No Change in the stipulation of the RFP.
69				After perusing the RFP document, we strongly feel that the standard procedures laid down for EPC contracts have been ignored with an intention to give undue advantage to particular bidders. This tender in its wisdom clearly seems to be made for same party all conditions mentioned above need to be necessarily followed by the institute. Kindly scrape the tender and refloat with all modified conditions as per CVC guidelines and standard tender procedure of GOI. This relaxation in the Physical condition of the contract enhances the number of bidder’s participation and helps in development of healthy environment for competitive Bidding process by allowing more bidders to participate in Bidding. In view we hope you will accept our inclusion/ modifications of all the above referred points and make required changes to the tenders documents. In anticipation, we remain.	No Change in the stipulation of the RFP.
70		13	Online bids from amongst the eligible EPC Contractor firms/ agency/ enterprise are invited under two bids system for Appointment of EPC Contractor For construction of Group VIII Projects Comprising of multi-storey hostel blocks, academic building, faculty offices & Apartments and other associated Infrastructure at IIM Indore.	Online bids from amongst the eligible Contractor firms/agency/enterprise are invited under two bids system for Appointment of EPC Contractor For construction of Group VIII Projects Comprising of multi-storey hostel blocks, academic building, faculty offices & Apartments and other associated Infrastructure at IIM Indore.	The EPC Contractor firms/ agency/ enterprise means Contractor firms/ agency/ enterprise having experience in EPC Contracts.

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71		13	The eligible EPC Contractor firms/agency/enterprise having experience in executing works for a similar project during the last 5 years ending the previous day of last date of submission of RFP are requested to participate in the tendering process. A similar project here means “Execution including Design/Engineering, Procurement and Construction / development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like:	The eligible EPC Contractor firms/agency/enterprise having experience in executing works for a similar project during the last 5 years ending the previous day of last date of submission of RFP are requested to participate in the tendering process. A similar project here means Construction of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses	No Change in the stipulation of the RFP.
72		15	B.14 The technical bid (stage-1) will be opened online first on due date and time, as mentioned above. The time and date of opening of Technical bid (stage-2) and financial bid of bidders qualifying the technical bid (stage-1) & financial bid respectively will be uploaded on CPPP	B.14 The technical bid (stage-1) will be opened online first on due date and time, as mentioned above. The time and date of opening of financial bid of bidders qualifying the technical bid (stage-1) & financial bid respectively will be uploaded on CPPP.	No Change in the stipulation of the RFP.
73		16	ix. Certificate(s) in respect of LEED/ GRIHA certified projects.	ix. Certificate(s) in respect of GREEN BUILDING certified projects.	No Change in the stipulation of the RFP.
74		17	Technical Bid (Stage-2) (Presentation) – All those Bidders, who qualify in Technical Bid (Stage-I) will have to make a presentation before the jury constituted by IIMI as per the details / heading explained in chapter-5. The copy of presentation to be uploaded on the CPP portal while submission of technical bid (stage-2) envelope. The presentation by each bidder should be of a minimum of 30 minutes in duration. Bidders have to make their own arrangements for making the presentations. The following documents should be duly attested, and scanned copies uploaded on CPP portal on or before the due date mentioned in RFP. Further, hard copies of these documents are also required to be submitted as per the modality & due date mentioned in the RFP: Copy of presentation proposed to be made before jury (time limit – within or maximum 30 minutes.; language – Hindi/English).	Kindly delete this stage and clause.	No Change in the stipulation of the RFP.
75		25	Minimum number of Personnel to be deployed on site by EPC Contractor during execution of the Project of Group-VIII Project.	Kindly add, if bidder does not have in-house designing facility or team than may submit MOU with capable designing firm.	No Change in the stipulation of the RFP.
76		29	C. Minimum number of Plants and Equipment’s to be deployed by EPC Contractor during execution of the Group-VIII Project as mentioned below but not limiting to -	As discussed in the Pre bid meeting it should be amended to Tentative numbers of plant and Equipment’s as the quantity given in the RFP in on very higher side. Bidder needs to provide adequate number of plant and equipment’s as per site requirement and to the satisfaction of Engineer In-charge. Kindly add, if bidder does not have any machinery as per list than may submit MOU.	Please refer Chapter 4 Clause C. page no. 29 of the RFP.
77		31	Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like:	Completed Institutional Building for University/ Higher Education/ Research and Development Centre in following category- One project having project cost at completion minimum of 80% of estimated cost (including GST). OR Two project having project cost at completion minimum of 50% of estimated cost (including GST). OR Three projects having project cost at completion minimum of 40% of estimated cost (including GST). The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to last date of receipt of applications for Tenders. Similar works shall mean- Construction work of Institutional campus of minimum 30 Acres with having facilities of Academic Block, Hostel Blocks, Residential Blocks, external development such as Road work, drainage, Sewerage and specialized services such as HVAC, Fire Fighting, Fire Alarm system, Lift, Data and Network, PA System, CCTV, UPS, External Electrical work, Sub-station, STP, WTP,ETP all executed under one agreement in India.	No Change in the stipulation of the RFP.

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78		31	Project Specific Eligibility Criteria • The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr. • The bidder shall have experience of executing G+14 structure with a min. height of 45 meter and shear wall technology. • Completed work shall be considered for qualifying and the contractor shall submit the work completion certificate along with the work value. • Work experience as a prime contractor will only be considered. • Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold rating for a project having construction area not less than 45000 sqm. • Solvency requirement 40% of the Contract Price. • The following ISO certification shall be required with latest audited report as mandatory – ➢ ISO 45001 ➢ OSHAS 18001 ➢ ISO 27001	Project Specific Eligibility Criteria • The bidder shall have experience in Single Non-Residential Building EPC Contract with min 50% of estimated cost. • The bidder shall have experience of executing G+10 (instead of G+14) structure with a min. height of 45 meter. • Completed work shall be considered for qualifying and the contractor shall submit the work completion certificate along with the work value. • Work experience as a prime contractor will only be considered. • Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold / Assocham 3-Gem rating for a project having construction area not less than 45000 sqm. • Solvency requirement 40% of the Contract Price.	For ISO Certification - Please refer to clarification Sr. no. - 50 Rest no change in the stipulation of the RFP.
79		32	• The bidder shall own Batching plant of min. 60 cum/hr. capacity and tower cranes (min 5 required) – height 50m, tip load 2 ton at 20m radius. • Requirement of experience in 5D BIM Modelling with LOD 500 in an EPC contract. • The bidder shall submit documents showing profitability for more than 3 years amongst the last 5 years.	• The bidder shall own Batching plant of min. 60 cum/hr. capacity and tower cranes (min 5 required) – height 35m 50m, tip load 2 ton at 20m radius. • All these are bought out items and can be bought as required for site. • The bidder shall submit documents showing profitability for more than 3 years amongst the last 5 years.	No Change in the stipulation of the RFP.
80		32	2. OVERALL EVALUATION PROCESS & SELECTION Bidding Process will be a two-bid system which comprises of technical bid and financial bid. Further the technical bid will be subdivided into two stages namely technical bid stage-1 and technical bid stage-2. The ratio of weightages for technical score and financial evaluation will be 30:70 (Thirty: Seventy) The Method of selection will be Quality and Cost Based Selection (QCBS). As is said earlier the technical bid will be evaluated in two stages,	2. OVERALL EVALUATION PROCESS & SELECTION Bidding Process will be a two-bid system which comprises of technical bid and financial bid.	No Change in the stipulation of the RFP.
81		32	Stage-1 - will be based on • Bidder's Company Profile / credentials / Years of establishment • Work experience in similar types of Projects as detailed in Eligibility Criteria above. • Liasoning capability of Bidder • Company Turnover /Bid Capacity / Work in hand • Bidders' performance on the previous project • Solvency Eligibility • Financial health of the company • Compliance of ISO standards • Green Building Projects Executed by Bidder • Experience in Executing Projects with more than 45-meter heights OR min criteria to execute G + 14 Residential multi storied building and commercial/institutional building with floor-to-floor height more than 4.5 meters. Stage – 2 – will be based on the following. • Technical Resources Associates planned by the Bidder. • Expertise consultant association with the Bidder • Project Understanding and Strategy of execution of project for timely completion. • Material Procurement Strategy in-terms of resourcing • Skilled and unskilled manpower deployment schedule • Plant and machinery planned by Bidder. • Approach towards safe working environment and HSE standards planned by the bidder. • Bidder's vision / Technical Presentation / approach towards the execution & the same will be evaluated through the	Stage-1 - will be based on • Bidder's Company Profile / credentials / Years of establishment • Work experience in similar types of Projects as detailed in Eligibility Criteria above. • Liasoning capability of Bidder • Company Turnover /Bid Capacity / Work in hand • Bidders' performance on the previous project • Solvency Eligibility • Financial health of the company • Compliance of ISO standards • Green Building Projects Executed by Bidder • Experience in Executing Projects with more than 45-meter heights OR min criteria to execute G+10 Non-Residential multi storied building or commercial/institutional building • Technical Resources Associates planned by the Bidder. • Expertise consultant association with the Bidder. • Project Understanding and Strategy of execution of project for timely completion.	Project Executed with Building G+14 structure with a min. height of 45 meters shall be considered irrespective of the typology of the building and floor-to-floor height. Selection shall broadly be following the marking system stipulated from Clause 3 to Clause 5 vide page no. 34 to 37 of the RFP. Rest no change in the stipulation of the RFP.
82			• After that the financial bid will be opened for the qualified bidders of the respective stage only. The weightage would be as follows. a. Technical Bid • Stage-1 (Bidder's profile/credentials/work experience) =10% • Stage-2 (Presentation) = 20% b. Financial Bid (i.e., cost) = 70% The bidder scoring the highest marks after final evaluation will be considered for selection as an EPC Contractor after due negotiation, if considered prudent by IIM Indore.		

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83			Note: i. The broad methodology brief is as follows: “Proposal with the lowest cost may be given a financial score of 100 (Hundred) and other proposals given financial scores that are inversely proportional to their prices with respect to the lowest offer. Similarly, proposals with the highest technical marks (as allotted by the evaluation committees) shall be given a score of 100 (Hundred) and other proposals be given technical score that are proportional to their marks with respect to the highest technical marks. The total score, both technical and financial, shall be obtained by assigning respective weightages as mentioned in this RFP and they will be ranked based on the combined score. The proposal obtaining the highest total combined score in evaluation of quality and cost will be ranked as H-1 followed by the proposals securing lesser marks as H-2, H-3 etc. The proposal securing the highest combined marks and ranked H-1 will be considered for further processing and may be considered for recommendation for award of contract.” ii. In the event two or more bids have the same score in final ranking, the bid with highest technical score will be H-1.	After technical evaluation of stage - I, financial bid will be open only of those who qualify the stage-I evaluation. Lowest quoted by the bidder shall be selected for this EPC contract.	No Change in the stipulation of the RFP.
84		34 To 37	3. TECHNICAL BID (STAGE-1) 3.1 The eligible bidder will be shortlisted by IIM Indore based on the marks obtained against the under-mentioned parameters.	Kindly delete this marking system, this bid should be Technical and Financial evaluation system.	No Change in the stipulation of the RFP.
85		90 to 91	A. Milestone Payment for Group-VIII Project H. Statutory Approvals as listed in Tender – 2% To be paid after obtaining statutory approvals as per List of Approvals. I. Final Completion Certificate – 10% Handing over of all Documents related to statutory approvals, Occupancy Certificate, Survey reports, OEM Manuals/ Certificates for equipment’s, Guarantee/ Warranty Certificates, as built drawings etc. as desired by Authority/ Authority Engineer. J. AMC – 3% To be paid in five years (year after year) as per AMC after 3 years of Defect Liability Period. FY-1-0.4% FY-2-0.5% FY-3-0.6% FY-4-0.7% FY-5-0.8%	Kindly make Statutory Approval as listed in Tender as 1% Please delete this clause, as the bidder is required to submit Performance Guarantee of 5% and security Deposit of 5% which is 10% of the awarded value. Kindly make payment of AMC in Eight years including Defect Liability Period. FY-1- 0.4% FY-2- 0.4% FY-3- 0.4% FY-4- 0.4% FY-5- 0.35% FY-6- 0.35% FY-7- 0.35% FY-8- 0.35%	(a) The defect Liability Period will also be covering the comprehensive AMC for the respective machinery, equipment, etc. enlisted in the RFP, apart from the 5 years CAMC mentioned in the RFP. (b)Rest No Change in the stipulation of the RFP.
86	RFPA.3.3 Mode of payment of Bid security	12 of 1352	Bidders will have to deposit the Bid Security through NEFT or RTGS only. Other instruments are not accepted on this account.	Request you to accept for EMD in the form of Bank guarantee. Also kindly share the format for EMD BG.	No Change in the stipulation of the RFP in case of Value of the Bid Security. However, the Bid security may be considered in the form of Bank guarantee from any scheduled commercial banks subject to verification from issuing bank by the Institute in the approved format shall be acceptable. The validity period would be 45 days beyond the final bid validity period.
87	RFPA.1.5 Compensation for delay	8 of 1352	@ 1% per week subject to a maximum of 10% of the accepted Tendered Value under this clause, to be computed on a per day basis after the contract period.	As per CPWD GCC 2022 for EPC Compensation for delay shall be 0.1875% per Week of Delay (ie. 0.75% per Month of Delay). Hence we request you to reduce the compensation of delay from @ 1% per week to 0.1875% per week.	No Change in the stipulation of the RFP.
88	RFP CHAPTER 7 MILESTONE PAYMENTA.A. Milestone Payment for Group-VIII Project	72 of 1352	g Occupancy Readiness - Snagging and de-snagging. 5% Clearance of snagging and de-snagging list.	With holding 5% of CV till project Completion and clearance of Snagging and De- Snagging list, will seriously affect the cashflow of the contractor. Hence request you to delete this item and add 5% to the S.No C. Shell & Core Works	No Change in the stipulation of the RFP.
89	RFP CHAPTER 7 MILESTONE PAYMENTA.A. Milestone Payment for Group-VIII Project	72 of 1352	H Statutory Approvals as listed in Tender 2% To be paid after obtaining statutory approvals as per List of Approvals.	The list of approvals shall include pre construction, construction and post construction approvals. Hence with holding 2% of CV till receipt of all the approvals which may extend beyond the construction duration will seriously affect the cashflow of the contractor. Hence request you to delete this item and add 2% to the S.No C. Shell & Core Works	No Change in the stipulation of the RFP.
90	RFP CHAPTER 7 MILESTONE PAYMENTA.A. Milestone Payment for Group-VIII Project	72 of 1352	I Final Completion Certificate 10% Handing over of all Documents related to statutory approvals, Occupancy Certificate, Survey reports, OEM Manuals/ Certificates for equipment’s, Guarantee/ Warranty Certificates, as built drawings etc. as desired by Page 91 of 1352 Authority/Authority Engineer.	With holding 10% of CV till project Completion will seriously affect the cashflow of the contractor. Hence request you to delete this item and add 10% to the S.No C. Shell & Core Works	(a) The defect Liability Period will also be covering the comprehensive AMC for the respective machinery, equipment, etc. enlisted in the RFP, apart from the 5 years CAMC mentioned in the RFP. (b)Rest No Change in the stipulation of the RFP.

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91	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS17.4Stage Payment Statement for Works	141 of 1352	The amount for the completed work shall not be less than Rs. 20 Cr (twenty crore) for each RA Bill claimed by EPC contractor.	The amount mentioned is so high and shall seriously affect the cashflow of the EPC Contractor. Hence we request you to reduce the minimum bill value to Rs. 15 Cr (Fifteen Crore) and also waive off this clause for first 3 Running Bills and last three running bills. Accordingly modify this clause as below. "The amount for the completed work shall not be less than Rs. **15** Cr (**Fifteen**) for each RA Bill **except first 3 RA Bills and last three RA bills** claimed by EPC contractor."	No Change in the stipulation of the RFP.
92	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS17.4 Stage Payment Statement for Works	141 of 1352	The amount for the completed work shall not be less than Rs. 20 Cr (twenty crore) for each RA Bill claimed by EPC contractor.	The amount mentioned is so high and shall seriously affect the cashflow of the EPC Contractor. Hence we request you to delete this clause.	No Change in the stipulation of the RFP.
93	ARTICLE 7 PERFORMANCE SECURITYARTICLE 17 PAYMENTS17.3 Procedure for estimating the payment for the Works.	140 of 1352	17.3.2 The EPC Contractor shall make its claim for interim payment for the stages completed till the end of the month for which the payment is claimed, valued in accordance with Clause 17.3.1, and supported with necessary particulars and documents in accordance with this Agreement.	Payment only at the completion of milestone seriously affect the cashflow of the EPC Contractor. Hence request you to allow milestone payment on **Pro-rata basis.**	No Change in the stipulation of the RFP.
94	RFPA.1.7 Bid Secuirty	10 of 1352	Rs. 10.538 Crores /- (Rupees Ten Crore Fifty-Three Lakh Eighty Thousand only)	EMD value mentioned is 2% of the estimated contract value. Generally EMD shall be 1% of the estimated contract value. Hence request you to change to **1% of Estimated Contract Value** (**ie. 5.269 Cr**)	No Change in the stipulation of the RFP.
95	RFP CHAPTER 7 MILESTONE PAYMENTA.A. Milestone Payment for Group-VIII Project	72 of 1352	Milestone Payment- Days column	We presume that the days mentioned in the milestone is tentative and for guidance purpose. The Contractor shall be allowed to propose their own schedule matching the work methodology meeting the project duration.	No Change in the stipulation of the RFP.
96	RFPC.3 III GST	17 of 1352	The Bidders are required to quote a consolidated amount of Price for the entire scope of work as detailed in this RFP except GST which will be reimbursed at actuals as applicable, in the prescribed format.	Request you to rephrase as follows: The Bidders are required to quote a consolidated amount of Price for the entire scope of work as detailed in this RFP except GST which will be reimbursed as applicable, in the prescribed format.	No Change in the stipulation of the RFP.
97	RFPC.3 III VGST increase	18 of 1352	In the event of delay attributable to the EPC Contractor & there is an increase in GST rate then the reimbursement towards GST shall be restricted to the rate as prevailing during currency of the original contract.	The change in Taxes by the government is beyond the control of the Contractor and cannot be envisaged. Hence we request you to delete this clause.	No Change in the stipulation of the RFP.
98	RFPAnnex - IV (Schedule-A)Environmental Clearances	188 of 1352	The contractor has to witness the documents available with IIM Indore, during the per- bid meeting.	We presume that the environmental clearance is already available and shall be shared during the prebid meeting. Please confirm.	Refer Clause 6.6 stipulated in the RFP.
99	RFPCONSTRUCTION STAGE:Viii	61 of 1352	Plot development including site clearing, cutting of trees and re-planting the same as per norms of Environmental clearance obtained by the Authority.		
100	RFPChapter 6- Scope of WorksCoordination / Obtaining necessary statutory and other approvals from Local, State & Central Government agencies, etc.	41 of 1352	The Group VIII Project is proposed to be executed inside the premise of IIM Indore. Necessary approvals and obtaining respective certificates/ clearances is in the scope of the EPC Contractor. The exhaustive list of approvals/ certifications/ clearances required is enlisted in Chapter6 Clause 6.6 but not limited to. The exhaustive list included is dynamic and it may change as per government rules and regulations during the currency of the Contract. The EPC Contractor before submitting the quote shall consider/ factor in the financial implication for obtaining requisite statutory approvals/ certifications/clearances as required in their quoted price.	It is requested to confirm the status of all the project related approvals for commencement of the works. Bidder assumes that all the project approvals shall be obtained by the Employer including but not limited all government/statutory apporvals in relation to the project shall be obtained by Employer (including ▫ Construction Permit, if required , Environmental clearances, AAI approvals, Forest clearances/ defence approvals NOC from Chief Fire Officer ▫ NOC from Lift Inspector where lifts are provided ▫ Occupancy certificate ▫ Platinum Rated Green Building Certification Minimum for the building). In the event of delay by the Employer, then the EMployer shall grant suitable extension of time for the execution of the work and adjustment in the contract price along with cost compensation for such delays. Bidder also requests that all statutory approvals shall be	Refer Clause 6.6 stipulated in the RFP.
101	RFPChapter 6- Scope of WorksCoordination / Obtaining necessary statutory and other approvals from Local, State & Central Government agencies, etc.	42 of 1352	Any additional new approvals from Government/ statutory agencies during the currency of contract and up until handing over of the Group VIII Project, which has not been enlisted, shall be forming the part of EPC Contractor's scope. EPC Contractor has to obtain all those required including additional approvals, certifications, clearances, NOC's, permissions, etc. at their own risk and cost. Necessary documentation, simulations, etc. shall be forming the part of the EPC Contractor's scope. All statutory fees, charges, incidental expenses, consultancy fees, laisoning fees, etc. will be solely borne by the EPC Contractor and no additional payment/ reimbursement would be made by IIM Indore on this account.		
102	RFPChapter 6- Scope of WorksCoordination / Obtaining necessary statutory and other approvals from Local, State & Central Government agencies, etc.	42 of 1352	The Institute has initiated for necessary approvals for Group VIII Projects from Local Authority/ Panchayat by paying necessary initial payments. The EPC Contractor is required to pursue with this authority for obtaining required clearances/certifications/ permissions and need to bear any further cost in this regard.		
103	RFP6.5The EPC Contractor's Roles and Responsibilities will include:	52 of 1352	The EPC Contractor shall take all necessary statutory approvals from all the concerned authorities. Preparation and submission of drawings / materials as per norms or any other body or as per municipal norms and models for obtaining these approvals will be done by the EPC Contractor at no additional cost. The EPC Contractor shall prepare all study reports, drawings, physical models, simulations, and assessment reports etc. which are required for clearance by all above bodies/authorities.		

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104	RFP6.6Liaisoning & Approvals (Obtaining approvals, certifications, clearances, NOC's, permissions, etc.):	62 of 1352	a) All necessary approvals, from local/state/central government authority for obtaining necessary certifications, permissions, clearances, statutory approvals/NOC's during, pre and post construction, is integral part of this contract for which all statutory fees, charges, incidental expenses, consultancy fees, laisoning fees, etc. will be solely borne by the EPC Contractor and no additional payment/ reimbursement would be made by IIM Indore on this account.	compensation for such delays. Bidder also requests that all statutory approvals shall be obtained by Employer. Therefore, requests to add: "It is further agreed that the Contractor shall be responsible for statutory approvals necessary for engagement of his workmen at site to the extent of 1.1 (a) to (h) only as per Schedule E. However, all other government/statutory approvals in relation to the project shall be obtained by Employer and in the event of any delays in the same, shall entitle the Contractor for equitable extension of time and adjustment in Contract Price."	
105	RFP6.6Liaisoning & Approvals (Obtaining approvals, certifications, clearances, NOC's, permissions, etc.):	62 of 1352	a) All necessary approvals, from local/state/central government authority for obtaining necessary certifications, permissions, clearances, statutory approvals/NOC's during, pre and post construction, is integral part of this contract for which all statutory fees, charges, incidental expenses, consultancy fees, laisoning fees, etc. will be solely borne by the EPC Contractor and no additional payment/ reimbursement would be made by IIM Indore on this account. b) EPC Contractor to follow the trees cutting and re-plantation norms as per statutory norms. c) Payments related to the same shall be borne by EPC Contractor as all such liaisoning and coordination is in the scope of the EPC Contractor. Payments herein mean all statutory fees, charges, incidental expenses, consultancy charges for simulation, etc., is in the scope of EPC Contractor. Any additional new requirement during the currency of the contract period will be forming the part of EPC Contractor's scope. EPC Contractor has to obtain all such additional approvals also at their own risk and cost.		
106	RFP6.6Liaisoning & Approvals (Obtaining approvals, certifications, clearances, NOC's, permissions, etc.):	62 of 1352	d) Time required for such approvals is part of the Contract Period.		
107	RFP6.6Below is the list of statuary approvals required but not limited to-..	62 of 1352	Below is the list of statuary approvals required but not limited to-..		
108	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS9.4 Felling of trees9.4 Felling of trees	117 of 1352	The IIM Indore shall assist the EPC Contractor in obtaining the Applicable Permits for felling of trees to be identified by the IIM Indore for this purpose if and only if such trees cause a Material Adverse Effect on the construction of the Project. The cost of such felling and of the compensatory plantation of trees, if any, shall be borne by the EPC Contractor.	Only owner can apply for Tree Cutting and Tree Transplantation and EPC Contractor cannot do the same on behalf of the Owner. Hence we request you to amend the clause as follows. The **IIM Indore** shall be obtaining the Applicable Permits for felling of trees to be identified by the IIM Indore for this purpose if and only if such trees cause a Material Adverse Effect on the construction of the Project. The cost of such felling and of the compensatory plantation of trees, if any, shall be borne by **IIM Indore**.	RFP Clause 6.6 (b) is hereby deleted.
109	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT10.1 Obligations prior to commencement of Works	119 of 1352	10.1.4 The EPC Contractor shall compute, on the basis of the Drawings prepared in accordance with Clause 10.2.7, and provide to the Authority Engineer, the detailed quantities, in respect of the various items of work specified in Schedule-G and comprising the Scope of the Project. The Parties expressly agree that these details shall form the basis for estimating the interim payments for the Works in accordance with the provisions of Clause 17.3. For the avoidance of doubt, the sum of payments to be computed in respect of all the items of work shall not exceed the Contract Price, as may be adjusted in accordance with the provisions of this Agreement.	There is no Clause as Clause 10.2.7. Hence request to delete this point.	No Change in the stipulation of the RFP.
110	RFP6.9Block Wise Scope of work Matrix:	67 of 1352	1.01 Demolition	Please provide the details and drawings of the buildings/ structures to be demolised.	The participants of the pre-bid meeting/ conference have been shown the actual site phyiscally.
111	RFPGeneral			Request to share the Autocadd drawing for working purpose	No Change in the stipulation of the RFP.
112	RFPChapter 6- Scope of WorksPre-Construction Stage Master Design Scope	41 of 1352	Note - The structural design of the buildings under the scope of work shall be as per BIS 1893 (Draft version in circulation for comments by BIS vide letter no. CED 39/T10 dated 26th April 2023).	Since the version circulated is a draft, there may be changes made on the fair & final version. Hence we presume the changes based on the draft version to final version shall be suitably compensated.	No Change in the stipulation of the RFP.
113	RFP Design Basis Report STRUCTURAL DBR9General	306 of 1352	9 Geotechnical Data & Foundation System Geotech Report for Project No 220036N Dated 20/08/2020 From Cengers Geotechnica Pvt Ltd, New Delhi is attached for reference only.	Request to share Geotech Report for Project No 220036N Dated 20/08/2020 From Cengers Geotechnica Pvt Ltd, New Delhi	Captioned report as available with the Institue is attached herewith.
114	RFP ARTICLE 4Stagewise Scope of Work of EPC Contractor for Group-VIII ProjectPre-Construction Stage BIM Modelling LOD 500	40 of 1352	After signing of agreement with IIMI, EPC Contractor shall prepare Building Information Model (BIM) for the Scope of work as per RFP. BIM (LOD 500) for Architectural, Structural, Interior, MEP, ELV, BMS, Networking services, External Development, External services, etc., to be created in line with the Design drawings, specification, DBR's and the other technical details. The said BIM (LOD 500) should include but not limited to the following - Drawings, BOQ, Elements, progressive coordinated drawings, clash detection work, walkthrough, rendering, as built drawings, etc. EPC Contractor to submit the same for approval to the IIM Indore within 45 days from the date of commencement.	As built Drawings shall be prepared only after the completion of the project. There is a typo mistake in the tender document. Request you to amend the bolded sentence as follows. "EPC Contractor to submit the same for approval to the IIM Indore within 45 days from the date of **Completion**"	As built drawings shall be prepared only after the completion of the project.
115	RFP Chapter - 6 Summary of Consequential Clauses in case of non-performanceChapter - 6BIM Modelling LOD 500	267 of 1352	After signing of agreement with IIMI, EPC Contractor shall prepare Building Information Model (BIM) for the Scope of work as per RFP. BIM (LOD 500) for Architectural, Structural, Interior, MEP, ELV, BMS, Networking services, External Development, External services, etc., to be created in line with the Design drawings, specification, DBR's and the other technical details. The said BIM (LOD 500) should include but not limited to the following - Drawings, BOQ, Elements, progressive coordinated drawings, clash detection work, walkthrough, rendering, as built drawings, etc. EPC Contractor to submit the same for approval to the IIM Indore within 45 days from the date of commencement. A recovery of Rs. 1000/- shall be made on per day basis in case of delay in submission of the above programme.		

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116	A.3.2Performance Guarantee		5 % of accepted tendered value (Awarded Value) on acceptance of bid. The performance guarantee may be submitted in the form of bank guarantee OR demand draft OR fixed deposit receipt from a scheduled bank which shall be refunded after 60 days of completion of contract/services as per complete scope of this RFP/issue of completion certificate whichever is later.	We find contradiction in the validity of Performance Guarantee/ Performance Security. We presume the validity of Performance Gurantee/ Performance Security is valid upto completion of contract/services as per complete scope of this RFP/issue of completion certificate ie. 24 Months. Please confirm.	No Change in the stipulation of the RFP.
117	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 7PERFORMANCE SECURITY	113 of 1352	The EPC Contractor shall, for the performance of its obligations hereunder, provide to the IIM Indore, within 15 (fifteen) days of the date of this Agreement, an irrevocable and unconditional guarantee, for an amount equal to 5% (five per cent) of the Contract Price, from a Bank in the form set forth in Annex-I of Schedule-F (the “Performance Security”). The Performance Security shall be valid until 60 (sixty) days of the expiry of the Defects Liability Period specified in GCC Clause 15.1.1.		
118	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS3Stamp Duty:	93 of 1352	For the services of the ‘EPC Contractor’, the stamp duty shall be as per the Indian Stamp Act, 1899 (as applicable to Madhya Pradesh). Any revision, if made by the govt. will be applicable at the time of execution of the agreements.	We presume any revision in the Stampduty from the last date of submission of tender to the date of agreement shall be reimbursed. Please confirm.	No Change in the stipulation of the RFP.
119	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS4.1.44.1 Obligations of the IIM Indore	107 of 1352	Delay in providing the Right of Way [or approval of GAD by IIM Indore / Authority Engineer, as the case may be,] in accordance with the provisions of GCC Clause 4.1.3 shall entitle the EPC Contractor to Damages in a sum calculated in accordance with the provisions of GCC Clause 8.3 of this Agreement and Time Extension in accordance with the provisions of GCC Clause10.5 of this Agreement. [For the avoidance of doubt, the Parties agree that the Damages for delay in approval of GAD by the IIM Indore/Authority Engineer for a particular phase/section/Building/Infra shall be deemed to be equal to the Damages payable under the provisions of GCC Clause 8.3 for delay in providing Right of Way.	GCC Clause 8.3 is "Protection of Site from Encroachments" and there is no clause provided in Article 8 for "delay in providing Right of Way". Request you to provide the clause for "delay in providing Right of Way" and update the reference.	Right of way is available, and is without encroachment.
120	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS4.1.44.1 Obligations of the IIM Indore	107 of 1352	Delay in providing the Right of Way [or approval of GAD by IIM Indore / Authority Engineer, as the case may be,] in accordance with the provisions of GCC Clause 4.1.3 shall entitle the EPC Contractor to Damages in a sum calculated in accordance with the provisions of GCC Clause 8.3 of this Agreement and Time Extension in accordance with the provisions of GCC Clause10.5 of this Agreement. [For the avoidance of doubt, the Parties agree that the Damages for delay in approval of GAD by the IIM Indore/Authority Engineer for a particular phase/section/Building/Infra shall be deemed to be equal to the Damages payable under the provisions of GCC Clause 8.3 for delay in providing Right of Way.	GCC Clause 10.5 refered here is "Incomplete Works" and the clause for Extension of time for completion is GCC Clause 10.4. Request you to update the same.	Right of way is available, and is without encroachment.
121	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS4.1.44.1 Obligations of the IIM Indore	107 of 1352	Notwithstanding anything to the contrary contained in this Agreement, the Parties expressly agree that the aggregate Damages payable under Clauses 4.1.4, 8.3 and 9.2 shall not exceed 3% (three per cent) of the Contract Price.	GCC Clause 8.3 is "Protection of Site from Encroachments" and there is no clause provided in Article 8 for "delay in providing Right of Way". Request you to provide the clause for "delay in providing Right of Way" and update the reference.	Right of way is available, and is without encroachment.
122	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS4.1.44.1 Obligations of the IIM Indore	107 of 1352	Notwithstanding anything to the contrary contained in this Agreement, the Parties expressly agree that the aggregate Damages payable under Clauses 4.1.4, 8.3 and 9.2 shall not exceed 3% (three per cent) of the Contract Price.	Request to remove the upper limit set for the obligation.	Right of way is available, and is without encroachment.
123	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS9.29.2 Shifting of obstructing utilities	117 of 1352	The EPC Contractor shall, in accordance with Applicable Laws, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects the execution of Works in accordance with the direction of Authority Engineer/ IIM Indore. The actual cost of such shifting shall be paid by the EPC Contractor.	Request to share the list/ map and details of the utiilities that are obstructing the site that are need to be shifted.	The successful bidder has to take necessary step for finding out and shifting the same as required and as per the instructions of Engineer-in-charge. Financial implication need to be borne by the contractor and the prospective bidder has to factor in the same in their quote. As. the site has been physically been shown and explained to the pre-bid participants.
124	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS9.29.2 Shifting of obstructing utilities	117 of 1352	The EPC Contractor shall, in accordance with Applicable Laws, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects the execution of Works in accordance with the direction of Authority Engineer/ IIM Indore. The actual cost of such shifting shall be paid by the EPC Contractor.	If the details of the existing utilities are not available, please amend the clause as below. The EPC Contractor shall, in accordance with Applicable Laws, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects the execution of Works in accordance with the direction of Authority Engineer/ IIM Indore. The actual cost of such shifting shall be paid by the **IIM Indore and suitable time compensation shall be provided to EPC Contractor.**	
125	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS9.3.29.3 New utilities	117 of 1352	In the event the construction of any Works is affected by a new utility or works undertaken in accordance with this Clause 9.3, the EPC Contractor shall be entitled to a reasonable Time Extension as determined by the Authority Engineer in accordance with the provisions of Clause 10.4.	As it is not possible for any EPC contractor to envisage the new utilities planned and quantify the effects to consider in financial bid, We request you to provide cost compensation for the new utility.	No Change in the stipulation of the RFP.
126	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTS9.4 Felling of trees9.4 Felling of trees	117 of 1352	For the avoidance of doubt, the Parties agree that if any felling of trees hereunder is in a forest area, the Applicable Permit thereof shall be procured by the EPC contractor within the time specified in the Agreement.	Time of Statutory approval from any government department is beyond the control of EPC Contractor. Hence request you to delete this clause.	No Change in the stipulation of the RFP.

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127	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT10.1 Obligations prior to commencement of Works	119 of 1352	10.1.4 The EPC Contractor shall compute, on the basis of the Drawings prepared in accordance with Clause 10.2.7, and provide to the Authority Engineer, the detailed quantities, in respect of the various items of work specified in Schedule-G and comprising the Scope of the Project. The Parties expressly agree that these details shall form the basis for estimating the interim payments for the Works in accordance with the provisions of Clause 17.3. For the avoidance of doubt, the sum of payments to be computed in respect of all the items of work shall not exceed the Contract Price, as may be adjusted in accordance with the provisions of this Agreement.	This project is being EPC project, there shall be no sharing of quantities. The milestone payment schedule mentioned in Chapter 7 of RFP on pro rata basis shall forms the basis of payment. Please confirm.	No Change in the stipulation of the RFP.
128	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT	119 of 1352	The EPC Contractor shall prepare and submit, with reasonable promptness and in such sequence as is consistent with the Project Completion Schedule, 10 copies each of the design and Drawings, duly certified by the Proof Consultant, to the Authority Engineer for review. Provided, however, that in respect of Project, the Authority Engineer may require additional drawings for its review in accordance with Good Industry Practice;	As per the general industrial good practices the number of copies for drawings shall be 3 Nos. Making 10 Nos of Copies shall unnecessarity increase the cost of design development and also affects the environment through over utilization of natural resources. Hence please change the number of **copies to 3**.	No Change in the stipulation of the RFP.
129	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT10.2 Design and Drawings 10.2.2 C	119 of 1352	within 15 (fifteen) days of the receipt of the Drawings, the Authority Engineer shall review the same and convey its observations to the EPC Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. The EPC Contractor shall not be obliged to await the observations of the Authority Engineer on the Drawing submitted pursuant hereto beyond the said period of 15 (fifteen) days and may begin or continue Works at its own discretion and risk;	Request to change this clause as follows within 15 (fifteen) days of the receipt of the Drawings, the Authority Engineer shall review the same and convey its observations to the EPC Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. The EPC Contractor shall not be obliged to await the observations of the Authority Engineer on the Drawing submitted pursuant hereto beyond the said period of 15 (fifteen) days **and the drawings shall be deemed to be approved by the Authority Engineer** and may begin or continue Works.;	No Change in the stipulation of the RFP.
130	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT10.2 Design and Drawings 10.2.3	120 of 1352	Any cost or delay in construction arising from review by the Authority Engineer shall be borne by the EPC Contractor.	In EPC Contract for the interest of the project there should be defined timelines for the deliverables from all the contracting parties. This clause is completely one sided and request to modify as follows. "10.2.3 Any cost or delay in construction arising from review by the Authority Engineer shall be **compensated to** the EPC Contractor by the Authority."	No Change in the stipulation of the RFP.
131	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 10 DESIGN AND CONSTRUCTION OF THE PROJECT10.4 Extension of time for completion	121 of 1352	10.4.1 Without prejudice to any other provision of this Agreement for and in respect of extension of time, the EPC Contractor shall be entitled to extension of time in the Project Completion Schedule (the "Time Extension") to the extent that completion of any Project Milestone is or will be delayed by any of the following, namely:	Request to include the following (f) Any other causes or delay which are beyond the control of the EPC Contractor.	No Change in the stipulation of the RFP.
132	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 13 CHANGE OF SCOPEARTICLE 13 CHANGE OF SCOPE	133 of 1352	Deleted	Request to provide the clauses under this article that details out the procedures set out for measurement, approval and payment of Change in Scope.	No Change in the stipulation of the RFP.
133	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 15 CHANGE OF SCOPEARTICLE 15 Defects Liability	135 of 1352	The EPC Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Project or any Section thereof, till the expiry of a period of 3 (three) years commencing from the date of Completion Certificate or expiry of a period of 36 (thirty six) months from the date of final bill payment, whichever is later (the "Defects Liability Period").	Request you to consider the DLP period as 1 Year in line with the market standard practice.	No Change in the stipulation of the RFP.
134	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSARTICLE 17 PAYMENTS17.8 Price adjustment for Works	143 of 1352	Deleted	Considering the volatile nature of the material market and unprecedented inflation the cost of the construction materials are varying heavily. Hence we request you to provide price adjustment clause inline with CPWD Clause 10CC	No Change in the stipulation of the RFP.
135	RFP CHAPTER 8 GENERAL CONDITIONS OF CONTRACTSA.3.1Security Deposit	11 of 1352	5 % of accepted tendered value (Awarded Value) to be recovered from running bills. Alternatively, Bank Guarantee (BG) Or fixed deposit receipts from a scheduled bank may be submitted, to be payable at Indore. And it must be valid up to 60 days after defect liability period or till the final completion of performance of the contract, whichever is later.	There is a contradiction between the clause in ITT and GCC. We presume there is no retention/ Secuirty deposit from running bill. Please confirm.	The Security deposit shall be collected by deductions from the running bills as well as final bill of the contractor at the rate of 5%.
136	ARTICLE 7 PERFORMANCE SECURITY7.57.5 Retention Money	114 of 1352	Deleted		
137	RFP CHAPTER 9 GENERAL CONDITIONS OF CONTRACTS9.199.19 Use of Site	226 of 1352	The EPC Contractor shall not use any portion of the Site for any purpose not connected with the Works. It shall maintain a permanent Site access free of spillage and shall not interfere with the existing flow of traffic thereof. Also, the same shall apply to terraces, basements, and other developed areas of the Works.	We request you to mark and provide the area inside IIM Campus that can be utilized for Site Temporary facilities.	Pl. refer Chapter-3 and Master Site Layout Plan drawing.

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138	RFP CHAPTER 9 GENERAL CONDITIONS OF CONTRACTS9.199.19 Use of Site	226 of 1352	The EPC Contractor shall not use any portion of the Site for any purpose not connected with the Works. It shall maintain a permanent Site access free of spillage and shall not interfere with the existing flow of traffic thereof. Also, the same shall apply to terraces, basements, and other developed areas of the Works.	We request you to mark and provide the area inside IIM Campus that can be utilized for Labour Colony.	No labour colony shall be permitted inside the campus.
139	ARTICLE 3 OBLIGATIONS OF THE EPC CONTRACTOR3.73.7 Obligations relating to electricity, water, and other services.	105 of 1352	The EPC Contractor shall be responsible for procuring all power, water, and other services that it may require for the Project. Necessary Liasoning with approval Authority (State/Central) is part of the scope of the work.	Since the campus is operating campus, we request you to provide Water and Power at one point in site on chargeable basis. Further distribution shall be arranged by EPC Contractor.	No Change in the stipulation of the RFP.
140	ARTICLE 1 DEFINITIONS AND INTERPRETATION1.4Priority of agreements and errors/discrepancies	99 of 1352	1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:	Request to include the ITT in Priority of agreements and errors/discrepancies	No Change in the stipulation of the RFP.
141	General			Request you to provide the Area statement for all the Buildings.	No Change in the stipulation of the RFP.
142	General			Request you to provide Retaining Wall Layout.	No Change in the stipulation of the RFP.
143	Chapter 2A.1.4Contract Period	8	24 Calendar Months, including monsoon periods (21 months for Engineering, procurement and Construction and 3 months for Project Closure) or till the completion / Finalization / complete documentation of Group VIII Projects, whichever is later.	The contract period shall be certain. The wordings "or till the completion / Finalization /complete documentation of Group VIII Projects, whichever is later." To be omitted.	No Change in the stipulation of the RFP.
144	Chapter 2A.1.5Compensation for Delay	8	If the EPC Contractor fails to adhere the timelines to complete the respective deliverables as mentioned in this RFP on or before the period mentioned or justified extended date of completion of the respective deliverables i.e. excluding any extension given without compensation, he shall, without prejudice to any other right or remedy available under the law to the IIM Indore on account of such breach, pay as compensation the amount calculated at the rates stipulated above	Bidder construes that the compensation for delay referred shall be applicable only in the events solely sttributable to the Contractor and any delays not attributable to the contractor shall entitle to justified extension of time with compensation by IIM. Further, levy of compensation for delays shall be sole and exclusive damages recoverable for the Contractor's delays under this contract. Please confirm	No Change in the stipulation of the RFP.
145	Chapter 2A.1.5Compensation for Delay	9	In case no compensation of delay has been imposed by the Director IIM Indore during the pendency of the contract, there shall be no waiver of right to levy compensation by the Director IIM Indore if the Work remain incomplete on final justified extended date of completion. If the institute decides to give further extension of time allowing performance of services/works beyond the justified extended date, the EPC Contractor may be liable to pay compensation for such an extended period. READ WITH . In case action has not been finalized and the works/services has been determined/terminated under the respective clause of this RFP, the right of action under this clause shall remain post determination of contract but levy of compensation shall be for days the progress is behind the schedule on date of determination, as assessed by the competent authority, after due consideration of justified extension. Compensation for the delay, if not decided before the determination of contract, shall be decided after the determination of contract. The amount of compensation may be adjusted or set off against any sum payable to the EPC Contractor under this RFP or any other contract with IIM Indore	The bidder requests that all and any events entitling IIM Indore for claims against the Contractor in terms of these conditions shall be duly notified in writing to the Contractor within 28 days from the date of such event along with relevant particulars. The determination of levy which is reserved to the final contract completion under this clause shall be subject to such timely notification by IIM Indore, of the events of delay attributable to the contractor.	No Change in the stipulation of the RFP.
146	Chapter 2A.1.5Compensation for Delay	9	Provided that compensation during the progress of Work before the justified extended date of completion for delay under this clause shall be for non-achievement of sectional completion or part handing over of Work on stipulated/justified extended date for such part work or if delay affects any other works/services. This is without prejudice to the right of action by the institute for levying compensation in respect of delay in performance and claim of compensation.	Bidder requests that the compensation for delay shall be attracted only if the final completion date is delayed and not the intermittent sectional milestones. In the event the same is levied, provided the non-achievement of the section being solely attributable to Contractor's delays, it shall be withheld and achievement of the next section of the works in the agreed dates shall entitle the contractor for release of these amounts levied without any further claims against the contractor.	No Change in the stipulation of the RFP.
147	Chapter 2A.3.5indemnity Bond	12	A.3.5 Indemnity Bond Bidder to submit professional indemnity insurance policy after award to indemnify the institute against losses and damages incurred due to EPC Contractor’s act @0.2% of accepted tendered value (Awarded Value) per annum till the currency of the agreement.	The clauses in the contract already cover the events of indemnifications and related obligations of the contractor. Moreover, any breach/non performance of the contract is covered under the Performance Security. The bidder therefore, requests that a separate indemnity bond may be omitted.	No Change in the stipulation of the RFP.
148	Chapter-8Art.3.9 of GCC; EPC AgreementUnforseeable difficulties.	106	(b) the EPC Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs; and (c) the Scheduled Completion Date shall not be adjusted to take account of any unforeseen difficulties or costs. For the purposes of this Clause, unforeseeable difficulties include physical conditions like man-made or natural physical conditions including sub-surface and hydrological conditions which the EPC Contractor encounters at the Site during execution of the Works	Bidder requests for time extension and appropriate cost reimbursement in the event of any unforseen difficulties impacting the site conditions and/or execution of the works, despite best mitigation measures commercially viable to the contractor which may be adopted. However, there may not be any price adjustment or time extension of foreseeable difficulties / site conditions.	No Change in the stipulation of the RFP.
149	Chapter-8Art. 4.1 of GCC; EPC AgreementObligations of IIM Indore	107	Obligations of IIM Indore ….(c) Deleted	Bidder requests to add that the certfication of works/invoices and timely payment obligations of IIM Indore shall be one among these material obligations	Pl. refer Article -17 of the RFP.

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150	Chapter-8Art. 4.1 of GCC; EPC AgreementObligations of IIM Indore	107	4.1.5 Notwithstanding anything to the contrary contained in this Agreement, the Parties expressly agree that the aggregate Damages payable under Clauses 4.1.4, 8.3 and 9.2 shall not exceed 3% (three per cent) of the Contract Price. For the avoidance of doubt, the Damages payable by the IIM Indore under the aforesaid Clauses shall not be additive if they arise concurrently from more than one cause but relate to the same part of the Project.	Bidder requests that the limitation shall not apply in case of (a) third party claims against the contractor due to faults of IIM Indore; (b) liabilities arising due to wilful misconduct and gross negligence and (c) non compliance with applicable laws. Further, this limitation shall in no manner be construed as a waiver by the Contractor or discharge of IIM INdore's obligations and liabilities arising due to non-performance of the Contract.	No Change in the stipulation of the RFP.
151	Chapter-8Art. 7.2 of GCC; EPC AgreementExtension of Performance Security	113	The EPC Contractor may initially provide the Performance Security for a period of completion of work; provided that it shall procure the extension of the validity of the Performance Security, as necessary, at least 2 (two) months prior to the date of expiry thereof	Bidder assumes that the Contractor shall be liable towards extension of BG and costs related thereto only if the delays are attributable to the Contractor.	No Change in the stipulation of the RFP.
152	Chapter-8Art. 8.5 of GCCRight of Way	116	The Right of Way given to the EPC Contractor hereunder shall always be subjectto the right of access of the IIM Indore and the Authority Engineer and their employees and agents for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement	It is construed that any delays/disruptions caused to the execution of Works by such access, other contractors if any engaged by IIM Indore shall entitle the Contractor for suitable extension of time and cost compensation	No Change in the stipulation of the RFP.
153	Chapter-8Art. 4.1 of GCC; EPC Agreement r/w 26.1 Obligations of IIM Indore and Appointed Date	107	(c) the date on which the Authority has provided the Right of Way on at least 90% (ninety percent) of the total land required for the Project in conformity with the provisions of Clause 8.2; and	Bidder construes that the LOA shall be issued and the Appointed Date shall be declared only upon 100% of Access to Site along with all approvals. If this is not viable, the remaining 10% of the Right of Way and clearances shall be arranged by the Employer, not later than 90 days from the Appointed Date.	No Change in the stipulation of the RFP.
154	Chapter-8Art. 10.2.2 of GCC; EPC Agreement r/w 26.1 Design & Drawings	119	The EPC Contractor shall not be obliged to await the observations of the Authority Engineer on the Drawing submitted pursuant hereto beyond the said period of 15 (fifteen) days and may begin or continue Works at its own discretion and risk;	Bidder requests to reword as : "*The EPC Contractor may begin or continue Works at its own discretion, in the event the Authority Engineer does not revert with comments within 15 days as the Drawings shall be deemed approved* ."	No Change in the stipulation of the RFP.
155	Chapter-8Art. 10.3.2 of GCC; EPC Agreement r/w 26.1 Construction of the Project	121	10.3.2 The EPC Contractor shall construct the Project in accordance with the Project Completion Schedule set forth in Schedule-I. In the event that the EPC Contractor fails to achieve any Project Milestone or the Scheduled Completion Date within a period of 30 (thirty) days from the date set forth in Schedule-I, unless such failure has occurred due to Force Majeure or for reasons attributable to the IIM Indore, it shall pay Damages to the IIM Indore in a sum calculated at the rate of 1% (One per cent) of the Contract Price for delay per week reckoned from the date specified in Schedule - I and until such Project Milestone is achieved or the Works are completed; provided that if the period for any or all Project Milestons or the Scheduled Completion Date is extended in accordance with the provisions of this Agreement, the dates set forth in Schedule-I shall be deemed to be modified accordingly and the provisions of this Agreement shall apply as if Sche...10.3.3 The IIM Indore shall notify the EPC Contractor of its decision to impose Damages in pursuance of the provisions of this Clause 10.3. Provided, however, that no deduction on account of Damages shall be affected by IIM Indore without taking into consideration the representation, if any, made by the EPC Contractor within 20 (twenty) days of such notice. The Parties expressly agree that the total amount of Damages under Clause 10.3.2 shall not exceed 10% (ten percent) of the Contract Price.	It is construed that the compensation for delay stipulated under A.1.5 pertains to the same compensation for delays by Contractor and that this clause 10.3.2 of the GCC supersedes any direct inconsistencies with A.1.5. Further, please omit the words: "any Project Milestone or" Please confirm.	No Change in the stipulation of the RFP.
156	Chapter-8Art. 10.4.3 of GCC; EPC Agreement r/w 26.1 Extension of Time for completion	122	10.4.3 In the event of the failure of the EPC Contractor to issue to the Authority Engineer a notice in accordance with the provisions of Clause 10.4.2 within the time specified therein, the EPC Contractor shall not be entitled to any Time Extension and shall forfeit its right to any such claims in future. For the avoidance of doubt, in the event of failure of the EPC Contractor to issue notice as specified in this Clause 10.4.3, the IIM Indore shall be discharged from all liability in connection therewith.	Bidder requests to omit this clause	No Change in the stipulation of the RFP.
157	Chapter-8Art. 11.13.2 r/w 15.4 of GCC; EPC Agreement Remedial Works r/w EPC Contractor's failure to rectify defects	127 r/w 135	11.13.2 If the EPC Contractor fails to comply with the instructions issued by the Authority Engineer under Clause 11.13.1, within the time specified in the Authority Engineer's notice or as mutually agreed, the Authority Engineer may advise the Authority to have the work executed by another agency. The cost so incurred by the Authority for undertaking such work shall, without prejudice to the rights of the Authority to recover Damages in accordance with the provisions of this Agreement, be recoverable from the EPC Contractor and may be deducted by the Authority from any monies due to be paid to the EPC Contractor. READ WITH ...The cost so determined, and an amount equal to 20% (twenty per cent) of such cost as Damages, shall be recoverable by the Authority from the EPC Contractor and may be deducted by the Authority from anymonies due to the EPC Contractor.	Bidder assumes that in the event of any claims by the Employer, the following procedure shall be followed and the Employer shall not unilaterally withhold or off-set the amounts from the Contractor: "Employer shall notify an event along with all particulars of the Employer's claim witihin 28 days of occurrence of such event giving raise to a claim. All claims of the Employer shall be first attempted by the Employer's Representative for mutual settlement based on the repsonse from the Contractor to the said Owner's claim letter. The Employer shall be entitled to such monies agreed as an outcome of this discussion. If not agreed, the said claim shall be resolved as per the dispute resolution mechansim under this Contract. Further any costs recoverable towards works performed through third party contractors under this Contract, cumilatively shall not exceed 10% of the Contract Price" Please confirm	No Change in the stipulation of the RFP.
158	Chapter-8Art. 11.17.4 of GCC; EPC Agreement Suspension of unsafe construction works	129	11.17.4If suspension of Works is for reasons not attributable to the EPC Contractor, the Authority Engineer shall determine any Time Extension to which the EPC Contractor is reasonably entitled in accordance with the provisions of Clause 10.4.	Bidder seeks to include Preservation Costs as part of this clause and omit 11.17.3.	No Change in the stipulation of the RFP.

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159	Chapter-8Art. 12.2 of GCC; EPC Agreement Completion Certificate	130	Completion Certificate	The Contractor shall submit a notice seeking for Completion Certificate upon completion of all preconditions as per this Clause. The Authority Engineer shall issue or reject the same with reasons of the complete details of actual works pending conformance by the Contractor as per Clause 12.2.3 below, within 15 days of such request. if not, the Completion Certificate shall be deeemed issued and the Defects Liability Period shall commence from such date.	No Change in the stipulation of the RFP.
160	Chapter-8Art. 13 of GCC; EPC Agreement Change of Scope	133	Deleted	Bidder requests to stipulate a change order procedure as per FIDIC Red Book provisions	No Change in the stipulation of the RFP.
161	Chapter-8Art. 15.6.2 of GCC; EPC Agreement Extension of Defects Liability Period	136	15.6.2 Any Materials or Works with Defects identified under Clause 15.2 and replaced or repaired during the Defects Liability Period or the extended Defects Liability Period, as the case may be, would be further warranted for a period of twelve (12) months from the date of completion of such repair or replacement.	The Bidder requests to omit this sub clause fully. This will keep the DLP obligations open ended.	No Change in the stipulation of the RFP.
162	Chapter-8Art. 16 of GCC; EPC Agreement Authority Engineer	137	The Director of IIM Indore shall have the authority to nominate any person as the Authority Engineer under this contract.	Bidder requests that any such person's details who will be acting as Authority Engineer must be notified by IIM Indore, in wrtiing to the Contractor. The Authority Engineer shall have the powers to performs the roles which are expressly provided to be performed by Authority Engineer under this Contract only.	The contractor shall be intimated in this regard.
163	Chapter-8Art. 17.1.3 r/w 17.13of GCC; EPC Agreement Contract Price r/w Change in Law and Price Adjustment	139 r/w 144	17.1.3 The Contract Price shall not be adjusted for any change in duties, taxes etc. specified in Clause 17.1.2 above, save and except as specified in Clauses 17.8 and 17.13. READ WITH Change in law. – Deleted	Bidder requests to provide for all Change in Tax and Changes in Applicable Laws- post the date of submission of the bid- shall entitle the Contractor for extneison of time and cost compensaiton	No Change in the stipulation of the RFP.
164	Chapter-8Art. 17.6 of GCC; EPC Agreement Payment of Damages r/w Termination Payment	142	17.6.1 The EPC Contractor may claim Damages due and payable to it in accordance with the provisions of this Agreement. 17.6.2 The Authority Engineer shall issue the IPC within 15 (fifteen) days of the receipt of the claim under Clause 17.6.1, after making adjustments in accordance with theprovisions of this Agreement. The Authority shall pay to the EPC Contractor the amount dueunder such IPC within a period of 30 (thirty) days from the date of the submission of the claim under this Clause 17.6 17.15 Authority's claims If the Authority considers itself to be entitled to any payment from the EPC Contractorunderany Clause of this Agreement, it shall give notice and particulars to the EPC Contractor 20 (twenty) days before making the recovery from any amount due to the EPC Contractor, andshall take into consideration the representation, if any, made by the EPC Contractor in this behalf, before making such recovery. READ WITH and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source	Recovery of any such damages shall be subject to the notification of claims and determination as per the clause proposed above and reiterated below: *Employer shall notify an event along with all particulars of the Employer's claim witihin 28 days of occurrence of such event giving raise to a claim. All claims of the Employer shall be first attempted by the Employer's Representative for mutual settlement based on the repsonse from the Contractor to the said Owner's claim letter. The Employer shall be entitled to such monies agreed as an outcome of this discussion. If not agreed, the said claim shall be resolved as per the dispute resolution mechansim under this Contract.* The termination payments, rectification costs and any third party ontractor engagement costs at the risk of the contractor for contractor's default notified but unremedied, shall be recoverable by the Authority limited to 10% of the contract price, cumilatively.	No Change in the stipulation of the RFP.
165	Chapter-8Art. 24 of GCC; EPC Agreement Dispute Resolution	169	B. If the dispute cannot be settled by mutual discussion within 30 days as provided herein, the dispute shall be referred to the Director IIM Indore, whose decision shall be full, final & binding on the parties.	The Bidder requests to replace this clause completely to provide for arbitration as the dispute resolution procedure, the decision of a Party representative cannot be final and binding in all fairness. *"B. If the dispute cannot be settled by mutual discussion within 30 days as provided herein, the dispute shall be referred to arbitration as per the Arbitration & Conciliation Act, 1996 as amended from time to time. The proceedings shall be conducted by a sole arbitrator mutually appointed by the parties as per the said Act. The seat of arbitration shall be Indore, Madhyapradesh and language used shall be English. The award of the sole arbitrator shall be final and binding on the parties. "*	No Change in the stipulation of the RFP.
166	Chapter-8Art. 25.16 of GCC; EPC Agreement Confidentiality	173	The Parties shall treat the details of this Agreement as private and confidential, excep to the extent necessary to carry out obligations under it or to comply with Applicable Laws. The EPC Contractor shall not publish, permit to be published, or disclose anyparticulars of the Works in any trade or technical paper or elsewhere without the previous consent of the Authority.	Bidder assumes that the confidential information may be permitted to shared with (potential) subcontractors, vendors and contractors for the purpose of participation in this project on need-to-know basis. However, will confidentiality agreement no less strignent than this clause. Please confirm	No Change in the stipulation of the RFP.
167	Chapter-8Schedule FForm of Bank Guarantee	197	10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.	Bidder requests to omit this clause	No Change in the stipulation of the RFP.

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168	Chapter-89.3 of SCC of Contract agreementOrder of Precedence	215	IIM Indore reserves the right to change/ modify the above-mentioned order of precedence in the interest of work & decision of competent Authority of IIM Indore shall be final and binding to the EPC Contractor.	Bidder requests to omit this clause. No changes to the tender conditions post bid submission shall be unilaterally made by a party.	No Change in the stipulation of the RFP.
169	Chapter-89.29.1 SCCWarranty	234	9.29.1 The EPC Contractor undertakes to be fully liable and responsible for the manufacturer's warranty in respect of proper design, quality and workmanship of all equipment, accessories, etc, for a period of 24 (Twenty-Four) months from the date of acceptance of the complete systems or as per OEM whichever is higher.	Bidder construes that the Warranty under this clause shall be nothing but the Defect Liability Period obligations of the Contractor and nothing herein shall expand or increase the liabilities of the contractor and the Contractor's defect liability oligations shall only be valid till the DLP expiry date as per the contract conditions. Any warranty of equipment provided by OEM beyond this period shall be assigned to the Authority and the Authority shall enforce such warranties thereafter only against the OEMs and the Contractor shall stand fully discharged from all liabilities/obligations after the expry of the DLP, except to the limited extent of the Waterproofing works and Anti Termite treatment warranties specifically provided for 10 years from date of Completion under clause 9.29.3.	No Change in the stipulation of the RFP.
170	Chapter-89.29.3 SCCGuarantee for Waterproofing Works and Anti Termite Treatment Works	234	9.29.3.1 On completion of the Waterproofing treatment and anti-termite works in all respects, a guarantee that the building is safe for a period of 10 years is required on Non-Judicial stamp paper of requisite valu	It is construed that it is 10 years from date of Completion Certificate/deeemed Completion Certificate. Please confirm. Further, Warranty shall exclude events beyond the control or acts of the Contractor.	No Change in the stipulation of the RFP.
171	Chapter-8Summary of Consequential Clauses Summary of Consequential Clauses	265	Summary of Consequential Clauses in case of non-performance For the sake of clarity in respect of various penal / compensation relatedprovisions, the respective clauses are summarized hereunder:	Bidder seeks to omit this section fully since it creates inconsistencies and interpretation issues. In any case, this shall be superseded by the contract documents listed in the Order of precedence and the relevant clauses referred in this Section only.	No Change in the stipulation of the RFP.
172	Chapter-8Format of Bank Guarantee Bank Guarantee for Performance SecurityFormat of Bank Guarantee Bank Guarantee for Performance Security	281	Format of Bank Guarantee Bank Guarantee for Performance Security	Please clarify whether the format in Pg. 281 of 1352 is applicable or the format of PBG in Schedule F is applicable?	The format at page no. 281 has to be followed.
173	Art. 25.18 GCCLimitation of Liability	174	25.18.2 The total liability of one Party to the other Party under and in accordance with the provisions of this Agreement, save and except as provided in Articles 21 and 23, shall not exceed the Contract Price. For the avoidance of doubt, this Clause shall not limit the liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party	Bidder seeks clarification that the payment obligations of Contract Price by the Authority and the over all cap on Damages of 3%- both shall be excluded from this liability limit and would be over and above this cap.	No Change in the stipulation of the RFP.
174	Plywood specification	618	fire retardant ply confirmimg to IS:5509	For furniture fire retardant plywood maynot be required and BWP /Marineply wood shall be sufficient for this Purpose. Fire retardant plywood commericialy very high compared to BWP/ Marine Ply. Kindly check and confirm.	No Change in the stipulation of the RFP.
175	Laminate spec	618	Fire retardant laminate	For Furniture the laminate need not be fire retardant laminate. This shall increase the cost of the furniture without adding any reasonable value. Kindly check and confirm.	No Change in the stipulation of the RFP.
176	Approved furnitures makers	1194 to 1198	Not mention furnitures approved makers	Please provide approved furnitures makers list	No Change in the stipulation of the RFP.
177	Furniture hardware makers		Not Provided	Kindly provide the list of approved makes for furniture.	No Change in the stipulation of the RFP.
178	solid wood		specification not mentioned	As per data sheet table leg are solid wood. Hence please provide the specification for solid wood.	Second class seasoned Teak wood to be considered.
179	furniture details		Sizes for the furnitures not mentioned	Please provide the sizes for the furnitures	Pl. refer to Furniture DBR, drawings, & specification . Apart from that phyiscally the items were shown to the participants during the pre bid meeting. For miscellaneous items it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
180	technical spec & images	618 to 635	Not available for all bulidings	Please share Specification and reference images for all the furnitures.	Pl. refer to Furniture DBR, drawings, & specification . Apart from that phyiscally the items were shown to the participants during the pre bid meeting. For miscellaneous items it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.

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181	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.6Pipe Protection	1127	Pipes in chase or buried underground shall be painted with two coats of hot bitumen, wrapped with bituminous pypkote or Hessian cloth and finished with one coat of hot bitumen paint.	We request to approve ready to use tape of IWL Pypkote AW 4 mm over coal tar Primer. It is a Coal Tar Based Corrosion Protection Tape conforming to IS10221/ AWWA C 203 specification.	No Change in the stipulation of the RFP.
182	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.10 MS Pot Strainer	1128	Double flanged MS pot strainers of required dia. With M.S. body and SS 40-grade mesh strainer, PN 16 shall be provided either at tank suction line or at individual pump suction line	Being suction side and pressure expected is very low, PN 10 can be used. Please confirm.	No Change in the stipulation of the RFP.
183	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.10 Orifice Plate	1128	Orifice plates shall be made of 6mm thickness Brass material to reduce pressure on individual hydrants to operating pressure of 3.5-kg/ sq.cm.	Clause No. 2.4.8 calls for SS Orifice Plates, plesae confirm whether SS or Brass is required.	No Change in the stipulation of the RFP.
184	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.11External Yard Hydrants	1129	RRL Hose pipe shall be controlled percolating (CP) type, ISI marked (IS:8423), 63 mm dia x 15 m long (2 Nos.) complete with instantaneous type gunmetal 63 mm dia ISI marked Male & Female couplings (IS:903) bound and riveted to hose pipe with copper rivets and 1.5 mm copper wire. Bursting pressure not less than 22 Kg/Sq.cm. E	RRL Hose is confirming to IS: 636 and CP Hose is confirming to IS: 8423. Please confirm which type of hose is to be considered	No Change in the stipulation of the RFP.
185	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.11External Yard Hydrants	1129	M.S. fire hose weatherproof cabinet (750x600x250mm 8namele.) made out of 16 gauge M.S. sheet capable of accommodating landing valve, hose pipes, fittings & accessories.	Please clarify whether hydrant valve shall be kept inside hose box. Given size is not enough to keep hydrant valve inside.	Valve shall be placed outside.
186	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.12Internal Hydrants	1129	The landing valve shall be of oblique pattern shall be complete with GI twist release chain with cap. The manufacturer's name & trademark along with year of manufacture & other details like size & type shall, be clearly mentioned	Tender Drawing No. 665 - AB - E - F - 600 - Academic Block Ground floor fire layout plan shows single hydrant and we are considering same, please confirm.	No Change in the stipulation of the RFP. (a)the fire related work need to be compliant with NBC/local fire authority norms/ IS Code, etc. (b) the drawings shows 4 IFHC with hydrants on ground floor.
187	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.12Internal Hydrants	1129	RRL Hose pipe shall be nonoperculate type, ISI marked (IS:8423), 63 mm dia x 15 m long (2 Nos.) complete with instantaneous type gunmetal 63 mm dia ISI marked Male & Female couplings (IS:903) bound and riveted to hose pipe with copper rivets and 1.5 mm copper wire.	RRL Hose is confirming to IS: 636 and CP Hose is confirming to IS: 8423. Please confirm which type of hose is to be considered	Mentioned in the RFP.
188	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.12Internal Hydrants	1129	External Hydrant post shall also include standard short size 63mm dia SS branch pipe with detachable hexagonal nozzle of 20 mm nominal bore outlet with instantaneous type 63 mm dia coupling complete & confirming to IS:903	Please confirm MOC of Branch Pipe, whether Gunmetal or Stainless steel. Because Hydrant valve specified is Gunmetal type.	No Change in the stipulation of the RFP.
189	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.12Internal Hydrants	1130	SS Double door capable of accommodating fire hose reel, landing valve, hose pipes, fittings, 1 No. CO2 & 1 No. Dry powder type portable fire extinguishers & accessories. The door shall have a front glass with lock and key arrangement & shall be painted with one coat of primer & two coat of finished stove enameled post office red color paint & "FIRE HOSE" written on front.(Approx. size of door: 2100 mm Height, Width of Door as per Shaft size)	Please confirm whether shaft door should be with Glass or plain SS door with Frame. Also Tender Drawing No. 665 - AB - E - F - 600 - Academic Block Ground floor fire layout plan shows Hose box inside Fire hydrant shaft to keep , please confirm whether hose box is required inside shaft or otherwise hoses can be fixed in shaft wall also.	No Change in the stipulation of the RFP.
190	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE2.4.12Internal Hydrants	1129	Swing type First Aid hose reel in red color with 36 meters long and 20 mm dia heavy duty rubber water hose, 20 mm dia globe valve stop cock, terminating with SS coupling & nozzle of 5mm outlet with shut off valve confirming to IS 8090 – 1976 complete with drum and brackets for fixing on wall, bolts & nuts conforming to IS:884- 1969 complete as required to be provided	Tender Drawing No. 665 - AB - E - F - 600 - Academic Block Ground floor fire layout plan typical details shows 30 Mtrs long hose, please confirm which is to be considered	No Change in the stipulation of the RFP.
191			6.1.1.3 CEILING (FLUSH) PATTERN • These shall be designed for use with concealed pipe work. These shall be installed pendant with plate or base flush to the ceiling with below the ceiling.	We presume that we can quote Recessed pendent sprinkler with 2 piece adjustable rosette plate. Please confirm.	No Change in the stipulation of the RFP.
192	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE7.1Pressure Testing of Pipes	1135	During laying of pipes, the same shall be subjected to 10 Kg/cm2 hydraulic pressure for a period of 24 hrs., in sections. After completion of the work, all valves/fittings shall be installed in position and entire system shall be tested for 24 Hrs. at a pressure of 10 Kg/cm2.The drop of pressure up to 0.5 Kg/cm2 shall be accepted.	We would like to emphasis that if we hydrotest 24 hours, there must chances of huge pressure variaion due to atmospheric conditions. Even NFPA 13 species hydrotest at 13.8 bar for minimum 2 hours. Hence we request to consider hydrotest of 13.8 bar for a period of 4 hours.	No Change in the stipulation of the RFP.
193	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORELIST OF APPROVED MAKES FOR FIRE FIGHTING SYSTEM	1206	47. Flexible Hoses : Gunebo/Tyco,Viking	Since HD fire is approved for Alarm valve and Sprinklers, we request to you to approve "HD FIRE" Make for Flexible hoses also.	No Change in the stipulation of the RFP.
194	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREDesign Intent	448	k) VESDA (Very Early Smoke Detection Apparatus) and Gas suppression/Total room flooding system by clean agent to cover the false flooring and room void areas of Data Hall, UPS, Battery rooms and MMR.	Please provide type of Gas to be used for total flooding and provide complete technical specification for Gas suppression System	NOVAC 123 gas shall be used for gas suppresion system for highly critical room as per system requirement.
195	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORELIST OF APPROVED MAKES FOR FIRE FIGHTING SYSTEM	1206	45 Electrical Panel Gas Suppression System/System Integrator Tyco(Ansul),Minimax,Rotarex,Firetrace	Please provide detail specification for Electrical panel suppression system and confirm which panels to be protected with Gas system.	No Change in the stipulation of the RFP. The fire-related work need to be compliant with NBC/local fire authority norms/ IS Code, Electrical standards etc.
196	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORELIST OF APPROVED MAKES FOR FIRE FIGHTING SYSTEM	1206	45 Electrical Panel Gas Suppression System/System Integrator Tyco(Ansul),Minimax,Rotarex,Firetrace	Please approve reputed brands ' SWASTIK ' and ' SVS BUILDWELL' for Electrical panel gas suppression system	No Change in the stipulation of the RFP.

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197	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	All type of CCTV -Camera Bosch/Mobotix/Avigilon	Please add the fololwing makes also Pelco / Honeywell	No Change in the stipulation of the RFP.
198	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	Access Control Suprema / Invixium / Bosch	Please add the following makes also HID / Honeywell / ID Cube	No Change in the stipulation of the RFP.
199	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	IP PBX and IP Phones NEC/ Cisco /Matrix	Please add the following makes Avaya / Tadrian	No Change in the stipulation of the RFP.
200	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	All type of Passive Network Molex / Element Cables / CommScope	Please add the following makes also R&M	No Change in the stipulation of the RFP.
201	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	Active Network Switches Juniper / Aruba /zyxel/Cisco	Please add the following makes also Extreme / Avaya	No Change in the stipulation of the RFP.
202	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREAPPROVED MAKE LIST OF ELV OEM	732	NAS Asuster / Qnap / Synology	Please add the following makes also Dell / IBM	No Change in the stipulation of the RFP.
203	RFP for EPC_Group VIII proejct at IIM IndoreClause no 15.1DEFECTS LIABILITY	135 of 1352	The EPC Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Project or any Section thereof, till the expiry of a period of 3 (three) years commencing from the date of Completion Certificate or expiry of a period of 36 (thirty six) months from the date of final bill payment, whichever is later (the “Defects Liability Period”).	Please conisder DLP as 12 months from date of Handing over of the project	No Change in the stipulation of the RFP.
204	RFP for EPC_Group VIII proejct at IIM IndoreClause no 6.8Comprehensive Annual Maintenance Contract	65 of 1352	The EPC Contractor’s quote shall include 5-year comprehensive AMC on yearly basis after the DLP period for the following packages	CAMC for the listed items shall be considered for 5 years from date of Handing over of the project	Pl. refer to clarification Sr. no. -85.
205	RFP for EPC_Group VIII proejct at IIM Indore9.29 WarrantyWarranty	234 of 1352	The EPC Contractor undertakes to be fully liable and responsible for the manufacturer’s warranty in respect of proper design, quality and workmanship of all equipment, accessories, etc, for a period of 24 (Twenty-Four) months from the date of acceptance of the complete systems or as per OEM whichever is higher.	All warranty shall be covered under DLP clause no 15.1	No Change in the stipulation of the RFP.
206	RFP for EPC_Group VIII proejct at IIM IndoreElectrical DBR - Clause 6wiring Installation	449 of 1352	1.5 sqmm for point wiring, 2.5sqmm for lighting, 4sqmm for power wiring	2.5 sqmm shall be considered for 6A sockets. Please confirm	No Change in the stipulation of the RFP.
207	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause 1.7Conduits	1038 of 1352	All conduits for concealed / surface / exposed shall be of 16G MS Black conduits / stell conduits	Please confirm whether conduits shall be considered as below. For Concealed - PVC conduit For Surface / exposed - MS Steell conduit	No Change in the stipulation of the RFP.
208	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause F1.2 General	1051 of 1352	Alu zinc coating shall be provided on the sheets	Alu zinc coating shall be offered only by one of approved OEM and hence we shall consider painting of panles as per approved manufacturer standards	No Change in the stipulation of the RFP.
209	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause 1.2.3Enclosure Manufacturing	1052 of 1352	A fairly uniform coating of atleast 70-80 microns shall be provided	Painting thickness shall be 50 microns as per approved manufacturer painting standards. Hence we presumed to consider the same.	No Change in the stipulation of the RFP.
210	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause 2.1.1Structure	1054 of 1352	Sheet steel shrouds and partitions shall be of 2mm thickness	Kindly confirm For load bearing sheet steel thickness shall be of 2mm and for non load bearing shall be of 1.6mm thickness	No Change in the stipulation of the RFP.
211	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause 2.1.13.3 Construction (b)	1058 of 1352	DB tichknes 2/1.8mm thick high quality CRCA sheet	Thickness of DB's shall be 1.2mm as per manufacurer standards	No Change in the stipulation of the RFP.
212	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause G-Cables1.1 General Scope	1064 of 1352	Sector shaped stranded conductors shall be used for cables of 50 sqmm and above	Cables sizing of 25 sqmm & above shall be considered with sector shaped as per standard industry practice.	No Change in the stipulation of the RFP.
213	RFP for EPC_Group VIII proejct at IIM IndoreTechnical specification - Clause I1.1 construction	1071 of 1352	Pre galvanised MS / Alu Zinc sheet	Alu zinc coating shall be offered only by one of approved OEM and hence we shall consider pregalvanised MS sheets as per approved manufacturer standards	No Change in the stipulation of the RFP.

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214	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalMODULAR SWITCHES, SOCKETS, TELEPHONE & TV OUTLET BOXES ETC	1199 of 1352	LEGRAND (ARTEOR)/ SIEMENS / ABB / CRABTREE/ SCHNEIDER ELECTRIC / HAGER	Kindly include the following additional makes MK / Northwest / Anchor Panasonic	No Change in the stipulation of the RFP.
215	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalWIRES -PVC INSULATED FRLSH COPPER CONDUCTOR FLEXIBLE TYPE	1199 of 1352	FINOLEX / RR KABEL/ HAVELLS/ POLYCAB	Kindly include the following additional makes LAPP / Rajnigandha / KEI	No Change in the stipulation of the RFP.
216	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalINDOOR LED LIGHTING FIXTURE	1199 of 1352	PHILIPS / CROMPTON / HAVELLS	Kindly include the following additional makes Wipro / Bajaj / Panasonic	No Change in the stipulation of the RFP.
217	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalOUTDOOR LED LIGHTING FIXTURE	1199 of 1352	PHILIPS / CROMPTON / HAVELLS	Kindly include the following additional makes Wipro / Bajaj / Panasonic	No Change in the stipulation of the RFP.
218	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalHT PANELS	1199 of 1352	ABB / SCHNEIDER ELECTRIC / SIEMENS / BHEL	We preumed to consider Authorised system integrators of ABB / SCHNEIDER ELECTRIC / SIEMENS / BHEL are approved for this project. Please confirm	No Change in the stipulation of the RFP.
219	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalLT PANELS	1199 of 1352	ABB / SCHNEIDER / SIEMENS / L&T / LEGRAND / TRICOLITE	We preumed to consider Authorised system integrators of ABB / SCHNEIDER / SIEMENS / L&T / LEGRAND are approved for this project. Please confirm	No Change in the stipulation of the RFP.
220	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalCOPPER CONDUCTOR CONTROL CABLE	1199 of 1352	LAPP/POLYCAB/RR KABEL/FUSION POLYMERS / FINOLEX	Kindly include the following additional makes Havells / KEI / Avocab	No Change in the stipulation of the RFP.
221	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalXLPE INSULATED LT CABLES	1199 of 1352	HAVELLS / POLYCAB / KEI/ RR CABLES	Kindly include the following additional makes Finolex / Avocab	No Change in the stipulation of the RFP.
222	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalUPS	1201 of 1352	EMERSON/ SCHNEIDER ELECTRIC / APC/ EATON	Kindly include the following additional makes Fuji Electric / SOCOMEC / Numeric	No Change in the stipulation of the RFP.
223	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalTRANSFORMERS	1201 of 1352	VOLTAMP/ KIRLOSKAR /CROMPTON / UNIVERSAL TRANSFORMERS / SIEMENS	Kindly include the following makes Indotech / Sudhir / ABB	No Change in the stipulation of the RFP.
224	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalLIFTS	1201 of 1352	OTIS/ KONE/ SCHIENDLER / MITSUBISHI	Kindly include the following makes Johnson / ThyssennKrupp	No Change in the stipulation of the RFP.
225	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalDG SETCOMPLETE WITH ENGINE, ATERNATOR, COOLING SYSTEM, FUEL PIPING, EXHAUST SYSTEM & OTHER REQUIRED ACCESSORIES.	1201 of 1352	CUMMINS / CATER PILLAR	DG set complete with engine and alternator are only being offered through Original Equipment assemblers of approved OEM's. Hence we presumed to consdier the same	No Change in the stipulation of the RFP.
226	RFP for EPC_Group VIII proejct at IIM IndoreList of Approved Makes ElectricalDG SETCOMPLETE WITH ENGINE, ATERNATOR, COOLING SYSTEM, FUEL PIPING, EXHAUST SYSTEM & OTHER REQUIRED ACCESSORIES.	1201 of 1352	CUMMINS / CATER PILLAR	Kindly include the following makes PERKINS / Baudouin / Kirloskar	No Change in the stipulation of the RFP.
227	RFP for EPC_Group VIII proejct at IIM IndoreApproved Make listApproved Make list	1193 - 1214	The Contractor shall submit samples of all the makes as specified in this list and the Architect shall have the power to select any of them. Architect decision in this regard shall be binding on the Contractor	In order to provide competitive bid, selection of make from the approved make list shall be lies with contractor. Please confirm.	No Change in the stipulation of the RFP.
228	Sanitary Fittings		Sanitary Fittings	Sanitary fitings has wide range from low end to high end. Hence, we request you to provide us the model numbers for better pricing.	Refer detailed finishing schedule for respective buildings attached with the drawings.
229	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Stagewise Scope of Work of EPC Contractor for Group-VIII Project, Pre-Construction StageBIM Modelling LOD 500	Page 40 of 1352	After signing of agreement with IIMI, EPC Contractor shall prepare Building Information Model (BIM) for the Scope of work as per RFP. BIM (LOD 500) for Architectural, Structural, Interior, MEP, ELV, BMS, Networking services, External Development, External services, etc., to be created in line with the Design drawings, specification, DBR's and the other technical details. The said BIM (LOD 500) should include but not limited to the following - Drawings, BOQ, Elements, progressive coordinated drawings, clash detection work, walkthrough, rendering, as built drawings, etc. EPC Contractor to submit the same for approval to the IIM Indore within 45 days from the date of commencement. A recovery of Rs. 1000/- shall be made on per day basis in case of delay in submission of the above programme	This clause needs modification. BIM with level of development LOD 500 including Asbuilt model / drawing could not be achieved in 45 days from date of commencement. BIM shall be developed in phases start from Scheme design to Asbuilt drawing as per the project phases with the LOD level as per the BIM standards for each stages. Bidder propose to submit only the BIM Implementation Plan ellobrating the BIM execution strategy desired for the project within 45 days from date of commencement	In the BIM modelling Virtual built can be presented, whereas actual as built drawings shall be prepared only after the completion of the project.

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230	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Stagewise Scope of Work of EPC Contractor for Group-VIII Project, Pre-Construction Stage Master Design Scope	Page 41 of 1352	EPC Contractor should review the Concept design, Master Development Plan (MDP) and all Architectural layout for execution and further development of their GFCs. These GFCs may further be submitted for Authority Engineers'/ IIM Indore's approval.	Bidder understanding on design Scope is as follows **For Architecture and MEP** - Bidder shall review the Concept Design provided as part of contract and Proceed with the GFC drawings and submit for Authority Engineer / IIM Indore's Approval **For Structure** - bidder shall prepare the detail structural drawing inline with DBR and obtain IIT approval for the Structural deliverables and drawings. The IIT vetted drawing shall be released as GFC drawing further to authority for commencment of work at site.	No Change in the stipulation of the RFP.
231	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Stagewise Scope of Work of EPC Contractor for Group-VIII Project, Pre-Construction Stage Coordination / Obtaining necessary statutory and other approvals from Local, State & Central Government agencies, etc.	Page 41 of 1352	The Institute has initiated for necessary approvals for Group VIII Projects from Local Authority/ Panchayat by paying necessary initial payments. The EPC Contractor is required to pursue with this authority for obtaining required clearances/certifications/ permissions and need to bear any further cost in this regard.	Bidder request to provided list of approval already initiated along with the status of the approval. All latest communication with authroirtes shall be provided for understanding	Prospective bidders may visit the office for witnessing the respective communications.
232	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Stagewise Scope of Work of EPC Contractor for Group-VIII Project, Pre-Construction Stage Schematic Design	Page 42 of 1352	Schematic Design of Architectural, Structural & MEP drawings. All Electrical and Mechanical Engineering Services should be designed as "NET ZERO ENERGY" Services.	Bidder understand the scope of NET Zero Energy is limited to provision of solar PV panels	Illustrated in the RFP.
233	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Structural DBR for Boys Hostel Building 9.0 Geotechnical Data & Foundation System	Page 333 of 1352	Geotechncial Report	Request you to provide the Geotechncial Report referred in the structural DBR	The detailed geotechnical report as available with the institute is attached herewith.
234	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Structural DBR 5. Design Methodology	Page 298 of 1352	The structural design of the buildings under the scope of work shall be as per BIS 1893(Draft version in circulation for comments by BIS vide letter no. CED 39/T10 dated 26th April 2023).	Since the draft code is still under discussion for implementation. With the changes and amendments yet to capture in the draft code, bidder request the Authority to include the code for sesmic as IS 1893: 2016	No Change in the stipulation of the RFP.
235	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Structural DBR	Page 333 of 1352	Structural DBR	Bidder understood the structural design shall be performed based on the performance / loading parameter mentioned in the Structural DBR, however the response reduction factor shall be choosen based on the structural system in line with IS 1893 / Draft Code	No Change in the stipulation of the RFP.
236	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Structural Drawing	Page 333 of 1352	General	We understand structural drawing provided is only for information. Bidder shall perform the structural design based on the architectural layout mentioned list of drawing section of RFP document . Bidder shall propose the structural system in line with performance and loading parameter mentioned in the structural DBR.	Yes
237	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Milestone Payment B. Schematic/ Detailed Design Development Drawings/GFC , and Laisoning Approvals @ 3%	Page 72 of 1352	Sub Mile Stone for Design and laisoning Approval	The mile stone days mentioned for each sub clause of Design including Laisoning Approval is not practical. Bidder propose to progress the design to the statisfication of authority engineer without comprimising the overall completion of each buildings for mentioned in the RFP.	No Change in the stipulation of the RFP.
238	Schedule - A Annex - IV Environmental Clearances	Page 188 of 1352	The contractor has to witness the documents available with IIM Indore, during the per- bid meeting.	Bidder understand the Environmental Clearance from PCB for the overall campus (Including the extension phase currently being taken as part of this RFP) has already been taken by the employer.	Pl. refer Clause 6.6 in the RFP.
239	Girls' Hostel Block Boys' Hostel Block Working Plans			Wall Type is not provided in the Plans issued	Typology mentioned in the RFP.
240	Staircase Details C-665 - MDCH - E - A - 1601 C-665 - TV - E - A - 1600		Wall Type is provided as "200mm thick Brick wall"	Please clarify which wall scheme to followed	Please refer the drawings in this respect.
241	Staircase Details SS Grading		Typical Railing Detail	SS Grade is not provided in the issued drawings	SS304 L
242	General Landscape		Horticulture Details	Please provide Detailed Technical Specification for Horticulture Works	Pl. refer Horticulture details attached with Landscape drawings. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
243	RFP Chapter - 9 Special Conditions of Contract 9.6 Maintenance Liability	216	9.6.1 The EPC Contractor shall be responsible for rectification of defects for a period of 36 (Thirty-six) Months from the date of Final Completion/ Handing Over of complete Project, without any additional charges/ cost implication on IIM Indore.	As per standard practice in Landscaping works the DLP period considered as 1 Year, Kindly check and confirm DLP and Maintenance period for Entire Landscape area.	No Change in the stipulation of the RFP.

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244	RFPChapter-4 List of personnerl, Plant & MachineryIndicative Manpower	28	B. Minimum month wise indicative number of skilled and unskilled resources to be deployed by EPC Contractor during the execution of the Group-VIII Project as mentioned below but not limiting to-	Kindly modify this clause as follows: B. The **tentative month wise deployment schedule** of skilled and unskilled resources for the execution of the Group-VIII Project provided as mentioned below. However, EPC contractor will be responsible to make arrangement of requisite resources to complete the project as per agreed timeline mentioned in RFP.	No Change in the stipulation of the RFP.
245	RFPChapter-4 List of personnerl, Plant & MachineryRequirement of P&M min. for Group VIII Projects	29	C. Minimum number of Plants and Equipment's to be deployed by EPC Contractor during execution of the Group-VIII Project as mentioned below but not limiting to Tower crane - 5 Nos, Mobile crane - 2 Nos, RMC Batching plant 60cum / hrs - 2 Nos, etc., Note – The aforesaid is minimum requirement as per the need of the Project however EPC Contractor will be responsible to make arrangement of requisite number of resources to complete the Project as per agreed timelines mentioned in the RFP	Provided minimum plants and equipments are higher side, hence, we request you to modify the clause as follows: Note – The aforesaid is **tentative** requirement **for** the Project however EPC Contractor will be responsible to make arrangement of requisite number of resources to complete the Project as per agreed timelines mentioned in the RFP	Please refer Chapter 4 Clause C. page no. 29 of the RFP.
246	General		Additional set of Queries	Kindly allow the submission of another set of queries after receipt of clarifications for first set of queries.	No further query shall be entertained.
247	General Last date and time of submission of RFP		Upto 3:00 PM on 14th July, 2023	Considering the scope of work and involving various specialised agenices, request to extend the bid submission by 3 (three) weeks from 14th July, 2023.	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
248	CHAPTER – 5 Eligibility Criteria, Evaluation and Selection of EPC Contractor		a. Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like: I. Institutional Buildings • Academic/ Training/ Resource • Complex Library building • Administrative Block/ Office Complex/ Board rooms/ Seminar halls • Smart classrooms II. Ancillary Buildings • Laboratory/ Workshop/ Studios • Auditorium/ convention Centre • Sports/Recreational Complex/ Community Centre • Cafeteria/ Student Activity Centre/ Utility Complex. III. Residential Facilities • Residential Complex • Hostels/ Guest House Complex	To become eligible for participating in bid process, the bidders shall satisfy the following work experience criteria. Three similar completed works each costing not less than Rs. 210.76 Crore. or Two similar completed works each costing not less than Rs. 263.45 Crore. or One similar completed work costing not less than Rs. 421.52 Crore. Similar Work shall mean: "Construction of any Completed Multi-Storied Building of minimum G+14 Storey (Machine Room and Mumty shall not be counted as a Storey) or 45-meter height in last 7 years. Additional Qualifying Criteria: - • Bidder should have completed one EPC work of 50% of ECV in Commercial /Institutional/ Hospital and Research Centres in last 7 years. • Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold rating for a project having construction area not less than 45000 sqm.	For Calculation of Storey, Machine Room and Mumty will not be counted/ considered as a Storey. Rest no change in the stipulation of the RFP.
249			b. Project Specific Eligibility Criteria • The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr. • The bidder shall have experience of executing G+14 structure with a min. height of 45 meter and shear wall technology. • Completed work shall be considered for qualifying and the contractor shall submit the work completion certificate along with the work value. • Work experience as a prime contractor will only be considered. • Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold rating for a project having construction area not less than 45000 sqm. • Solvency requirement 40% of the Contract Price. • The following ISO certification shall be required with latest audited report as mandatory – ➢ ISO 45001 ➢ OSHAS 18001 ➢ ISO 27001 • The bidder shall own Batching plant of min. 60 cum/hr. capacity and tower cranes (min 5 required) – height 50m, tip load 2 ton at 20m radius. • Requirement of experience in 5D BIM Modelling with LOD 500 in an EPC contract. • The bidder shall submit documents showing profitability for more than 3 years amongst the last 5 years.	• The following ISO certification shall be required with latest audited report as mandatory – ➢ ISO 45001/ OSHAS 18001 ➢ ISO 14001 ➢ ISO 9001 • Bidder/Associate should have experience in 5D BIM Modelling with LOD 500. • The bidder shall own Batching plant of min. 60 cum/hr. capacity and tower cranes (min 5 required) – height 50m, tip load 2 ton at 20m radius. Financial Requirement: • Solvency requirement 40% of the Contract Price. • The bidder shall submit documents showing profitability for more than 3 years amongst the last 5 years.	
250	CHAPTER – 2 C3- I - Technical Bid Stage-1:		iv. Average annual financial turnover of Minimum Rs. 2000 Cr. or more during the last 3- financial years 2019-20, 2020-21,2021-22 duly certified by a practicing Chartered Accountant with UDIN.	Since Project Estimated cost is: Rs. 526.9 Crore (Including GST as on date) And Project Duration is: 24 Calendar Months, including monsoon periods Practically Turnover for the project in a Year required maximum upto INR 302.96 Crores i.e. 125% of the annualised turnover. Hence request you to consider 50% of the required current financial turnover i.e. INR 1000 Crores. (Which will take care of the bidders current ongoing projects liability PLUS this project proposed liability in case of award to the bidder.)	No Change in the stipulation of the RFP.

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251	CHAPTER 2 - Invitation of RFP & Instruction to Bidders A.1.7 - Bid Security		Rs. 10.538 Crores /- (Rupees Ten Crore Fifty-Three Lakh Eighty Thousand only) A.3.3 - Bidders will have to deposit the Bid Security through NEFT or RTGS only. Other instruments are not accepted on this account.	Considering the project estimated cost bid security required is approximately 2% of the ECV. We request you to kindly reduce the value of bid security to 0.50% of the ECV i.e. Rs. 2.64 Crores & also allow EMD/Bid Security by Bank Guarantee also. Please provide the Bank Guarantee format.	No Change in the stipulation of the RFP in case of Value of the Bid Security. However, the Bid security may be considered in the form of Bank guarantee from any scheduled commercial banks subject to verification from issuing bank by the Institute in the approved format shall be acceptable. The validity period would be 45 days beyond the final bid validity period.
252	PQ - Tender notice - RFP -	Pg No: 3 1 of RFP	Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like:	Kindly add Residential Housing also in the Prequalifications requirement : Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional or Residential Housing campuses having facilities 1ilke:	No Change in the stipulation of the RFP.
253	3. TECHNICAL BID (STAGE— 1) {3.1)	Pg No: 34 of RFP	Completed Single EPC contract of similar scope (i.e., design, detail engineering, procurement, construction, preparation of drawings, interpretation of drawings, modifying drawings where necessary, preparation of estimates, supervision/ monitoring/fortnightly progress review/ project overall management till completion etc. complete ensuring quality & safety at works) for the work of similar nature & value having project cost at completion minimum of Rs. 526.9 Crore (including GST).	According to the Standard Bid Documents of Various States and Central Government agencies, The PQ conditions, Similar nature of work Shall be for Single work will be 80% and for Two works, it will be 60%. So, please modify it accordingly.	No Change in the stipulation of the RFP.
254	3• TECHNICAL BID (STAGE- 1) (3.1)	Pg No: 35 of RFP - Financial Credential	Average annual financial turnover of Minimum Rs. 2000 Cr. or more during the last 3- financial years 2019-20, 2020- 21, 202 1-22 duly certified by a practicing Chartered Accountant with UDIN	Kindly allow for Average annual financial turnover of Minimum Rs. 1800 Cr. or more during the last 3- financial years 2019-20, 2020- 21, 2021-22 duly certified by a practicing Chartered Accountant with UDIN.	No Change in the stipulation of the RFP.
255	3. TECHNICAL BID (STAGE— 1) (3.1)	Pg to: 35 of RFP - Project Specific	Project Executed with Building G+ 14 structure with a min. height of 45 meter.	Kindly modify as Project Executed with Building G+13 structure with a min. height of 42 meter	No Change in the stipulation of the RFP.
256	3. TECHNICAL BID (STAGE- l) (3.1)	Pg No: 35 of RFP - Project Specific	Bidder having previous Experience of executing an EPC project for IIT, IIM, AIIMS of similar scope having minimum value of Rs. 526.9 Cr. For a Single EPC Project.	Bidder having previous Experience of executing an Construction Project for IIT, IIM, AIIMS of similar scope having minimum value of 60% of ECV i.e, Rs.320 Cr. For a Single Construction Project.	No Change in the stipulation of the RFP.
257	Last date and time of submission of RFP	Up to 03:00 PM on 14th July , 2023		We here by request you to kindly extend the PQ - Bid Submission date to more Fifteen (15) days (i.e. till 29. 07. 2023) instead of the original date of submission 14.07.2023, to enable us to submit our most competitive bid.	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
258	GENERAL QUERIES-	--	-	Kindly provide priliminary Fire NOC (if available).	Pl. refer Clause 6.6 of the RFP.
259	GENERAL QUERIES-	--	-	Please be informed that, as per NBC 2016 Part 4 clause:3.4.6.3, Electrical MV main distribution panel and lift panels shall be provided with panel flooding system whereas the same is not mentioned in the RFP docs. Kindly confirm about the requirement to consider.	System shall be compliant with latest NBC/ IS Code.
260	GENERAL QUERIES-	--	-	Kindly provide the Fire Protection Schematic drawing for "MESS" Building.	Under the scope of EPC Contractor.
261	GENERAL QUERIES-	--	-	Kindly provide the Fire Alarm System (FAS) - schematic and floor layouts for all the buildings.	Pl. refer Chapter no. 6 and Fire fighting DBR.

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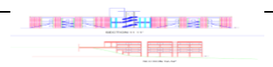
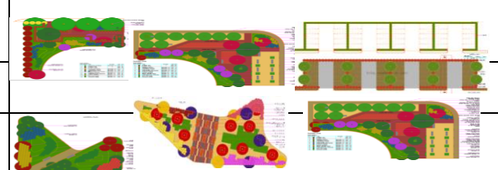
262	i) Dwg no. 665 - AB - E - F - 6000 to 6004 ii) Dwg no. C-665 - BH - E - FF - 6000 to 6004 iii)Dwg no. C-665 - GH - E - FF - 6000 to 6004 iv) Dwg no. C-665 - MC - E - A - 1100 to 1102 v) Dwg no. C-665 - MDCH - E - FF - 6000 to 6002 vi) Dwg no. 665 - MB - E - PL - 6000 to 6002 vii) GroupVIIIProjectsRFPatiimindore210623 FPS DBR	vii) Page 539 to 566 of 1352 Sprinkler Pipe Schedule	i) to vi) Sprinkler pipe schedule is as per NFPA vii) Sprinkler design as per Indian Standards	Please be informed that, in Sprinkler drawings, the Piping schedule is shown to be considered as per NFPA std, whereas FPS DBR mentions that Indian Std to be followed for Sprinkler design. Kinldy confirm that whcih std to be followed for sprinkler pipe schedule.	No Change in the stipulation of the RFP.
263	i) Dwg.no. C-665-BH-E-FF-6007 ii) Dwg no.C-665-GH-E-FF-6007 iii) GroupVIIIProjectsRFPatiimindore210623FPS Technical Specification	iii) pg.1124-1136 of1352 Sprinkler System	Single sprinkler riser is shown in the layout and technical specification do not mention about multi outlet type pumps.	The Building height of Boys & Girls Hostel is 49m. Please be informed that, as per IS 15105:2021, for a building of 45m ht. & above, individual sprinkler risers to be drawn from the pump for every 45 m and the pumps shall be of Multi stage multi outlet pump. Kindly confirm the same to follow as it is not indicated in the tender drgs.	System shall be compliant with latest NBC/ IS Code. And is very well forming part of the scope of the EPC Contractor.
264	i) Dwg.no. C-665 - AB - E - F - 6007 ii) Dwg.no. C-665 - BH - E - FF - 6007 iii) Dwg.no. C-665 - GH - E - FF - 6007 iv) Dwg.no. C-665 - MC - E - A - 1104 v) Dwg.no. C-665 - MDCH - E - FF - 6003 -		Internal Hydrant system Schematic layout - Shows double headed Hydrant valve Floor layouts - Shows Single headed Hydrant valve	Please note that Hydrant Valve Symbol shown in Fire protection Schematic layout indicates Double Headed Hydrant Valve whereas Specification and Floor layouts indicates Single headed hydrant valve as per NBC std. Biidder understands that system shall be as per NBC std. Kinldy confirm.	System shall be compliant with latest NBC/ IS Code. And is very well forming part of the scope of the EPC Contractor.
265	GroupVIIIProjectsRFPatiimindore210623Clause # 3	432/1352	Data System, LAN & Wi-Fi System Wi-Fi system is proposed for each Residence Flats 02Nos. Routers, corridors, Common area, Lobby, Control Room, utility areas of premises. 5nos. Data point with Cat6 Data Cable is provided with RJ-45 sockets in each residence.	Please confirm individual residences to be provided with Central wifi system or only provision to be made for the residence to choose any one of the available ISP's.	No Change in the stipulation of the RFP.
266	General Clause		Data System, LAN & Wi-Fi System Active Components.	Bidder understands that all active network components are not in our scope of work.	No Change in the stipulation of the RFP. It is very well forming part of the scope of the EPC Contractor.
267	Clause # 4	415, 421/1352	Dish Antenna TV System TV points (Dining area) is to be provided with RG Coaxial cables and Modular Socket and with Cat 6 Data cable for IPTV in Café / Common Room. The system shall consist of dish antenna, amplifier, Splitter, Set-top box, cabling and the modular outlet points inside the buildings.	Please clarify whether MATV or IP TV system to be considered.	Provision for both systems needs to be incorporated.
268	Clause # 4	415, 421/1352	Dish Antenna TV System TV points (Dining area) is to be provided with RG Coaxial cables and Modular Socket and with Cat 6 Data cable for IPTV in Café / Common Room. The system shall consist of dish antenna, amplifier, Splitter, Set-top box, cabling and the modular outlet points inside the buildings.	Bidder understands that only infrastructure to be provided for MATV. Displays are not part of the scope of works.	Display part is included in the scope of contractor, except Type V Residence where it rests with the occupants.
269	Clause # 3	456/1352	Computer, LAN , Networking. Cat 6A RJ 45 data outlets points will be provided for Computers, Networking, Telephones, Wi-Fi, Access Control, CCTV, Information Display system, BMS, SCADA etc.	Please provide the design brief and scope of Information display system.	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
270			General queries	Kindly provide the CAD drawings /3d models avaiable for the same.	No Change in the stipulation of the RFP.
271			General queries	Bidder request the authority to include the Built up area of each building in the RFP. Bidder responsibility is to develop the design with in the built up area and design intent provided with in the RFP	No Change in the stipulation of the RFP.
272			General queries	Kindly provide the male female ratio anticipated in each academic block.	No Change in the stipulation of the RFP.
273	Master site planC-665-LY-E-A-1000	Layout plan	Battery limit of scope in masterplan	Kindly provide the Battery limit of the project along with total site area of the development.	Master site layout plan is already there in the RFP.
274	Master site planC-665-LY-E-A-1000	Layout plan	Drawings	Kindly provide the detailed drawings of -	Detailed drawing development is forming the part of scope of EPC Contractor.
275				1. Electric substation 1&2	
276				2.Central UGT &Pump room	
277				3.Proposed STP & ETP	
278				4.Watch tower	
279	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE6. PAINTING WORKS	Page 848 of 1352	PAINTING ON EXTERNAL WALLS The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint/100% premium acrylic emulsion paint) of an approved brand and manufacturer.	We understand all the buildings shall have the external finish of painted surface. Kindly confirm	No Change in the stipulation of the RFP.

Sl. No.	Clause No. mentioned in communications of prospective bidders	Page No. mentioned in communications of prospective bidders	Subject mentioned in communications of prospective bidders	Prospective Bidder's Querry	Clarification/ Response by IIM Indore
280	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORETechnical speciifcations	Page 848 of 1352	PAINTING ON EXTERNAL WALLS The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint/100% premium acrylic emulsion paint) of an approved brand and manufacturer.	We understand all the buildings shall have the external finish of painted surface. Kindly confirm	No Change in the stipulation of the RFP.
281	6. PAINTING WORKS				
282	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORETechnical speciifcations	Page 859 of 1352	General The specialist agency engaged to carry out the external glazing installation and supply shall have at least 5 years of relevant experience and have completed external glazing systems of similar nature and equivalent scale of works as shown in the tender documents.	We understand the spcecialized agency can be contractor by itself. Kindly confirm.	Yes
283	7.4. Glazing with Patch Fittings		The specialist contractor shall submit an outline of recent comparable works (illustrated by appropriate drawings, sketches, photographs, brochures) by the firm / its technical partner to illustrate the competence, experience and suitability of the firm.		
284	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORETechnical speciifcations	Page 863 of 1352	Scope of Work-	Kindly confirm thye glass type and thickness for structural glazing system for all blocks. Only academic block has been provided with details.	Pl. refer DBR and drawings. Everywhere toughened glass need to be considered for Structural Glazing.
285	8.3. Structural Glazing System				
286	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORETechnical specifications	-		Kindly provide the Technical speciifcation for -	
287				1. Kota stone	First class Kota stone having 25mm thickness. The detailed specification shall be in conformation with CPWD specifications/ IS Code.
288				2. Ceramic tile	The detailed specification shall be as per the IS Code and in accordance with the direction of Engineer-in-charge.
289				3.Tensile roofing material	Serge Ferrari Flexlight advanced 902 S2 or equivalent with 15 years warranty.
290				4.Glass siliding doors	Mentioned in the RFP.
291	ACADEMIC BUILDING INCLUDING FACULTY & STAFF \ AA OFFICESC-665 - AB - E - A - 1106-1109	Sheet 1 of 1 SECTIONS		Kindly provide the Material & Detailsof external façade finishes of academic building along with the site contour layout	Mentioned in the RFP. Site contour layout is attached herewith.
292	ACADEMIC BUILDING INCLUDING-		Finsihing schedule - -	Kindly provide the complte wall finsihes for -	
293				1.Faculty cabins,	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
294				2. corridors,	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
295				3. electrical rooms,	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
296				4. staircase side walls	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
297				5. SS railing	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
298	GROUP VIII PROJECTS, IIM INDORE		Detailed Finishes for Type V	Kindly clarify if the kitchen slab and counter are in contractor scope.	Yes it is forming the part of the scope of the EPC Contractor.
299	MESS -	- -	-	Kindly provide the finishing schedule for internal and external of MESS.	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.

Sl. No.	Clause No. mentioned in communications of prospective bidders	Page No. mentioned in communications of prospective bidders	Subject mentioned in communications of prospective bidders	Prospective Bidder's Querry	Clarification/ Response by IIM Indore
300	MESSC-665 - MESS - E - A - 1721		SERVICE AREA WALL DADO LAYOUT	Kindly provide the wall Dado layout for Service area.	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
301	MESSC-665 - MESS - E - A - 1102, C-665 - MESS - E - A - 1201		TERRACE FLOOR WORKING PLAN & SECTIONS	Kindly provide the following details of terrace level seating arrangement-	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
302	MESS			1. Stage	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
303	MESS			2. Shops	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
304	MESS			3.Handwash area requirement	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
305	HOSTELBoys and Girls' Hostel Block	Working Plans		Wall Type is not provided in the Plans issued	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
306	MDC ACCOMMODATIONC-665 - MDCH - E - A - 1601	Staircase Details	Wall Type is provided as "200mm thick Brick wall"	Please clarify which wall scheme to followed	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
307	MDC ACCOMMODATIONC-665 - TV - E - A - 1600	Staircase Details	Wall Type is provided as "200mm thick BLock wall"		Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
308	MDC ACCOMMODATION	Typical Railing Detail	-	SS Grade is not provided in the issued drawings	SS304 L
309	MDC ACCOMMODATIONC-665 - MDCH - E - A - 1600	STAIRCASE DETAIL-01	-	Kindly provide the finishes of water tanks and service shafts	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
310	MDC ACADEMIC +INCUBATIONC-665 - MC - E - A - 1722			Kindly provide the wal finsihges of collaborative spaces,work cabins	Mentioned in the RFP. For additional detailing, it would be guided by the requirement of the Institute and as per the direction of Engineer-in charge.
311	Landscape LayoutC-665-LA-E-A-1020	1		Kindly clarify that the parking marking will be a part of Contractor's scope.	Yes it is forming the part of the scope of the EPC Contractor.
312	Landscape LayoutC-665-LA-E-A-1025 to C-665-LA-E-A-1036	6 to 17		Kindly provide sections through the different landscape area to understand the level of elements in the landscape layout.	Development of section is forming the part of the scope of the EPC Contractor.
313	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORELiaisoning & Approvals	63	Griha PreCertifiction	Kindly confirm if GRIHA Precertification should be obtained as a part of Overall Scope of Work . Kindly confirm if any agencies are already appointed by the client for Green building consulting.	No agency has been appointed by the Institute. As per the RFP stipulation Pre Certification is forming part of the scope of the EPC Contractor.
314	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE9.68 GRIHA Compliance	254	SPECIAL CONDITIONS OF GRIHA FOR CIVIL. The EPC Contractor shall make adequate arrangements to remove and store the topsoil layer (200mm upper layer) of the site in a standard manner or as recommended and approved by the Green Building Consultants.	It is Understood that the Genral Contractor shall support the Client appointed Green building Consultant with Required support for Documentation and Simulation works (Providing photographs, Technical datasheets etc) required to obtain the Griha certifiation.	Obtaining of certification including documentation, simulation, liasoning, visits, etc. is forming the part of EPC Constractor.
315	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDOREGREEN BUILDING DBR	590	It is mandatory for EPC contractors to get GRIHA 5-star rating for Group VIII Projects, IIM Indore.	Kinldy confim the cost of Registration,Precertification and Certification Fee to be paid to GRIHA Council is with Client or General Contractor.	Payment of statutory fees, liasoning cost, incidental expenses,charges of any nature required for obtaining of captioned certification is forming part of the scope of the EPC Contractor.

Sl. No.	Clause No. mentioned in communications of prospective bidders	Page No. mentioned in communications of prospective bidders	Subject mentioned in communications of prospective bidders	Prospective Bidder's Querry	Clarification/ Response by IIM Indore
316	RFP FOR EPC_GROUP VIII PROJECT AT IIM INOREPre- Construction Stage	Page 41 of 1352	Master Design Scope EPC Contractor has to develop detailed Structural design and drawing as per the relevant codal stipulations & in line with the DBRs/ Drawings/grids/ numerations given in RFP. After the development the same need to be vetted by any of the IIT for its correctness, stability, safety, durability, etc. EPC Contractor has to carry out detailed soil investigation as per the requirement/ for further development of the structural design/ upon requirement given by IIT's for vetting/ checking/ as per the codal stipulation. **All the designs and developments must encompass the provision for future expansions as detailed in the DBR (normally additional two floors provision has to be made in each building etc.) This activity has to be carried out by the EPC Contractor on its own risk and cost.**	Please confirm the EPC contractor scope is limited to structural loading provisioning for additional two floor for all building and shall not include any other design provision.	For the additional two floors, its is not limited to structural design only, it should also factor in all services, utilities, etc required to be provisioned for future expansion.
317	RFP 11.5	125 of 1352	External Internal Audits At any time during construction, the Authority may apoint on external technical auditor to conduct an audit of the Quality of the works.	The Authority appointed external technical auditor can access all processes related directly to the project.	No Change in the stipulation of the RFP.
318	RFP Chapter 7 - Milestone Payment	72	Milestone Payment	Can the intermediate & overall milestone of individual buildings be deviated keeping the overall duration of 24 months intact.	No Change in the stipulation of the RFP. However, any early achievement shall be appreciated. It is hereby reiterated that the time for EPC is 21 months only and 3 months for Handing over.
319	RFP Chapter 7 - Milestone Payment	76	Milestone Payment	Each building's finishing work includes a fabrication milestone; could you please specify what kind of fabrication it is?	Mentioned in the RFP.
320	RFP	45	Campus Rules And Regulations The construction will be happening inside the campus which is protected by the compound wall. Entries and exits are regulated by security. All the construction workers including Senior Staff of EPC Contractor should produce police clearance, COVID Vaccination Certificate and an ID card issued by them. Security/project department of IIM will randomly check the police clearance, COVID Vaccination Certificate and if anyone	Since the project location shall have separate barrication and entry to the site premises shall not affect the function of IIM Indore, we request you to remove the requriement of Police clearance. Also the number of labours shall be very high since there shall be change in labour from one specialization to other specialization and also continuity of same labour is limited.	No Change in the stipulation of the RFP.
321				The date be extended by 21 days after releasing of clarification of pre-bid queries	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.
322				Please allow joint venture	No Change in the stipulation of the RFP.
323				Please official sublet of up to 40% of contract value	No Change in the stipulation of the RFP.
324				Kindly allow secured advance in the tender.	No Change in the stipulation of the RFP.
325				Kindly make payment for the statutory approval by the department as this the standard norms.	No Change in the stipulation of the RFP.
326				Please revised the turnover criteria and similar work criteria as per the CPWD	No Change in the stipulation of the RFP.
327				Green building ongoing work should also be allowed	No Change in the stipulation of the RFP.
328				Please including price adjustment Clause which is currently deleted in the tender,	No Change in the stipulation of the RFP.
329	RFP FOR EPC_GROUP VIII PROJECT AT IIM INDORE Clause C.23	Page 20 of 1352	Joint Venture and Consortium is not permitted.	We request the Authority to review the clause requirement of JV as mentioned herein and allow JV for facilitating more bidder to participate in the bid which will create Healthy competition as for such large size of project not every bidder individually cannot meet the eligibility criteria sole as required which will limit competition in the project. In view of the above we request the Authority to amend the clause and allow JV which will create healthy competition and a competitive quote for the department.	No Change in the stipulation of the RFP.

Sl. No.	Clause No. mentioned in communications of prospective bidders	Page No. mentioned in communications of prospective bidders	Subject mentioned in communications of prospective bidders	Prospective Bidder's Querry	Clarification/ Response by IIM Indore
330	CHAPTER 5 Eligibility Criteria, Evaluation and Selection of EPC Contractor	Page 31 of 1352	1. Eligibility Criteria: Prospective bidder should have the following for making oneself eligible for participation in the bidding process – a. Should possess the experience of Single EPC Contract in the field of Design, Procurement, Engineering and Construction of Project comprising of planning and development of Integrated Campuses for Universities, Higher Education Institutions, Research and Development (R&D) institutions and other such institutional campuses having facilities like: I. Institutional Buildings -Academic / Training / Resource -Complex Library building -Administrative Block / Office Complex/ Board rooms / Seminar halls -Smart classrooms II. Ancillary Buildings -Laboratory / Workshop / Studios -Auditorium / convention Centre -Sports / Recreational Complex/ Community Centre -Cafeteria / Student Activity Centre / Utility Complex. III. Residential Facilities -Residential Complex -Hostels/ Guest House Complex	We request the Authority to review the Eligibility criteria as mentioned herein and amend the clause as requested below: - Any / All type of buildings, Roads, Highways or Railway projects of similar value shall be considered for meeting the eligibility criteria. Please do the needful as requested.	No Change in the stipulation of the RFP.
331	CHAPTER 5 Eligibility Criteria, Evaluation and Selection of EPC Contractor	Page 31 - 32 of 1352	-The bidder shall have experience in Single EPC Contract with min. Rs. 526.9 Cr. -The bidder shall have experience of executing G+14 structure with a min. height of 45 meter and shear wall technology. -Completed work shall be considered for qualifying and the contractor shall submit the work completion certificate along with the work value. -Work experience as a prime contractor will only be considered. -Contactor should have executed Green Building project and as certified, GRIHA – 3-star rating/ IGBC Gold rating for a project having construction area not less than 45000 sqm. -Solvency requirement 40% of the Contract Price. -The following ISO certification shall be required with latest audited report as mandatory – ➢ ISO 45001 ➢ OSHAS 18001 ➢ ISO 27001 -The bidder shall own Batching plant of min. 60 cum/hr. capacity and tower cranes (min 5 required) – height 50m, tip load 2 ton at 20m radius. -Requirement of experience in 5D BIM Modelling with LOD 500 in an EPC contract. -The bidder shall submit documents showing profitability for more than 3 years amongst the last 5 years.	We request the Authority to keep the Eligibility criteria confined to Similar Work requirement as requested above, which will create healthy competition in the bid as for such project not every bidder can meet all the requirement which limits competition as mentioned herein. Please do the needful as requested above.	(a)For P&M- Please refer Chapter 4 Clause C. page no. 29 of the RFP. (b)For ISO compliance - Pl. refer to clarification Sr. no. 50 '© For heights - Pl. refer to clarification Sr. no. 52 Rest no change in the stipulation of the RFP.
332	General		Due Date Extension	We are keenly interested to participate in the above bid, but looking into the clarity required for participation in bid as requested above and looking into the size and complexity of project, we request the Authority to please extend the bid Due date of the Project by one month from date of reply from your end for ubmitting a comprehensive bid.	The Last date of online submission of bids is hereby extended upto 3:00 PM of July 20th, 2023 and in accordance the hard copy submission shall be made up till 5:00 PM of July 26th, 2023 & Technical Bid opening shall be on 3:30 Pm of July 21st, 2023.

Important Note- The prospective bidders who have not attended Pre-bid meeting are advised to visit the site latest by July 14th, 2023 as it is mandatory. Failing which bids will not be considered.

Format of Bank Guarantee for Bid Security

Beneficiary: Indian Institute of Management Indore (hereinafter referred to as Beneficiary)

Date: …. [Insert date of issue of BG] …….

BANK GUARANTEE No.: … [Insert guarantee number] …

BANK GUARANTEE Amount: Rs. …….. [Rupees …….. Only]

Name/no. of RFP Request for proposal for Appointment of EPC Contractor for construction of Group VIII Projects comprising of multistorey hostel blocks, academic building, faculty offices & apartments and other associated Infrastructure at IIM Indore vide NIT No.: IIMI/Project/09/2023/144 File No 492.

Applicant / Bidder: … [Insert Bidder Name and Address] …

Guarantor: …. [Insert name and address of the issuing Bank] ….

Whereas Applicant / Bidder is willing to submit its bid against above referred RFP, and as per RFP conditions, Applicant is required to submit a Bank Guarantee as bid security. At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of Rs. …….. [Rupees …… Only]

THE CONDITIONS OF THIS OBLIGATION ARE:

1. If the Bidder withdraws or amends, impairs or derogates from the bid in any respect within the period of validity of this bid.

2. If the Bidder having been notified of the acceptance of his bid by the beneficiary during the period of its validity.

a. If the Bidder fails to furnish the Performance Security for the due performance of the contract, and / or

b. Fails or refuses to execute the contract, and / or

3. Contravenes any other RFP condition of the referred notified RFP having implications related to bid security.

We undertake to pay the Beneficiary up to the above amount upon receipt of its first written demand, unconditionally and without demur, protest or reservation, and without reference to the applicant / bidder and without the Beneficiary having to substantiate its demand, provided that in its demand the Beneficiary will note that the amount claimed by it is due to or owing to the occurrence of one or more of the above conditions.

This guarantee will remain in force up to and including 45 days after the period of bid validity with a claim period of 60 days after the validity period of BG.

Dated .....

For.....

(Indicate the name of the Bank)

Signature.....

Name of the Officer.....

Designation of the officer .....

Code no .....

Name of the Bank and Branch.....

GENERAL NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS INDICATED ARE IN METERS UNLESS OR OTHERWISE SPECIFIED.
3. THIS DRAWING, UNLESS OTHERWISE MENTIONED, TO BE PLOTTED TO MENTIONED PAPER SIZE.
4. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. DO NOT SCALE THE DRAWING.
5. DIMENSIONS / LEVELS SHOWN TO BE VERIFIED AT SITE BEFORE COMMENCEMENT OF WORK, ANY DISCREPANCIES IF NOTED BE BROUGHT TO THE NOTICE OF ARCHITECT PRIOR TO THE COMMENCEMENT OF WORK.

LEGEND :

S. NO.	NAME	SYMBOLS
01	ROAD	
02	BOUNDARY LINE	
03	STREET LIGHT ELECTRIC POLE	
04	TEMPLE	
05	SMALL TREE	
06	TREE	
07	OPEN DRAIN	
08	CHAMBER	
09	TBM	

T.B.M. LIST -

S.NO	TBM	X.	Y.	Z
1	A	581009.997	2502205.005	588.682
2	B	581006.356	2502211.483	588.605

CULVERT NEAR GATE NO. 3 - B.L.(HFL)- 574.765 M.

GRID INTERVEL - 10.0M. x 10.0 M.
CONTOUR INTERVEL - 0.5M.

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W E
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Report by :

CENGRS GEOTECHNICA PVT. LTD.
SOIL AND FOUNDATION EXPERTS

Final Report on:

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore Madhya Pradesh.

Submitted to:

M/s. A.K.A. Consultants (India) Pvt. Ltd.

8, S.B.I. Officers Colony, Near Beema Nagar, Opp. Anand Bazar, Indore - 452 001 (Madhya Pradesh)

Project No. 220036N | Date: 20th August, 2020 | Revision: 0

IAS ISO 9001:2015 CERTIFIED

Cengrs Geotechnica Pvt. Ltd.
Corporate Office : A - 100, Sec - 63, Noida - 201309 (U.P.) India. I CIN - U74899DL1990PTC040605
Phone : +91 120-4206771, Fax : +91 120-4206775, E : cengrs@gmail.com, W : www.cengrs.com
Registered Office : Cengrs House, B - 3/87, Safdarjung Enclave, New Delhi - 110029

ISO/IEC 17025:2017 Certified Laboratory (NABL) T-1741

20th August, 2020

M/s. A.K.A. Consultants (India) Pvt. Ltd.
8, S.B.I. Officers Colony,
Near Beema Nagar, Opp. Anand Bazar,
Indore - 452 001 (Madhya Pradesh)

Sub: **Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh**

We have carried out the captioned study in accordance to your work order 19th March, 2020. We thank you for your business, and hope that you are satisfied with our services rendered.

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

We have prepared this report based on our findings on site, as well as our vast experience gained in over 9000 projects completed over the past 30 years. We welcome you to involve us during the detailed foundation design, construction and testing phases, so that we may use our knowledge to serve you better.

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

Yours faithfully,
CENGRS GEOTECHNICA PVT. LTD.

Sanjay Gupta
Managing Director

Ravi Sundaram
Director

EXECUTIVE SUMMARY

Report Section	Topic	Summary of Results		
1.1	Project Name	Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh		
	Location	IIM , Indore, Madhya Pradesh		
1.3	Scope of Work	Nine (9) boreholes upto 3.0 m into rock with core recovery more than 50%.		
4.3	Site Stratigraphy	Depth,m		Soil Description
		From	To	
		0.0	0.5	Filled up
		0.5	3.5	Very weak Basalt, disintegrated, very severely weathered
		3.5	14.5	Moderately weak to moderately strong Basalt, moderately weathered
		14.5	16.5	Moderately strong Basalt, moderately weathered
4.4	Groundwater	Groundwater was met at 5.9 to 6.5 m depth at the time of our field investigations (July, 2020)		
5.2	Seismic Zone	Zone-III		
5.2	Liquefaction Potential	Liquefaction is not likely to take place at the site in the event of an earthquake.		
5.3	Foundation Type and Depth	Isolated foundations/ raft foundations may be provided for the proposed multi-storied Commercial Building.		
5.6	Open/raft Foundation Recommendations	Isolated foundations/ raft foundations for the planned facilities bear at or below 1.0-1.5 below EGL. Our recommended net bearing pressures for isolated foundations bearing at 1.5-3.0 m depth below EGL are presented in Section 5.6.		
6.0	Foundation Construction Considerations	Please refer to **Section 6.0** of this report for general foundation construction considerations on excavation, foundation level preparation and chemical attack.		

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Appendix-A : Typical Calculations

DEFINITION OF ACRONYMS

EGL	Existing Ground Level
NGL	Natural Ground Level
RL	Reduced Level
SPT	Standard Penetration Test
ISO	International Standards Organization
NABL	National Accreditation Board for Testing and Calibration Laboratories
BIS	Bureau of Indian Standards

LIST OF REFERENCES

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

1.0 INTRODUCTION

1.1 Project Description

M/s. Indian Institute of Management (IIM) Indore is planning to construct Boy's hostel, Girl's hostel, Academic block, Mess building, Academic Block, MDC Building, FOC Building, for its Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh. M/s. A.K.A. Consultants (India) Pvt. Ltd is the consulting engineers and architects for this project.

M/s. Cengrs Geotechnica Pvt Ltd has been appointed by M/s. A.K.A. Consultants (India) Pvt. Ltd to carry out a geotechnical investigation at the project site.

1.2 Purposes of Study

The overall purposes of this study are to investigate the stratigraphy at the site and to develop geotechnical recommendations for design and construction of the foundation system for the planned development. To accomplish these purposes, the study was conducted in the following phases:

(i) drilling nine (9) boreholes to 3.0 m into rock with core recovery more than 50%, in order to evaluate the stratigraphy and to collect soil and groundwater samples for laboratory testing;

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

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

1.3 Scope of Geotechnical Investigation

The following table presents details of the boreholes covered in this report:

Sr. No.	Structure Planned	Floor Planned	Borehole No.	UTM Coordinates, m*		Reduced Level,m	Termination Depth**, m
				Easting	Northing		
1	Boys Hostel-I	G+14	BH-1	580993	2502077	587.0	16.50
2	Boys Hostel-II	G+14	BH-2	581014	2502077	586.5	14.50
3	Acad Block (Lec Hall)	G+1	BH-3	581180	2502021	589.2	14.00
4	MDC Housing	G+10	BH-4	581353	2501981	589.8	13.50
5	FOC Housing-I	G+8	BH-5	581401	2501984	590.5	13.50
6	Mess Building	G	BH-6	581061	2502053	587.5	15.50
7	Girls Hostel	G+14	BH-7	581321	2502049	591.5	13.50
8	MDC Academic	G+2	BH-8	581308	2502007	590.0	14.50
9	Acad Block	G+4	BH-9	581189	2502054	591.0	14.38

* The test locations were marked on the field by us in the presence of a client representative using a hand-held Global Positioning System (GPS). A satellite image indicating the borehole locations (as recorded by GPS) is presented on Plate 2.

** As per instruction at site by the client to us / specified termination criteria.

2.0 FIELD INVESTIGATIONS

2.1 Rock Drilling

Rotary drilling through the soil /rock was performed using a rotary drill machine. The drill machine is driven by a bevel gear system run by a diesel engine. The drill chuck has four jaws to accommodate NW size drill rod.

Drilling and sampling of the rock was performed using a NX size double tube core barrel. A 32–carat diamond impregnated bit was used to drill through rock strata. It was attached to the end of a core barrel, which is connected to the machine by a string of NW drill rods and rotated by the drilling machine.

Water was circulated through the drill rods to the bottom of the hole. The water serves the purpose of lubrication, cooling and protection of the diamond drill bit in addition to flushing the cuttings out of the hole. A reciprocating pump was used to circulate the water. While drilling through soft rock that is likely to collapse, casing was installed. A NX casing (80 mm OD) was used. The casing with a diamond shoe bit was used to assist the casing to advance.

The percent recovery and Rock Quality Designation (RQD) was measured for each core run. The percent recovery is defined as the percent ratio of the cumulative length of core sample recovered to the total length of the core run. The Rock Quality Designation (RQD) is defined as the ratio of the cumulative length of core pieces 10 cm or longer to the total length of the core run, expressed as percentage.

The Rock Mass Rating (RMR), an engineering parameter that assists in assessing the rock quality and behavior is also presented on the individual rock profiles.

Details of samples collected and their respective RQD are presented on the rock profiles at various depths. The net effective drilling time, a qualitative assessment of the nature of the strata, is also included on the borehole logs. The color of return water and the extent of water loss while drilling the borehole recorded on the boring logs may be used for an assessment of the nature of rock, water-tightness of joints and possible presence of interconnected channels / cavities.

2.2 Groundwater

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

3.0 LABORATORY TESTS

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

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

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

- Test on Rock samples:

Name of Test	IS Code No.
Density & Water absorption	IS : 13030-1991, RA-2006
Specific Gravity	IS : 2720 (Part-3)-1980, RA-2007
Brazilian Shear Test	IS: 10082-1981 RA 2001
Unconfined compressive strength	IS : 9143-1979, RA-2006
Point Load Strength Index	IS : 8764-1998, RA-2008

Engineering terms used for describing soil is presented on Plate 3. Engineering terms used for describing rock are explained on Plate 4. Rock mass rating system using Bieniawski is presented on Plate 5. A note on our NABL accreditation together with uncertainty estimates in laboratory measurements is presented on Plate 6.

4.0 GENERAL SITE CONDITIONS

4.1 Site Conditions

The site is located near Chakka Residence at IIM, Indore having latitude of 22°37'25.26" N and longitude 75°47'17.28"E. It is accessible by Rau-Pithampur road which is passes near IIM. Site is covered by bushes and trees. A fill of 0.5 m is met at site except borehole-6 and borehole-8 where rock is encountered from ground level.

The existing ground levels all over the site in the campus area range from RL 586.5 m to RL 591.5 m, indicating a 5.0 m level variation in EGL. The depths referred to in this report are with respect to the EGL at the borehole locations, unless specified otherwise.

4.2 Regional Geology

The area belongs to the Deccan Traps[1]. It is a volcanic formation that consists of lava flows covering an area of more than 4,00,000 sq. km. with a thickness about 3,000 m.

The rock at the project site classifies as grey to black coloured basalt. It has vesicular and amygdaloidal features. Basalt in this area shows glassy texture with dull lusture.

The traps are classified into three groups i.e. Upper Traps, Middle Traps and Lower Traps.

Upper Trap	450 m	Basaltic flow	Bombay & Kathiwar
Middle Trap	1500 m	Basaltic flow	Madhaya Pradesh & Malwa
Lower Trap	150 m	Basaltic flow	Madhaya Pradesh

The topography has the variation in hardness in different flows. Upper trap of this succession is the hardest portion of this formation; which lies at the top (Bombay & Kathiwar), the middle fairly compact and the bottom showing cylindrical pipes filled with secondary minerals [2].

4.3 Site Stratigraphy

Based on the borehole data, the site stratigraphy may be broadly divided into two strata as given below:

Stratum–I: The overburden soils consist primarily of filled up material to 0.5 m depth except at BH-1 where silty clay is met from ground level to 0.5 m depth. At BH-6 and BH-8 rock was met from EGL. Refusal was met on soil-rock interface

Stratum–II: Below Stratum-I, very weak to moderately strong Basalt is met. The rock is grayish to black in colour. It is disintegrated from 0.5 to about 3.5 with core recoveries of 0 to 15% and nil RQD value. Below this the rock is moderately fractured, moderately weathered to the final explored depth of 16.5 m . The core recoveries range from 5 to 98 % with nil to 87 % RQD values. The RMR value ranges from 15 to 40.

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(1) Krishnan, M.S. (1986), **"*Geology of India & Burma*"**, CBS Publishers, New Delhi.
(2) Parbin Singh (6th Edition 1997), **"*Engineering & General Geolgy*".**

The following table summarizes the detailed stratigraphy encountered at each of the borehole locations:

Borehole No.	Depth, m		Reduced Level,m		Stratigraphy	SPT-N Value	Core Recovery, %	RQD, %	RMR
	From	To	From	To					
BH-1 (Boys Hostel-I)	0.0	0.5	587.0	586.5	Silty clay	-	-	-	-
	0.5	2.5	586.5	584.5	Very weak grey Basalt, disintegrated, very severely weathered	Ref	0	0	15
	2.5	4.5	584.5	582.5	Moderately weak grey Basalt, moderately weathered	-	26	0	20
	4.5	9.5	582.5	577.5	Moderately strong grey Basalt, moderately weathered	-	53-66	0-20	25-35
	9.5	10.5	577.5	576.5	Weak grey Basalt, severely weathered	-	21	0	17
	10.5	11.5	576.5	575.5	Moderately strong grey Basalt, moderately weathered	-	69	10	32
	11.5	16.5	575.5	570.5	Moderately strong grey Basalt, slightly weathered	-	79-90	30-87	35-50
BH-2 (Boys Hostel-II)	0.0	0.5	586.5	586.0	Fill	-	-	-	-
	0.5	3.5	586.0	583.0	Very weak grey Basalt, disintegrated, very severely weathered	Ref	0	0	15
	3.5	6.5	583.0	580.0	Weak grey Basalt, severely weathered	-	13-22	0	15-18
	6.5	7.5	580.0	579.0	Moderately weak grey Basalt, moderately weathered	-	39	28	30
	7.5	11.5	579.0	575.0	Moderately weak grey Basalt, moderately weathered	-	24-47	0	20-28
	11.5	14.5	575.0	572.0	Moderately weak grey Basalt, moderately weathered	-	58-63	0-15	28-35
BH-3 (Acad Block (Lec Hall)	0.0	0.5	589.2	588.7	Fill	-	-	-	-
	0.5	5.5	588.7	583.7	Very weak grey Basalt, disintegrated, very severely weathered	Ref	0-7	0	15
	5.5	10.5	583.7	578.7	Weak grey Basalt, severely weathered	-	16-29	0	15-20
	10.5	14.0	578.7	575.2	Moderately weak Basalt, moderately weathered	-	63-64	0-14	28-34
BH-4 (MDC Housing)	0.0	0.5	589.8	589.3	Fill	-	-	-	-
	0.5	1.5	589.3	588.3	Very weak grey Basalt, disintegrated, very severely weathered	Ref	0	0	15
	1.5	6.5	588.3	583.3	Weak grey Basalt, severely weathered	-	14-28	0	18-23
	6.5	11.5	583.3	578.3	Moderately weak grey Basalt, moderately weathered	-	40-49	0-10	22-30
	11.5	13.5	578.3	576.3	Moderately strong grey Basalt, moderately weathered	-	74-85	10-29	35-40
BH-5 (FOC Housing-I)	0.0	0.5	590.5	590.0	Fill	-	-	-	-
	0.5	9.5	590.0	581.0	Moderately weak grey Basalt, moderately weathered	Ref	19-36	0	18-25
	9.5	13.5	581.0	577.0	Moderately strong grey Basalt, moderately weathered	-	48-52	0-32	25-35

Borehole No.	Depth, m		Reduced Level,m		Stratigraphy	SPT-N Value	Core Recovery, %	RQD, %	RMR
	From	To	From	To					
BH-6 (Mess Building)	0.0	2.5	587.5	585.0	Weak grey Basalt, severely weathered	-	10-15	0	17
	2.5	5.5	585.0	582.0	Moderately weak grey Basalt, moderately weathered	-	30-42	0-25	20-32
	5.5	7.5	582.0	580.0	Weak grey Basalt, severely weathered	-	8-9	0	15
	7.5	11.5	580.0	576.0	Moderately weak grey Basalt, moderately weathered	-	30-52	0	22-30
	11.5	15.5	576.0	572.0	Moderately strong Basalt, moderately weathered		65-88	0-32	27-40
Bh-7 (Girls Hostel)	0.0	0.5	591.5	591.0	Fill	Ref	-	-	-
	0.5	3.5	591.0	588.0	Very weak grey Basalt, disintegrated, very severely weathered	Ref	0	0	15
	3.5	5.5	588.0	586.0	Moderately weak Basalt, severely weathered	-	23-40	0	20-23
	5.5	7.5	586.0	584.0	Moderately strong grey Basalt, moderately weathered	-	47-53	33-44	35-38
	7.5	9.5	584.0	582.0	Moderately weak grey Basalt, moderately weathered	-	34-40	0	25
	9.5	13.5	582.0	578.0	Moderately strong grey Basalt, moderately weathered	-	74-98	0-24	30-40
BH-8 (MDC Academic)	0.0	2.5	590.0	587.5	Weak grey Basalt, severely weathered	-	0-18	0	15
	2.5	8.5	587.5	581.5	Moderately weak to weak grey Basalt, severely weathered	-	22-33	0	18-22
	8.5	14.5	581.5	575.5	Moderately strong grey Basalt, moderately weathered	-	40-67	0-25	25-38
BH-9 (Acad Block)	0.0	0.5	591.0	590.5	Fill	-	-	-	
	0.5	2.5	590.5	588.5	Very weak grey Basalt, disintegrated, very severely weathered	-	0	0	15
	2.5	4.5	588.5	586.5	Weak grey Basalt, severely weathered	Ref	15-28	0	15-22
	4.5	9.5	586.5	581.5	Moderately strong grey Basalt, moderately weathered	-	33-61	0-17	22-32
	9.5	11.5	581.5	579.5	Moderately weak to weak grey Basalt, severely weathered	-	27-39	0	22-25
	11.5	14.4	579.5	576.6	Moderately weak to weak Basalt, moderately weathered	-	62-70	0	30-32

A pictorial summary of the borehole profiles is illustrated on Plates 17 & 18.

4.4 Groundwater

Based on the measurements in the completed boreholes, groundwater was met at 5.9 to 6.5 m depth (RL 580.4 to 585.6) at the time of our field investigations (July, 2020). Fluctuations may occur in measured water levels due to seasonal variations in rainfall and surface evaporation rates.

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

5.1 General

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

5.2 Liquefaction Susceptibility Assessment

Liquefaction is defined as the transformation of a granular material from a solid to a liquefied state as a consequence of increased pore-water pressure and reduced effective stress (Marcuson, 1978[3]). Increased pore pressure may be induced by the tendency of granular materials to compact when subjected to cyclic shear deformation, such as in the event of an earthquake.

As per IS: 1893 (Part 1) - 2002, liquefaction is likely in loose fine sand (SP) below the water table. The following points are highlighted for the soils with regard to liquefaction susceptibility assessment:

1. As mentioned in Section 4.3, 0.5 m thick Fill/silty clay is underlain by Basalt formation.

2. As mentioned in Section 4.4, groundwater was met at 5.9 to 6.5 m depth at the time of our field investigations (July, 2020).

Reviewing the site conditions, we are of the opinion that liquefaction is not likely to take place at the site in the event of an earthquake.

According to Fig.1 of IS: 1893 (Part1)-2002 showing seismic zones, the proposed site falls under Zone-III. The design for seismic forces should be done considering the project in Zone-III.

5.3 Foundation Type and Depth

As per the information provided to us, the proposed project comprises of various buildings such as Boy's hostel, Girl's hostel, Academic block, Mess building, Academic Block, MDC Building, FOC Building. We recommend the isolated foundations for the planned facilities may be used to support the structural loads.

We recommend a minimum foundation embedment depth of 1.0-1.5 m below EGL (existing ground level). Our recommended bearing pressures for foundation are given in Section 5.6.

5.4 Open Foundation on Rock - Concepts of Analysis

Analysis for allowable bearing capacity on rock has been done using the following methods:

(i) Presumptive values as published in IS: 12070-1987, RA-2010.
(ii) Based on rock mass rating (RMR values) as per IS: 12070-1987, RA-2010.
(iii) Using Bearing Capacity Factors, as given in "*Foundation on Rock*" by Duncan C.Wyllie (1992)

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

- **Presumptive Values**:

The classification of rock mass for assessing safe bearing pressure based on rock type is as follows:

Material	q_{ns} (T/m^2)
Bedded limestone in sound condition	400
Sedimentary rock, including hard shales and sandstones	250
Soft or broken bed rock (excluding shale), and soft limestone	100
Soft shale	30

Reduction factors are to be applied on the above presumptive values for saturation and orientation of joints.

- **Based on Rock Mass Rating (RMR)**

Analysis has been carried out using the RMR also known as Geo-mechanics classification [4] by considering classification parameters and their ratings. Depending upon the quality of rock as assessed from the RMR values, the net safe allowable bearing pressures are specified in IS: 12070.

- **Using Bearing Capacity Factors (Duncan C. Wyllie[5])**

Based on our evaluation of rock characteristics, parameters may be selected for foundation analysis by using following equation.

$$q_{ult} = c\,N_c C_c + 0.5\,B\Upsilon\,N_\Upsilon C_\Upsilon + \Upsilon D\,N_q$$

where :

c	=	cohesion intercept
ϕ	=	angle of internal friction of the rock mass
B	=	width of foundation
D	=	depth of foundation
Υ	=	effective unit weight of rock
C_c, C_γ	=	correction factors for foundation shape
C_c	=	1.20 for circular foundation
	=	1.25 for square foundation
C_γ	=	0.70 for circular foundation
	=	0.85 for square foundation
N_c,N_q,N_γ	=	bearing capacity factors which are a function of ϕ.

The bearing capacity factors may be calculated using the following equations:

$$N_c = 2\,N_\phi^{0.5}\,(N_\phi + 1)$$
$$N_\Upsilon = N_\phi^{0.5}\,(N_\phi^2 - 1)$$
$$Nq = N_\phi^2$$
$$N_\phi = \tan^2(45 + \phi/2)$$

(4) Bieniawski, Z.T (1989). **"Engineering Rock Mass Classifications"**, A Complete Manual for Engineers and Geologists in Mining, Civil & Petroleum Engineering, John Wiley Publication, New York.

(5) Duncan C.Wyllie (1992) **"Foundation on Rock"** by E&FN SPON (An imprint of Chapman & Hall) pp.114

The net safe bearing capacity may be worked out using the following equation:

$$q_{ns} = \frac{1}{F} [q_{ult} - \Upsilon D]$$

where :

q_{ns} = net safe bearing capacity
F = factor of safety (*taken as 3.0*)

5.5 Design Profile

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

Structure	Boreholes	Analysis Case	Design Parameters	
Boy's Hostel-I	BH-1		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 120 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 20
		Bearing Capacity Factors	c = 12 T/m^2 ϕ = 14°	c = 13 T/m^2 ϕ = 15°
Boy's Hostel-II	BH-2		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 85 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 15
		Bearing Capacity Factors	c = 12 T/m^2 ϕ = 14°	c = 13 T/m^2 ϕ = 15°
Academic Block (Lec. Hall)	BH-3		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 85 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 15
		Bearing Capacity Factors	c = 12 T/m^2 ϕ = 13°	c = 12 T/m^2 ϕ = 14°
MDC Housing	BH-4		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 100 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 18	RMR = 23
		Bearing Capacity Factors	c = 13 T/m^2 ϕ = 14°	c = 13 T/m^2 ϕ = 15°
Faculty Housing-I	BH-5		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 100 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 100 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 18	RMR = 18
		Bearing Capacity Factors	c = 13 T/m^2 ϕ = 14°	c = 13 T/m^2 ϕ = 15°
Mess Building	BH-6		Foundation Depth = 1.0 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 80 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 120 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 17	RMR = 25
		Bearing Capacity Factors	c = 11 T/m^2 ϕ = 13°	c = 13 T/m^2 ϕ = 15°

Structure	Boreholes	Analysis Case	Design Parameters	
Girl's Hostel	BH-7		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 85 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 15
		Bearing Capacity Factors	c = 12 T/m^2 ϕ = 14°	c = 13 T/m^2 ϕ = 15°
MDC Academic	BH-8		Foundation Depth = 1.0 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 110 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 22
		Bearing Capacity Factors	c = 11 T/m^2 ϕ = 13°	c = 13 T/m^2 ϕ = 15°
Academic Block (Faculty Office)	BH-9		Foundation Depth = 1.5 m	Foundation Depth = 3.0 m
		Presumptive Value	q_{na} = 75 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1	q_{na} = 85 T/m^2 c_{sub} = 0.75 c_s = 0.75 c_c = 1
		RMR	RMR = 15	RMR = 15
		Bearing Capacity Factors	c = 12 T/m^2 ϕ = 13°	c = 12 T/m^2 ϕ = 14°

Design water table for foundation analysis: Taken at ground level.

5.6 Recommended Net Allowable Bearing Pressures

The following table presents our recommended values of net allowable bearing pressures for isolated foundations bearing at 1.0-1.5 m depths below EGL.

Structure	Borehole	Foundation Depth, m below EGL	RL of Foundation, m	Likely Foundation Bearing Material	*Recommended Net Allowable Bearing Pressure, T/m^2	Modulus of Subgrade Reaction, k, kN/m^3
Boys Hostel-I	BH-1	1.5	585.5	Weathered Rock	35.0	29000
		3.0	584.0		40.0	33333
Boys Hostel-II	BH-2	1.5	585.0	Weathered Rock	35.0	29000
		3.0	583.5		40.0	33333
ACAD Block (LEC Hall)	BH-3	1.5	587.7	Weathered Rock	30.0	25000
		3.0	586.2		35.0	29000
MDC Housing	BH-4	1.5	588.3	Weathered Rock	35.0	29000
		3.0	586.8		40.0	33333
FOC Housing-I	BH-5	1.5	589.0	Weathered Rock	35.0	29000
		3.0	587.5		40.0	33333
Mess Building	BH-6	1.0	586.5	Weathered Rock	30.0	25000
		2.0	585.5		35.0	29000
		3.0	584.5		40.0	33333
Girls Hostel	BH-7	1.5	590.0	Weathered Rock	35.0	29000
		3.0	588.5		40.0	33333
MDC Academic	BH-8	1.0	589.0	Weathered Rock	30.0	25000
		2.0	588.0		35.0	29000
		3.0	587.0		40.0	33333
ACAD Block	BH-9	1.5	589.5	Weathered Rock	30.0	25000
		3.0	588.0		35.0	29000

* minimum 0.5 m seated into disintegrated rock and rock.

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

1. The above values include a bearing capacity safety factor of 3.0 for foundations in rock.

2. Total settlement of foundations designed for the above recommended bearing pressures is expected to be about 12 mm for rock.

3. Net bearing pressures for foundations at intermediate depths may be interpolated linearly between the values given above.

4. The suggested modulus of sub grade reaction (k) has been computed based on empirical relationships as given in published literature (Bowles, J.E. (1996), "Foundation Analysis and Design Fifth Edition", The McGraw-Hill Companies Inc., pp. 503) and is applicable for 6-10 m size square footing at the centre of the loaded area.

5.7 Definition of Net Bearing Pressure

For the purposes of this report, the net allowable bearing pressure should be calculated as the difference between total load on the foundation and the weight of the soil overlying the foundation divided by the effective area of the foundation.

The following equations may be used –

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

where:

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

It may please be noted that safe bearing pressures recommended in this report refer to “net values”. Where filling is done, it should be treated as a surcharge over the foundation.

6.0 FOUNDATION CONSTRUCTION CONSIDERATIONS

6.1 Excavation

Excavation through the weathered / fractured rock formation may be done using jack hammers or rock breakers or using a JCB (or equivalent) excavator. We anticipate that most excavations through rock can be completed mechanically without the need of blasting. If localized zones of hard rock are met, controlled blasting may be done if required.

6.2 Foundation Level Preparation

For foundations on rock, all loose, weathered or fragmented rock should be removed so that foundations may bear on the natural undisturbed rock formation. The rock surface should be roughened, scarified and watered thoroughly to ensure proper bond between rock and concrete. The foundations should be seated at least 0.5 m into the rock formation.

The surface should then be protected from disturbances due to construction activities so that the foundations may bear on the natural undisturbed ground. We recommend the placement of minimum 50 mm thick “blinding layer” of lean concrete to facilitate placement of reinforcing steel and to protect the soils from disturbance.

7.0 VARIABILITY IN SUBSURFACE CONDITIONS

Subsurface conditions encountered during construction may vary somewhat from the conditions encountered during the site investigation. In case significant variations are encountered during construction, we request to be notified so that our engineers may review the recommendations in this report in light of these variations.

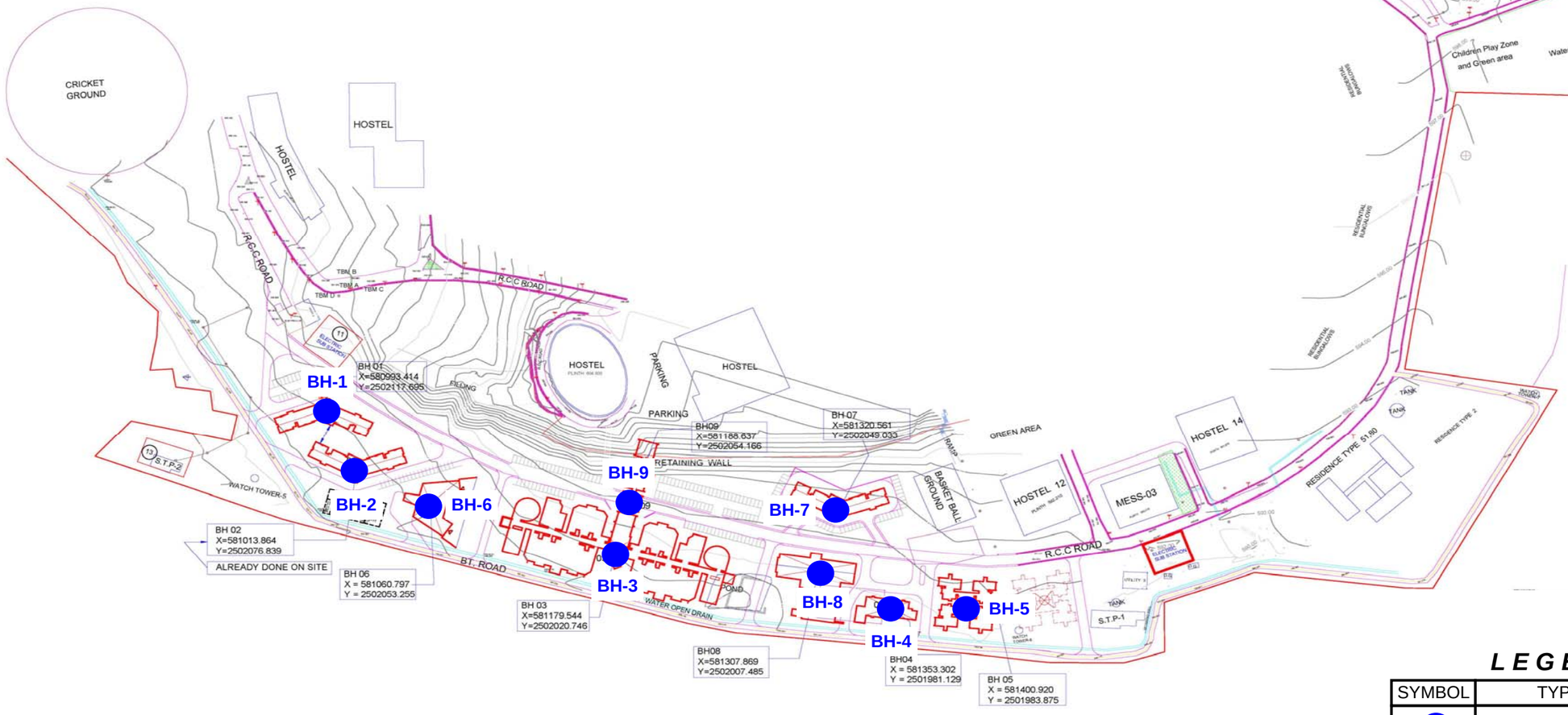
COORDINATES

S.No.	BLOCK NAME	FLOOR HT.	GRID POINT	COORDINATES		
1.	BOYS' HOSTEL-I	(G+14)	BH01	X= 580993.414	Y=2502117.695	Z=587.00
2.	BOYS' HOSTEL-II	(G+14)	BH02	X = 581013.864	Y = 2502076.839	Z=586.50
3.	ACAD. BLOCK (LEC. HALL)	(G+1)	BH03	X = 581179.544	Y = 2502020.746	Z=589.20
4.	MDC HOUSING	(G+10)	BH04	X = 581353.302	Y = 2501981.129	Z=589.80
5.	FAC. HOUSING-I	(G+8)	BH05	X = 581400.920	Y = 2501983.875	Z=590.50
6.	MESS BUILDING	(G)	BH06	X = 581060.797	Y = 2502053.255	Z=587.50
7.	GIRLS HOSTEL	(G+14)	BH07	X = 581320.561	Y = 2502049.033	Z=591.50
8.	MDC ACADEMIC	(G+2)	BH08	X=581307.869	Y=2502007.485	Z=590.00
9.	ACAD. BLOCK (FAC. OFF.)	(G+4)	BH09	X=581188.637	Y=2502054.166	Z=591.00

S. NO.	NAME	SYMBOLS
01	ROAD	
02	BOUNDARY LINE	
03	STREET LIGHT ELECTRIC POLE	
04	TEMPLE	
05	OPEN DRAIN	
06	CHAMBER	

T.B.M. LIST -

S.NO	TBM	X.	Y.	Z	
1	A	581009.997	2502205.005	592	
2	B	581006.356	2502211.483	591.923	
3	D	580991.461	2502199.291	591.927	NEAR UTILITY 4
4	G	581126.656	2502170.107	603.702	
				NEAR HOSTEL	



LEGEND

SYMBOL	TYPE OF TEST
●	Borehole **(BH)**

Plan of Field Investigation

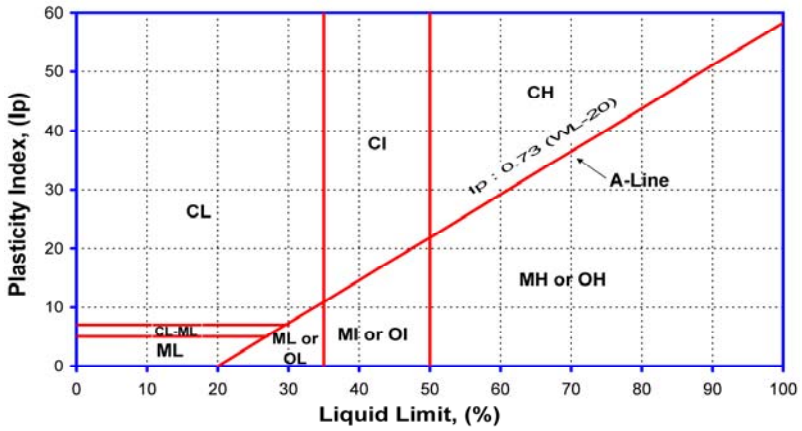
- Satellite image taken from Google Earth®
- Test Locations marked as per GPS coordinates taken on site using hand-held Garmin ® device
- Accuracy of hand-held GPS device generally ranges from 4-6m, and varies depending on the availability of satellite connection at the site

Satellite Image of Site and Test Locations

Plasticity of Clay

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

Plasticity Chart



Consistency of Cohesive Soils

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

Density Condition of Granular Soils

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

Degree of Expansion of Fine Grained Soils

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

Engineering Description of Soils

Intact Rock Strength		
Term	Unconfined Compressive Strength (kg/sq.cm)	Field Estimation of Hardness
Extremely Strong	>2000	Several blows of geologic hammer required to break specimen
Very strong	1000 to 2000	More than one blow of geologic hammer required to break specimen
Strong	500 to 1000	Hand held specimen can be broken with single blow of hammer.
Moderately strong	125 to 500	Indentation of 5 mm with sharp end of pick
Moderately weak	50 to 125	Too hard to cut by hand into a compression test specimen
Weak	12.5 to 50	Materials crumble under firm blows with the sharp end of a geologic pick.
Very weak	4 to 12.5	Brittle or tough, may be broken by hand with difficulty

Relationship of RQD and Rock Quality		Weathering	Grade
Rock Quality	Rock Quality Designation (RQD), %	Fresh : No visible sign of rock material weathering: perhaps slight discoloration on major discontinuity surfaces	I
Very Poor	0-25	Slightly weathered: Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally that in its fresh condition	II
Poor	25-50		
Fair	50-75		
Good	75-90	Moderately weathered : Less than half of the rock material is decomposed and/or disintegrated to a soil.Fresh or discolored rock is present either as a continuous framework or as core stones	III
Excellent	90-100		
RQD is the percentage ratio of the total length of intact core specimen 100 mm long or longer to the total length of core run.		Highly weathered: More than half of the rock material is decomposed and/or disintegrated to a soil.Fresh or discolored rock is present either as a continous framework or as core stones	IV
		Completely weathered: All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact	V

Rock Description Terms	
Igneous	Rock formed by cooling of molten rock/earth mass.Example:Granite, basalt.
Sedimentary	Rock formed by deposition of sediments. Example: Sandstone, Limestone. Shale.
Metamorphic	Sedimentary rock metamorphosed by natural process under the action of high termperature and pressure.Example:Quartzite, slate.
Solution cavities	Cavities formed by dissolving of rock in water-during flow of underground water, usually observed in limestone.
Vugs	Deposits of crystals, usually calcite or gypsum, formed in solution cavities during the drying of the water inside these cavities.
Intrusions	Usually of igneous nature formed by intrusion of such matter into sedimentary rock formations. Intrusions cutting across bedding or structural planes are called dykes. Intrusions conforming to bedding/structural planes are called sills.
Porphyritic	A rock texture term, describes igneous rock containing relatively large crystals set in a fine grained groundmass.
Vesicular	Small gas bubbles trapped in volcanic lavas during solidification.

Engineering Desciption of Rocks

A. Classification Parameters and Their Ratings									
Parameter			Rating of Values						
1	Strength of Intact Rock Material	Point-load strength index (MPa)	>10	4-10	2-4	1-2	for this low range, uniaxial compressive test is preferred		
		Uniaxial compressive strength (MPa)	>250	100-250	50-100	25-50	5-25	1-5	<1
	Rating		15	12	7	4	2	1	0
2	Drill core quality RQD(%)		90-100	75-90	50-75	25-50	<25		
	Rating		20	17	13	8	3		
3	Spacing of discontinuities		>2m	0.6-2 m	200-600m	60-200 mm	<60 mm		
	Rating		20	15	10	8	5		
4	Condition of discontinuities		Very rough surfaces Not continuous No separation unweathered wall rock	Slightly rough surfaces separation <1 mm slightly weathered walls	Slightly rough surfaces separation < 1 mm Highly weathered walls	Slickensided surfaces or Gouge< 5mm thick or separation 1-5 mm continous	Soft gouge>5 mm thick or separation >5mm Continuous		
	Rating		30	25	20	10	0		
5	Ground water	Inflow per 10 m tunnel length (L/mm)	None	<10	10-25	25-125	>125		
		Ratio : Joint water pressure / Major principal stress	0	<0.1	0.1-0.2	0.2-0.5	>0.5		
		General Conditions	Completely dry	Damp	Wet	Dripping	Flowing		
	Rating		15	10	7	4	0		

B. Rating Adjustment for Discontinuty Orientation						
Strike and dip orientations of		Very favourable	Favourable	Fair	Unfavourable	Very unfavourable
Rating	Tunnels and mines	0	-2	-5	-10	-12
	Foundations	0	-2	-7	-15	-25
	Slopes	0	-5	-25	-50	-60

C. Rock Mass Classes Determined from Total Ratings					
Rating	100-81	80-61	60-41	40-21	<20
Class no.	I	II	III	IV	V
Description	Very good rock	Good rock	Fair rock	Poor rock	Very poor rock

D. Meaning of Rock Mass Classes					
Class No.	I	II	III	IV	V
Average stand-up time	20 yr for15 m span	1 yr for 10 m span	1 wk for 5 m span	10hr for 2.5 m span	30 min for 1 m span
Cohesion of the rock mass (kPa)	>400	300-400	200-300	100-200	<100
Frictin angle for the mass (deg)	>45	35-45	25-35	15-25	<15

Rock Mass Rating System

NABL Accredited Laboratory

Our laboratory is accredited to **National Accreditation Board for Testing and Calibration Laboratories (NABL)**, New Delhi. The quality procedures in our laboratory conform to the International Standard **ISO/IEC: 17025-2017.**

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

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

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

Uncertainty

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

As a part of our commitment to our clients, we have worked out the uncertainty in the parameters reported by our laboratory. Although this does not form a part of our contract agreement, we present below our statistical estimate of uncertainty of various parameters based on our most recent evaluation (November, 2019).

Test / Parameter		Uncertainty*	Test / Parameter		Uncertainty*
Moisture Content		± 0.20%	Free Swell Index, %		± 0.1%
Bulk & Dry Density		± 0.05 g/cc	Swell Pressure		± 0.89 %
Specific Gravity		± 0.020	Consolidation	Pressure	± 0.03 kg/cm^2
Liquid Limit		± 0.41%		Void Ratio	±0.01
Plastic Limit			Density Index (relative density) of cohesionless soils		± 5 %
Shrinkage Limit		± 0.24%			
Unconfined Compression	c	± 0.052 kg/cm^2	CD Direct Shear Test	ϕ	± 0.52 degrees
UU Triaxial Test	c	± 0.11 kg/cm^2	Soil Gradation		± 0.4% of particle size
	ϕ	± 0.11 degree			
Std/Mod Proctor Compaction	MDD	± 0.05 g/cc	Coefficient of Permeability		± 1.0%
	OMC	± 0.38%	Rock	Crushing Strength	± 4.7 kg/cm^2
Laboratory CBR		± 1.6%		Point Load Strength Index	± 0.017 kg/cm^2

* at 95 percent confidence level for coverage factor of 2

Uncertainty in Laboratory Measurements

BOREHOLE NO: BH-1

PAGE 1 OF 2

BOREHOLE NO : BH-1	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: Boys Hostel-I	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 587
COORDINATES: 580993.414 E, 2502076.839 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.3
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 16.5
DATE OF START : 07-Jul-2020	**DATE OF FINISH** : 10-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			0.50	Hard grey silty clay, high plastic (CH)	586.50	DS-1	0.00-0.50							
1	100/ 1cm			Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1	0.50-0.66							
						WS-1	0.50-1.50					0	0	15
2	Ref*/ 3cm			completely weathered, disintegrated		SPT-2	1.50-1.53							
						WS-2	1.50-2.50					0	0	15
3	Ref*/ 3cm			Moderately weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-3	2.50-2.53							
						RK-1	2.50-3.50					26	0	20
4				highly weathered		RK-2	3.50-4.50					26	0	20
5				Moderately strong greyish black		RK-3	4.50-5.50					66	10	35
6				BASALT with amagadaloidal structures,		RK-4	5.50-6.50					58	20	35
7				moderately fractured, moderately weathered		RK-5	6.50-7.50					38	0	25
8						RK-6	7.50-8.50					56	0	25
9				Weak reddish black vesicular		RK-7	8.50-9.50					53	0	25
10				BASALT with amagadaloidal structures,		RK-8	9.50-10.50					21	0	17
11				moderately fractured, severely weathered		RK-9	10.50-11.50					69	10	32
12				Moderately strong greyish black		RK-10	11.50-12.50					83	43	35
13				BASALT with amagadaloidal structures,		RK-11	12.50-13.50					84	55	40
14				moderately fractured, slightly weathered		RK-12	13.50-14.50					79	30	40
15						RK-13	14.50-15.50					82	37	40
16						RK-14	15.50-16.50							

Brown

Grey

90%

80%

Impregnated Bit

(Continued Next Page)

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-1

PAGE 2 OF 2

BOREHOLE NO : BH-1	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: Boys Hostel-I	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 587
COORDINATES: 580993.414 E, 2502076.839 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.3
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 16.5
DATE OF START : 07-Jul-2020	**DATE OF FINISH** : 10-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			16.50		570.50	RK-14	15.50-16.50			80%		90	87	50
				Termination at 16.50 meters Depth.										

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-2

PAGE 1 OF 1

BOREHOLE NO : BH-2	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: Boys Hostel-II	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 586.5
COORDINATES: 581013.864 E, 2502076.839 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.1
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 14.5
DATE OF START : 25-Jul-2020	**DATE OF FINISH** : 25-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			0.50	Filled up Material	586.00	DS-1	0.00-0.50							
1	Ref*/ 7cm			Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1	0.50-0.57							
						WS-1	0.50-1.50					0	0	15
2	Ref*/ 7cm			completely weathered, disintegrated		SPT-2	1.50-1.57							
						WS-2	1.50-2.50					0	0	15
3	Ref*/ 3cm					SPT-3	2.50-2.53							
						WS-3	2.50-3.50					0	0	15
4	Ref*/ 7cm			Weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-4	3.50-3.57							
						RK-1	3.50-4.50					13	0	15
5				highly weathered		RK-2	4.50-5.50					15	0	15
6						RK-3	5.50-6.50					22	0	18
7				Moderately weak greyish black BASALT with		RK-4	6.50-7.50					39	28	30
8				amagadaloidal structures, intensely fractured,		RK-5	7.50-8.50					24	0	20
9				moderately weathered		RK-6	8.50-9.50					26	0	20
10						RK-7	9.50-10.50					22	0	20
11						RK-8	10.50-11.50					47	0	28
12						RK-9	11.50-12.50					58	15	35
13						RK-10	12.50-13.50					59	0	28
14			14.50		572.00	RK-11	13.50-14.50					63	0	28

Brown

Grey

90%

80%

70%

Impregnated Bit

Termination at 14.50 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-3

PAGE 1 OF 1

BOREHOLE NO : BH-3	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 2.5 m
STRUCTURE: ACAD Block (LEC Hall)	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 589.2
COORDINATES: 581179.544 E, 2502020.746 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.2
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 14
DATE OF START : 23-Jul-2020	**DATE OF FINISH** : 24-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
1	Ref*/ 8cm		0.50	Filled up Material	588.70	DS-1	0.00-0.50	DS						
				Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1	0.50-0.58	WS						
						WS-1	0.50-1.50					0	0	15
2	Ref*/ 4cm			completely weathered, disintegrated		SPT-2	1.50-1.54							
						WS-2	1.50-2.50					0	0	15
3	Ref*/ 4cm					SPT-3	2.50-2.54							
						RK-1	2.50-3.50	RK				7	0	15
4	Ref*/ 2cm					SPT-4	3.50-3.52							
						RK-2	3.50-4.50					5	0	15
5	Ref*/ 1cm					SPT-5	4.50-4.51							
						WS-3	4.50-5.50					0	0	15
6	Ref*/ 2cm			Weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-6	5.50-5.52							
						RK-3	5.50-6.50					16	0	15
7				highly weathered		RK-4	6.50-7.50		Brown	90%		22	0	15
8						RK-5	7.50-8.50					29	0	20
9						RK-6	8.50-9.50					19	0	17
10				Moderately weak greyish black BASALT with		RK-7	9.50-10.50		Brownish Grey	80%		23	0	17
11				amagadaloidal structures, intensely fractured,		RK-8	10.50-11.50					63	14	34
12				moderately weathered		RK-9	11.50-12.50		Grey	70%		64	0	28
13						RK-10	12.50-14.00					64	0	28
14			14.00		575.20									

Termination at 14.00 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-4

PAGE 1 OF 1

BOREHOLE NO : BH-4	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: MDC Housing	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 589.8
COORDINATES: 581353.302 E, 2501981.129 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.5
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 13.5
DATE OF START : 15-Jul-2020	**DATE OF FINISH** : 16-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			0.50	Filled up Material	589.30	DS-1	0.00-0.50							
1	Ref*/ 4cm			Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1 WS-1	0.50-0.54 0.50-1.50					0	0	15
2	Ref*/ 2cm			completely weathered, disintegrated Weak greyish black BASALT with		SPT-2 WS-2	1.50-1.52 1.50-2.50					21	0	18
3				amagadaloidal structures, intensely fractured,		RK-1	2.50-3.50					28	0	23
4				highly weathered		RK-2	3.50-4.50					14	0	18
5						RK-3	4.50-5.50					24	0	19
6						RK-4	5.50-6.50					25	0	19
7				Moderately weak greyish black BASALT with		RK-5	6.50-7.50		Yellowish Brown	90%	Impregnated Bit	40	0	22
8				amagadaloidal structures, intensely fractured,		RK-6	7.50-8.50					54	0	25
9				moderately weathered		RK-7	8.50-9.50					49	0	25
10						RK-8	9.50-10.50					44	0	25
11				Moderately strong greyish black		RK-9	10.50-11.50		Brown	80%		48	10	30
12				BASALT with amagadaloidal structures,		RK-10	11.50-12.50		Grey			74	29	40
13				moderately fractured, moderately weathered		RK-11	12.50-13.50					85	10	35
			13.50		576.30									

Termination at 13.50 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-5

PAGE 1 OF 1

BOREHOLE NO : BH-5	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: FOC Housing-I	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 590.5
COORDINATES: 581400.92 E, 2501983.875 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.2
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m** 13.5
DATE OF START : 16-Jul-2020	**DATE OF FINISH** : 18-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
1	Ref*/ 2cm		0.50	Filled up Material	590.00	DS-1	0.00-0.50	DS						
				Moderately weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1	0.50-0.52							
						WS-1	0.50-1.50	WS				26	0	18
2				moderately weathered		RK-1	1.50-2.50	RK				19	0	18
3						RK-2	2.50-3.50					23	0	18
4						RK-3	3.50-4.50					27	0	22
5						RK-4	4.50-5.50					30	0	22
6						RK-5	5.50-6.50		Brown	90%	Impregnated Bit	25	0	22
7						RK-6	6.50-7.50					29	0	25
8						RK-7	7.50-8.50					36	0	25
9						RK-8	8.50-9.50					28	0	22
10				Moderately strong greyish black		RK-9	9.50-10.50		Greyish	80%		50	32	35
11				BASALT with amagadaloidal structures,		RK-10	10.50-11.50					50	10	30
12				moderately fractured, moderately weathered		RK-11	11.50-12.50					52	0	25
13			13.50		577.00	RK-12	12.50-13.50					48	0	25

Termination at 13.50 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-6

PAGE 1 OF 1

BOREHOLE NO : BH-6	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 2.5 m
STRUCTURE: Mess Building	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 587.5
COORDINATES: 581060.797 E, 2502053.255 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.42
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m** 15.5
DATE OF START : 10-Jul-2020	**DATE OF FINISH** : 13-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m / LAYER ELEVATION, m	MATERIAL DESCRIPTION	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
1				Weak greyish black BASALT with amagadaloidal structures, intensely fractured, highly weathered	RK-1	0.00-0.50	Rock Core (RK)	Brownish Grey	80%	Impregnated Bit	10	0	17
					RK-2	0.50-1.50					15	0	17
2					RK-3	1.50-2.50					13	0	17
3				Moderately weak greyish black BASALT with amagadaloidal structures, intensely fractured, moderately weathered	RK-4	2.50-3.50					42	0	25
4					RK-5	3.50-4.50					52	25	32
5					RK-6	4.50-5.50					30	0	22
6				Weak greyish black BASALT with amagadaloidal structures, intensely fractured, highly weathered	RK-7	5.50-6.50					8	0	15
7	Ref*/ 2cm				SPT-1	6.50-6.52	Standard Penetration Test (SPT)						
					WS-1	6.50-7.50	Wash Sample (WS)				9	0	15
8	Ref*/ 6cm			Moderately weak greyish black BASALT with amagadaloidal structures, intensely fractured, moderately weathered	SPT-2	7.50-7.56	Rock Core (RK)						
					RK-8	7.50-8.50					52	0	30
9					RK-9	8.50-9.50					42	0	25
10					RK-10	9.50-10.50					44	0	25
11					RK-11	10.50-11.50					30	0	22
12				Moderately strong greyish black BASALT with amagadaloidal structures, moderately fractured, moderately weathered	RK-12	11.50-12.50		Grey	70%		88	32	40
13					RK-13	12.50-13.50					65	26	35
14					RK-14	13.50-14.50					80	0	27
15			15.50 / 572.00		RK-15	14.50-15.50					67	10	27

Termination at 15.50 meters Depth.

Ground Water Table | Rock Core (RK) | Standard Penetration Test (SPT) | Wash Sample (WS)

BOREHOLE NO: BH-7

PAGE 1 OF 1

BOREHOLE NO : BH-7	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 4 m
STRUCTURE: Girls Hostel	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 591.5
COORDINATES: 581320.561 E, 2502049.033 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 5.9
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m** 13.5
DATE OF START : 22-Jul-2020	**DATE OF FINISH** : 23-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			0.50	Filled up Material	591.00	DS-1	0.00-0.50							
1	Ref*/ 4cm			Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1 WS-1	0.50-0.54 0.50-1.50					0	0	15
2	Ref*/ 3cm			completely weathered, disintegrated		SPT-2 WS-2	1.50-1.53 1.50-2.50					0	0	15
3	Ref*/ 4cm					SPT-3 WS-3	2.50-2.54 2.50-3.50					0	0	15
4	Ref*/ 2cm			Moderately weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-4 RK-1	3.50-3.52 3.50-4.50					23	0	20
5				severely weathered		RK-2	4.50-5.50					40	0	23
6				Moderately strong greyish black		RK-3	5.50-6.50					47	33	35
7				BASALT with amagadaloidal structures,		RK-4	6.50-7.50					53	44	38
8				moderately fractured, moderately weathered		RK-5	7.50-8.50					34	0	25
9				Moderately strong greyish black		RK-6	8.50-9.50					40	0	25
10				BASALT with amagadaloidal structures,		RK-7	9.50-10.50					74	0	30
11				moderately fractured, moderately weathered		RK-8	10.50-11.50					75	0	30
12						RK-9	11.50-12.50					86	0	30
13			13.50		578.00	RK-10	12.50-13.50					98	24	40

Brown

Grey

90%

80%

70%

Impregnated Bit

Termination at 13.50 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

BOREHOLE NO: BH-8

PAGE 1 OF 1

BOREHOLE NO : BH-8	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3 m
STRUCTURE: MDC Academic	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 590
COORDINATES: 581307.869 E, 2502007.485 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.2
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m:** 14.5
DATE OF START : 13-Jul-2020	**DATE OF FINISH** : 14-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
1				Weak greyish black BASALT with amagadaloidal structures, intensely fractured,		RK-1	0.00-0.50	Rock Core (RK)	Brown	90%	Impregnated Bit	18	0	15
						RK-2	0.50-1.50					0	0	15
2	Ref*/ 3cm			highly weathered		SPT-1	1.50-1.53							
						RK-3	1.50-2.50					12	0	15
3				Moderately weak greyish black BASALT with		RK-4	2.50-3.50					32	0	22
4				amagadaloidal structures, intensely fractured,		RK-5	3.50-4.50					33	0	22
5				severely weathered		RK-6	4.50-5.50					28	0	18
6						RK-7	5.50-6.50					26	0	18
7						RK-8	6.50-7.50					18	0	18
8						RK-9	7.50-8.50					22	0	18
9				Moderately strong greyish black		RK-10	8.50-9.50		Grey	70%		51	10	25
10				BASALT with amagadaloidal structures,		RK-11	9.50-10.50					50	0	25
11				moderately fractured, moderately weathered		RK-12	10.50-11.50					45	11	25
12						RK-13	11.50-12.50					40	0	25
13						RK-14	12.50-13.50					50	0	25
14			14.50		575.50	RK-15	13.50-14.50					67	25	38

Termination at 14.50 meters Depth.

Ground Water Table | Rock Core (RK) | Standard Penetration Test (SPT)

BOREHOLE NO: BH-9

PAGE 1 OF 1

BOREHOLE NO : BH-9	**SOIL BORING METHOD** Rotary Drilling	**CASING DEPTH** : 3.5 m
STRUCTURE: ACAD Block	**ROCK DRILLING METHOD:** Rotary Drilling	**GROUND ELEVATION, m:** 591
COORDINATES: 581188.637 E, 2502054.166 N	**BOREHOLE DIAMETER IN SOIL, mm :** NX	**GROUND WATER DEPTH, m:** 6.2
	BOREHOLE DIAMETER IN ROCK, mm : NX	**TERMINATION DEPTH, m** 14.38
DATE OF START : 18-Jul-2020	**DATE OF FINISH** : 20-Jul-2020	**LOGGED BY:** Mr. Ayush Gupta

DEPTH (m)	FIELD N VALUES	GRAPHICAL LOG	LAYER DEPTH, m	MATERIAL DESCRIPTION	LAYER ELEVATION, m	SAMPLE NUMBER	SAMPLE DEPTH (m)	SAMPLE TYPE	RETURN WATER COLOR	RETURN WATER LOSS	BITS USED	PERCENTAGE RECOVERY	ROCK QUALITY DESIGNATION (RQD), %	ROCK MASS RATING (RMR)
			0.50	Filled up Material	590.50	DS-1	0.00-0.50							
1	Ref*/ 3cm			Very weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-1 WS-1	0.50-0.53 0.50-1.50					0	0	15
2	Ref*/ 4cm			completely weathered, disintegrated		SPT-2 WS-2	1.50-1.54 1.50-2.50					0	0	15
3	Ref*/ 2cm			Weak greyish black BASALT with amagadaloidal structures, intensely fractured,		SPT-3 RK-1	2.50-2.52 2.50-3.50					15	0	15
4				highly weathered		RK-2	3.50-4.50					28	0	22
5				Moderately strong greyish black		RK-3	4.50-5.50					44	13	28
6				BASALT with amagadaloidal structures,		RK-4	5.50-6.50					33	0	22
7				moderately fractured, moderately weathered		RK-5	6.50-7.50					39	14	28
8						RK-6	7.50-8.50					61	12	32
9						RK-7	8.50-9.50					46	17	32
10				Moderately weak greyish black BASALT with		RK-8	9.50-10.50					39	0	25
11				amagadaloidal structures, intensely fractured,		RK-9	10.50-11.50					27	0	22
12				moderately weathered		RK-10	11.50-12.50					62	0	30
13						RK-11	12.50-13.50					68	0	32
14			14.38		576.62	RK-12	13.50-14.38					70	0	32

Brown

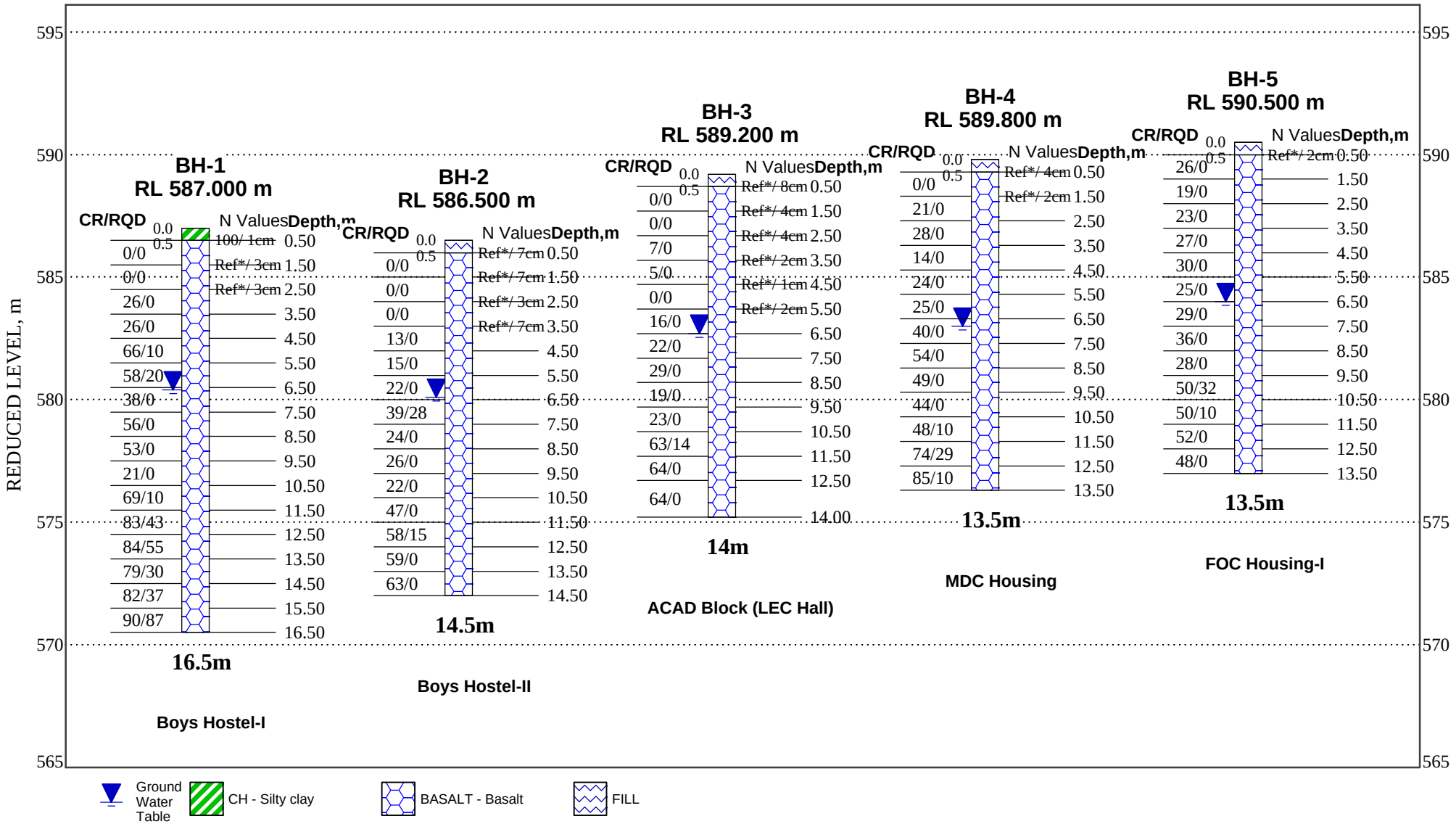
90%

Impregnated Bit

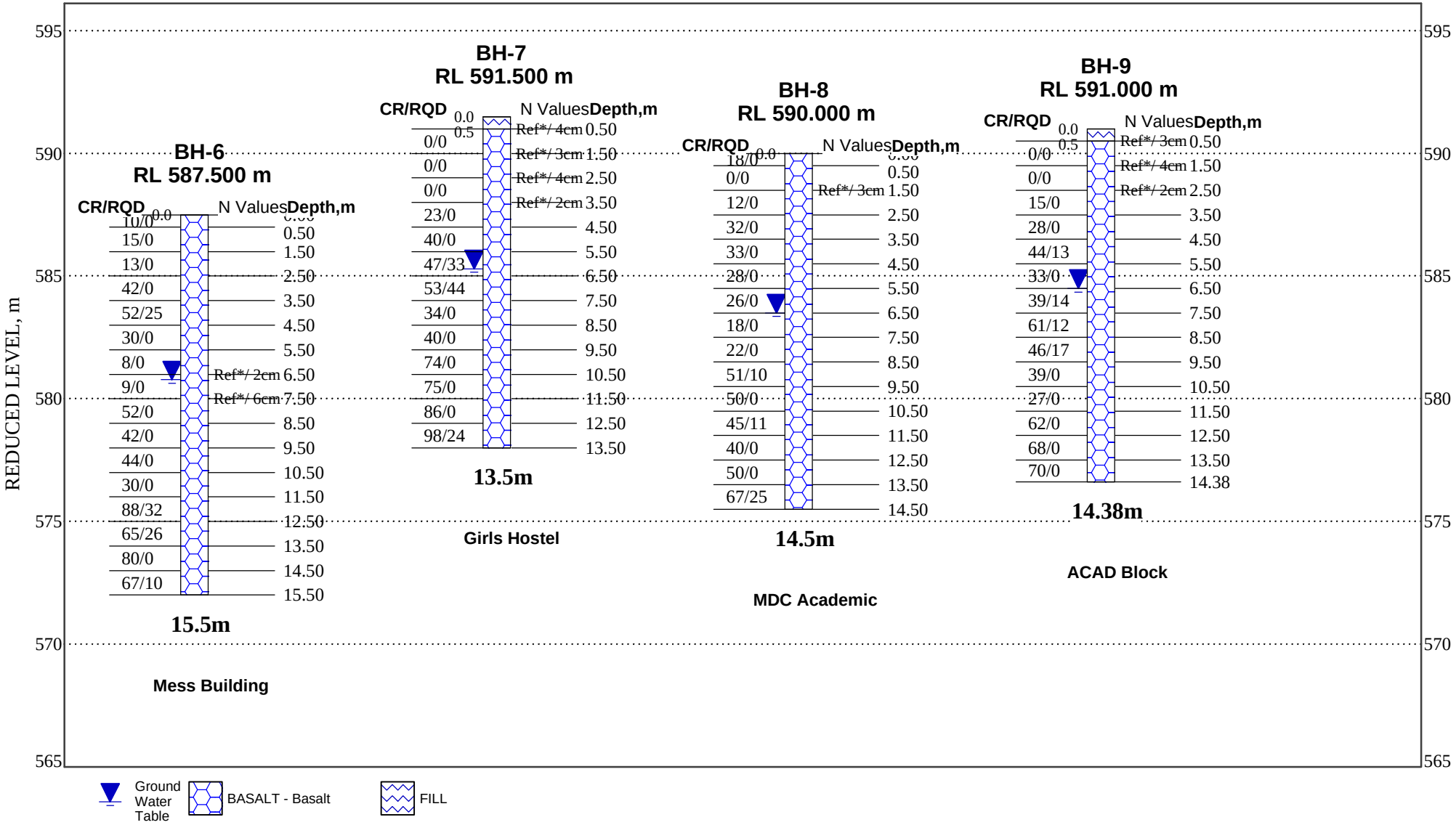
Termination at 14.38 meters Depth.

Ground Water Table | DISTURBED SAMPLE (DS) | Standard Penetration Test (SPT) | Wash Sample (WS) | Rock Core (RK)

Summary of Borehole Profiles



Summary of Borehole Profiles



BH. No.	Rock Sample No.	Depth, (m)	IS : 2720 (Part-3)-1980, RA-2007	IS : 13030-1991, RA-2006			By Calculations		IS : 8764-1998, RA-2008	IS : 9143-1979, RA-2006	Moh's Scale Hardness	IS: 10082-1981 RA 2001
			Specific Gravity	Density (gm/cc)	Moisture Content, %	Water Absorption, %	Void Ratio	Porosity	Point Load Index (kg/sq.cm)	Unconfined Compressive Strength (kg/sq.cm)		Brazilian Tensile Strength (kg/sq.cm)
1	5	4.50-5.50	2.77	2.71	1.91	2.29	0.022	0.022	-	327	2	-
	8	5.50-6.50	2.78	2.75	2.63	3.85	0.011	0.011	7	162*	-	-
	16	7.50-8.50	2.79	-	3.98	6.28	-	-	-	-	-	31
	26	10.50-11.50	2.72	2.70	2.31	3.52	0.007	0.007	29	626*	-	-
	31	11.50-12.50	2.76	2.75	2.22	2.57	0.004	0.004	-	656	3	-
	36	12.50-13.50	2.82	2.71	1.32	1.48	0.041	0.039	-	386	-	-
	40A	13.50-14.50	2.78	2.74	1.37	1.44	0.015	0.014	94	2062*	-	-
	45	14.50-15.50	2.76	2.73	1.12	1.31	0.011	0.011	43	955*	-	-
	50	15.50-16.50	2.79	2.71	0.46	0.56	0.030	0.029	-	517	-	-
2	4	6.50-7.50	2.80	2.75	0.44	0.55	0.018	0.018	-	879	3	-
	14	11.50-12.50	2.76	2.74	4.85	7.93	0.007	0.007	11	233*	-	-
	16	12.50-13.50	2.71	-	1.59	1.75	-	-	-	-	-	100
	21	13.50-14.50	2.72	2.70	0.76	0.84	0.007	0.007	95	2100*	-	-
3	6	10.50-11.50	2.78	-	2.83	4.64	-	-	-	-	-	27
	9	11.50-12.50	2.76	2.72	1.81	2.05	0.015	0.014	51	1130*	3	-
	14	12.50-14.00	2.77	-	0.63	0.77	-	-	-	-	-	82

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

Physical Properties of Rock

ISO/IEC 17025:2017
Certified Laboratory
(NABL)
Certificate No. TC-7134

BH. No.	Rock Sample No.	Depth, (m)	IS : 2720 (Part-3)-1980, RA-2007	IS : 13030-1991, RA-2006			By Calculations		IS : 8764-1998, RA-2008	IS : 9143-1979, RA-2006	Moh's Scale Hardness	IS: 10082-1981 RA 2001
			Specific Gravity	Density (gm/cc)	Moisture Content, %	Water Absorption, %	Void Ratio	Porosity	Point Load Index (kg/sq.cm)	Unconfined Compressive Strength (kg/sq.cm)		Brazilian Tensile Strength (kg/sq.cm)
4	7	7.50-8.50	2.75	2.73	5.15	7.06	0.007	0.007	-	105	-	-
	9	8.50-9.50	2.74	-	7.14	10.17	-	-	-	-	2	25
	16	10.50-11.50	2.74	2.72	5.30	12.90	0.007	0.007	0	0	-	-
	24A	11.50-12.50	2.75	2.73	2.84	3.22	0.007	0.007	-	308	-	-
	27	12.50-13.50	2.70	-	4.27	5.93	-	-	-	-	3	54
5	4	4.50-5.50	2.76	-	0.50	0.67	-	-	-	-	-	87
	6	5.50-6.50	2.67	2.65	2.85	3.59	0.008	0.015	21	462*	-	-
	11	7.50-8.50	2.75	-	1.12	1.23	-	-	-	-	-	36
	17	9.50-10.50	2.78	2.73	1.97	2.35	0.018	0.037	-	374	3	-
	22	10.50-11.50	2.77	2.70	1.95	2.16	0.026	0.052	53	1163*	-	-
	26	11.50-12.50	2.71	-	1.02	1.12	-	-	-	-	-	65
6	3	2.50-3.50	2.74	-	0.54	0.71	-	-	-	-	-	116
	5	3.50-4.50	2.72	-	0.69	0.87	-	-	-	-	-	192
	12	10.50-11.50	2.80	-	3.86	5.26	-	-	-	-	-	28
	14B	11.50-12.50	2.71	2.69	2.38	2.78	0.007	0.015	55	1202*	3	-
	26	12.50-13.50	2.75	2.71	5.59	13.20	0.015	0.030	-	120	-	-

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

Physical Properties of Rock

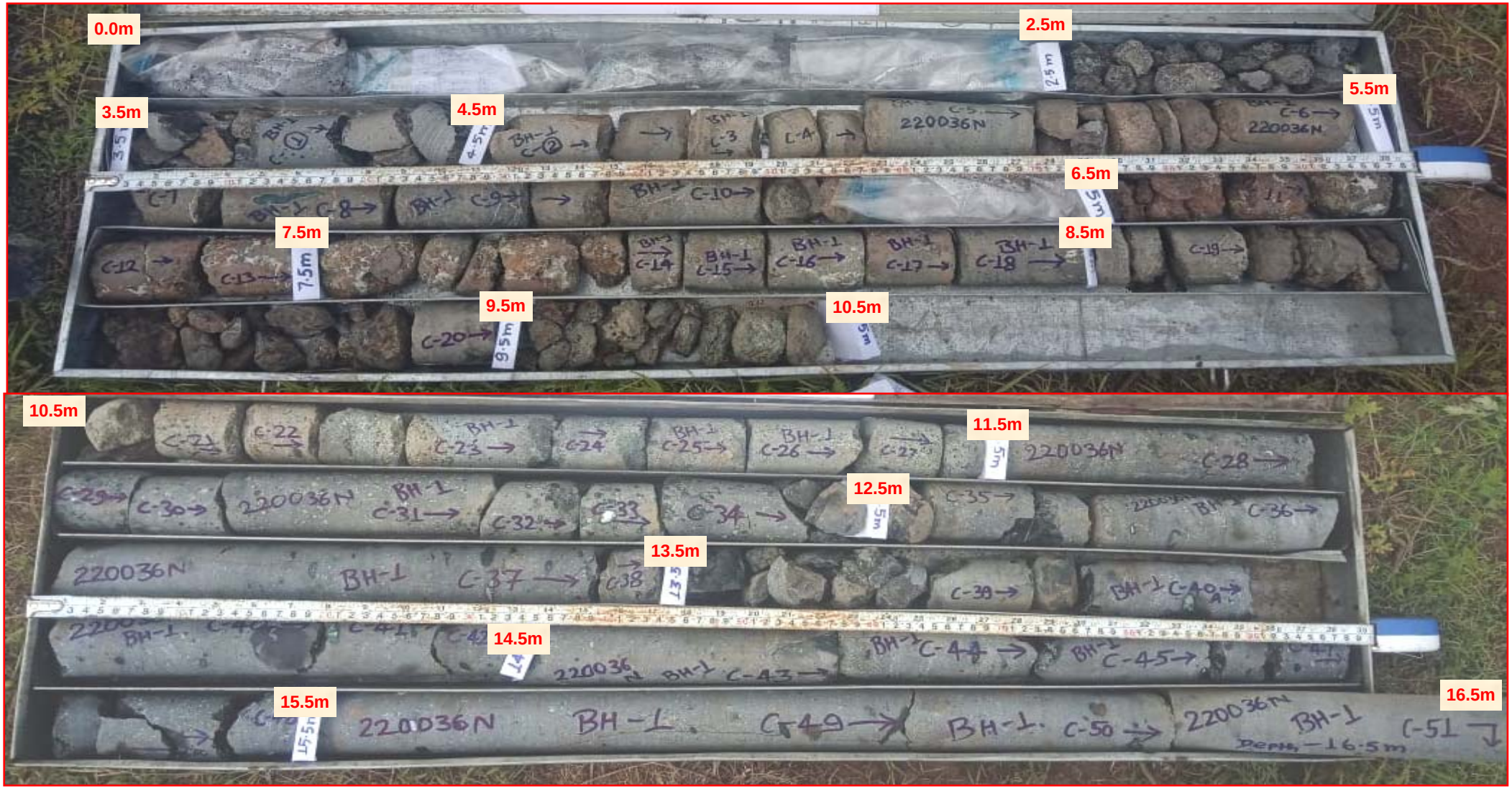
ISO/IEC 17025:2017
Certified Laboratory
(NABL)
Certificate No. TC-7134

BH. No.	Rock Sample No.	Depth, (m)	IS : 2720 (Part-3)-1980, RA-2007	IS : 13030-1991, RA-2006			By Calculations		IS : 8764-1998, RA-2008	IS : 9143-1979, RA-2006	Moh's Scale Hardness	IS: 10082-1981 RA 2001
			Specific Gravity	Density (gm/cc)	Moisture Content, %	Water Absorption, %	Void Ratio	Porosity	Point Load Index (kg/sq.cm)	Unconfined Compressive Strength (kg/sq.cm)		Brazilian Tensile Strength (kg/sq.cm)
6	33	13.50-14.50	2.77	-	2.12	2.45	-	-	-	-	-	67
7	7	5.50-6.50	2.74	2.72	2.59	4.13	0.007	0.015	-	434	3	-
	8A	6.50-7.50	2.76	2.68	1.57	2.31	0.030	0.060	52	1153*	-	-
	17	9.50-10.50	2.76	-	0.60	0.76	-	-	-	-	-	73
	32	11.50-12.50	2.75	-	1.99	2.23	-	-	-	-	3	61
8	9	8.50-9.50	2.72	2.69	4.47	6.95	0.011	0.022	0	0	4	-
	16	10.50-11.50	2.80	-	0.50	0.60	-	-	-	-	-	127
	25	12.50-13.50	2.78	-	1.01	1.12	-	-	-	-	-	66
	28	13.50-14.50	2.78	2.68	0.79	0.93	0.037	0.075	39	857*	-	-
9	3	4.50-5.50	2.78	2.69	0.49	0.65	0.033	0.067	81	1782*	-	-
	6	5.50-6.50	2.76	-	0.72	0.89	-	-	-	-	-	115
	9	7.50-8.50	2.79	-	0.61	0.75	-	-	-	-	-	135
	13	8.50-9.50	2.73	2.68	0.56	0.68	0.019	0.037	-	452	3	-
	18	11.50-12.50	2.78	-	4.31	7.29	-	-	-	-	-	19
	30	13.50-14.38	2.74	-	2.69	3.37	-	-	-	-	-	66

* Equivalent Unconfined Compressive Strength based on Point Load Strength Index

Physical Properties of Rock

ISO/IEC 17025:2017
Certified Laboratory
(NABL)
Certificate No. TC-7134

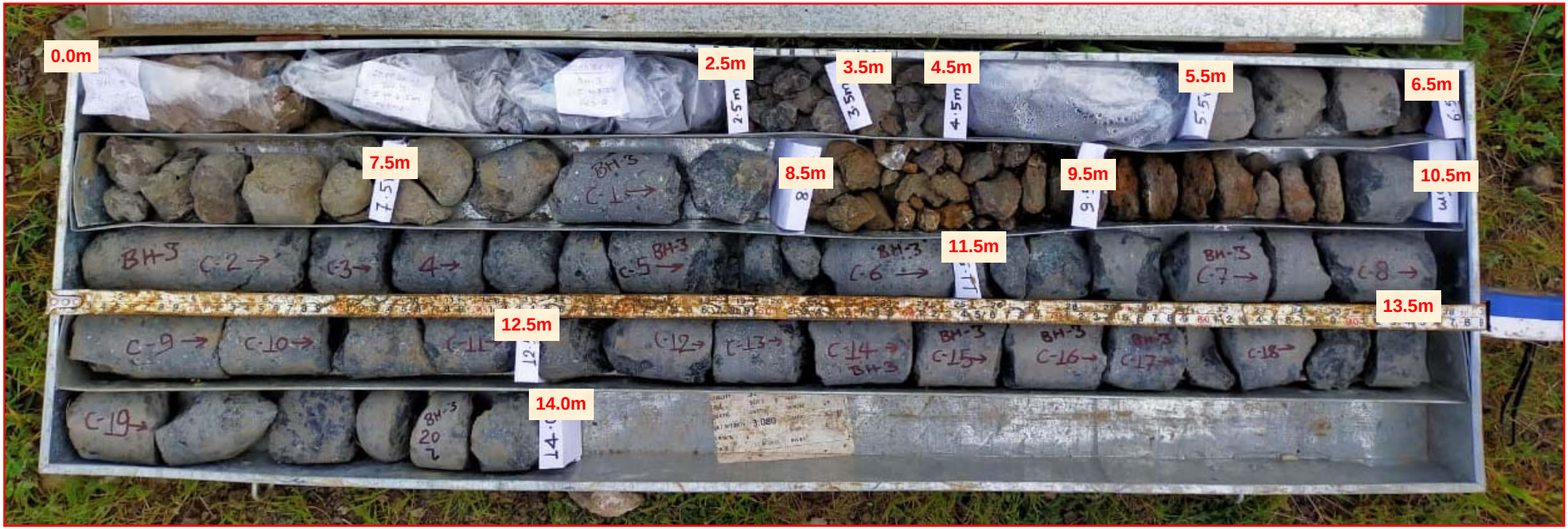


Borehole No. BH-1

Photograph of Rock Core Sample

Borehole No. BH-2

Photograph of Rock Core Sample



Borehole No. BH-3

Photograph of Rock Core Sample

Borehole No. BH-4

Photograph of Rock Core Sample

Borehole No. BH-5

Photograph of Rock Core Sample

Borehole No. BH-6

Photograph of Rock Core Sample

Borehole No. BH-7

Photograph of Rock Core Sample

Borehole No. BH-8

Photograph of Rock Core Sample

Borehole No. BH-9

Photograph of Rock Core Sample

APPENDIX-A

TYPICAL CALCULATIONS

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-1)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 26 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 120 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 67.5 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 20 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 45.0 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-1)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.8
0.5	4.5	2.3
4.5	16.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.65 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 131.3 T/m^2

Computed Safe Bearing Capacity: **$q_{net\ safe}$ =** 42.5 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	67.5
RMR value	45.0
Bearing Capacity Factors	42.5

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-1)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-1)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.8
0.5	4.5	2.3
4.5	16.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.70 T/m^2

$N\phi$ = 1.64

N_c = 6.74 $N\gamma$ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 111.5 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 36.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	36.6

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-2)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-2)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	6.5	2.3
6.5	14.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.60 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 111.3 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 36.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	36.6

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-2)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 85 T/m^2

Correction for saturation/submergence:	c_{sub}=	0.75
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 47.8 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-2)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	6.5	2.3
6.5	14.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.55 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 131.0 T/m^2

Computed Safe Bearing Capacity: **$q_{net\ safe}$ =** 42.5 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	47.8
RMR value	41.3
Bearing Capacity Factors	42.5

Recommended value of Net Safe Bearing Pressure for Design: 40 **T/m^2**

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-3)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-3)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 13 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	6.5	2.3
6.5	14.0	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.60 T/m^2

Nϕ = 1.58

N_c = 6.47 Nγ = 0.93 N_q = 2.49

Computed Ultimate Bearing Capacity: q_{ult} = 106.3 T/m^2

Computed Safe Bearing Capacity: **$q_{net\ safe}$ =** 34.9 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	34.9

Recommended value of Net Safe Bearing Pressure for Design: 30 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-3)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 7 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 85 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 47.8 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-3)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	6.5	2.3
6.5	14.0	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.55 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 116.5 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 37.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	47.8
RMR value	41.3
Bearing Capacity Factors	37.6

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-4)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 21 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 85 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 47.8 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 18 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 43.5 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-4)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	1.5	2.3
1.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.60 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 120.2 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 39.5 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	47.8
RMR value	43.5
Bearing Capacity Factors	39.5

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-4)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 24 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 100 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 56.3 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 23 Class of Rock: **IV** Rock Description: Poor

$q_{net\ safe}$ = 57.2 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-4)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	1.5	2.3
1.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.85 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 132.4 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 42.9 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	56.3
RMR value	57.2
Bearing Capacity Factors	42.9

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-5)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 19 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 100 T/m^2

Correction for saturation/submergence:	c_{sub}=	0.75
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 56.3 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 18 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 43.5 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-5)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.80 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 120.7 T/m^2

Computed Safe Bearing Capacity: **$q_{net\ safe}$ =** 39.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	56.3
RMR value	43.5
Bearing Capacity Factors	39.6

Recommended value of Net Safe Bearing Pressure for Design: **35** **T/m^2**

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-5)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 23 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 100 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75

Correction for orientation of joints c_s = 0.75

Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 56.3 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 18 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 43.5 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-5)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 4.05 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 133.0 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 43.0 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	56.3
RMR value	43.5
Bearing Capacity Factors	43.0

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1 m

Below Founding Level : Rock Core Recovery: 15 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 80 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 45.0 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 17 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 42.8 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 11 T/m^2 ϕ = 13 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	15.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.30 T/m^2

Nϕ = 1.58

N_c = 6.47 Nγ = 0.93 N_q = 2.49

Computed Ultimate Bearing Capacity: q_{ult} = 97.4 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 32.0 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	45.0
RMR value	42.8
Bearing Capacity Factors	32.0

Recommended value of Net Safe Bearing Pressure for Design: 30 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 2 m

Below Founding Level : Rock Core Recovery: 18 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 90 T/m^2

Correction for saturation/submergence:	c_{sub}=	0.75
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 50.6 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 17 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 42.8 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	15.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 2.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 2.60 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 113.9 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 37.1 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	50.6
RMR value	42.8
Bearing Capacity Factors	37.1

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 30 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 120 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 67.5 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 25 Class of Rock: **IV** Rock Description: Poor

$q_{net\ safe}$ = 66.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-6)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	15.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 4.00 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 132.9 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 43.0 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	67.5
RMR value	66.3
Bearing Capacity Factors	43.0

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-7)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-7)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	3.5	2.3
3.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.60 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 111.3 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 36.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	36.6

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-7)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 85 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75

Correction for orientation of joints c_s = 0.75

Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 47.8 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-7)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\ N_c\ C_c + 0.5\ \gamma\ B\ N_\gamma\ C_\gamma + \gamma\ D\ N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	3.5	2.3
3.5	13.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.55 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 131.0 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 42.5 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	47.8
RMR value	41.3
Bearing Capacity Factors	42.5

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence:	c_{sub}=	0.75
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 11 T/m^2 ϕ = 13 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	14.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.30 T/m^2

Nϕ = 1.58

N_c = 6.47 Nγ = 0.93 N_q = 2.49

Computed Ultimate Bearing Capacity: q_{ult} = 97.4 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 32.0 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	32.0

Recommended value of Net Safe Bearing Pressure for Design: 30 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 2 m

Below Founding Level : Rock Core Recovery: 12 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 90 T/m^2

Correction for saturation/submergence:	c_{sub}=	0.75
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 50.6 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	14.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 2.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 2.60 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 113.9 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 37.1 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	50.6
RMR value	41.3
Bearing Capacity Factors	37.1

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 32 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 110 T/m^2

Correction for saturation/submergence: c_{sub}= 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 61.9 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 22 Class of Rock: **IV** Rock Description: Poor

$q_{net\ safe}$ = 52.6 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-8)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 13 T/m^2 ϕ = 15 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	2.5	2.3
2.5	14.5	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 4.00 T/m^2

Nϕ = 1.70

N_c = 7.02 Nγ = 1.22 N_q = 2.87

Computed Ultimate Bearing Capacity: q_{ult} = 132.9 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 43.0 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	61.9
RMR value	52.6
Bearing Capacity Factors	43.0

Recommended value of Net Safe Bearing Pressure for Design: 40 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-9)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 1.5 m

Below Founding Level : Rock Core Recovery: 0 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 75 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 42.2 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-9)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 13 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	3.5	2.3
3.5	14.3	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 1.50 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 1.60 T/m^2

Nϕ = 1.58

N_c = 6.47 Nγ = 0.93 N_q = 2.49

Computed Ultimate Bearing Capacity: q_{ult} = 106.3 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 34.9 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	42.2
RMR value	41.3
Bearing Capacity Factors	34.9

Recommended value of Net Safe Bearing Pressure for Design: 30 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-9)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987
3) Bell Solution using Bearing Capacity Factors: "Foundations on Rock" by Duncan C. Wyllie (First Ed., 1992), Clause 5.2.4, pp. 120

Rock Type: Basalt Foundation Depth: 3 m

Below Founding Level : Rock Core Recovery: 15 **%** RQD value 0 %

Presumptive Values: Clause 5.2 of IS 12070-1987

$$q_{net\ safe} = q_s * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ = safe net bearing capacity
q_s = safe bearing capacity
c_{sub} = correction for saturation / submerged condition
c_s = correction for orientation of joints
c_c = correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	$q_{net\ safe}$, T/m^2
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000
Foliated rocks such as schists or slate in sound condition	400
Bedded limestone in sound condition	400
Sedimentary rock,including hard shales and sandstones	250
Soft or broken bed rock (excluding shale)and soft limestone	100
Soft shale	30

Presumptive Value of safe bearing capacity for design: q_s = 85 T/m^2

Correction for saturation/submergence: c_{sub} = 0.75
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 47.8 T/m^2

Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 15 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 41.3 T/m^2

Bearing Capacity Analysis for Foundation on Rock

Analysis as per IS 12070-1987 (Including Amendment No. 1 Nov 2008) & International Practice

Geotechnical Investigation for Proposed Group-VIII Project at IIM, Indore, Madhya Pradesh

0.5 m seating into rock (BH-9)

Bell Solution : Based on Interpreted c-ϕ value of rock and Bearing Capacity Factors

$$q_{ult} = c\,N_c\,C_c + 0.5\,\gamma\,B\,N_\gamma\,C_\gamma + \gamma\,D\,N_q$$

where:

c= Cohesion of rock T/m^2

γ = Density of Rock t/m^3

B= width of foundation, m

D= Depth of Foundation, m

N_c, N_q, N_γ = Bearing Capacity Factors which are a function of ϕ

q_{ult} = Ultimate Bearing Pressure T/m^2

C_c = 1.25 for square footing, 1.2 for circular footing

C_γ = 0.8 for square footing, 0.7 for circular footing

Design Parameters

c= 12 T/m^2 ϕ = 14 degrees

Bulk Density Profile		
epth, m		γ
From	To	T/m^3
0	0.5	1.6
0.5	3.5	2.3
3.5	14.3	2.5

Design Water Table Depth: 0.0 m

Foundation Width B= 6.0 m

Foundation Depth D= 3.00 m

Foundation Shape square

C_c = 1.25 C_γ = 0.8

Factor of Safety = 3

Overburden Pressure at Foundation Level: 3.55 T/m^2

Nϕ = 1.64

N_c = 6.74 Nγ = 1.07 N_q = 2.67

Computed Ultimate Bearing Capacity: q_{ult} = 116.5 T/m^2

Computed Safe Bearing Capacity: $q_{net\ safe}$ = 37.6 T/m^2

SUMMARY OF ANALYSIS

Method of Analysis	Computed Safe Net Bearing Pressure, T/m^2
Presumptive method	47.8
RMR value	41.3
Bearing Capacity Factors	37.6

Recommended value of Net Safe Bearing Pressure for Design: 35 T/m^2