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As per distribution

FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE

GEOTECHNICAL INVESTIGATIONS

Package 1: Construction Materials 0-60 km

Package 2: Tunnels 0-60 km

Package 3: Trackway, Stations and Structures 0-20 km

Package 4: Trackway, Stations and Structures 20-40 km

Package 5: Trackway, Stations and Structures 40-60 km

Invitation of Bids for Geotechnical Investigations (Field and Laboratory Works)

Dear Sir,

Sealed bids (**Technical and Financial in separate sealed envelopes**) are invited in accordance with the attached **BOQs** (for five packages, i.e. Package 1 to Package 5, separately) and **qualification criteria** from drilling Contractors/Companies for carrying out the geotechnical investigations for the subject project.

The bidders may quote for one, multiple, or all five packages. The bidder must meet the qualification requirements specified in the attached criteria for each package they bid on, including demonstrating adequate equipment, personnel and financial resources to complete the works for all awarded packages simultaneously and on time.

The companies capable of carrying out subject work are requested to provide their company profile and the following documents along with their sealed bids:

1. PEC Registration Certificate
2. FBR & PRA Registration Certificates
3. List of Similar Projects completed during last three years
4. Financial Capability
5. Equipment Capability
6. Personnel Capability
7. Litigation History
8. HSE Policies

The work comprises; execution of boreholes, excavation of testpits, installation of piezometers, performance of field testing, collection of soil and rock samples, collection of water samples and laboratory testing of selected samples. The field and laboratory work shall have to be completed according to the following time schedule:

Sr. No.	Minimum No. of Straight Rotary/Heavy Percussion Drilling Rigs Required	Time for Completion of Field Investigations	Time for Completion of Laboratory Testing	Total Time for Completion of Field & Laboratory Investigations
Package 1	-	25 days	15 days	40 days
Package 2	2	30 days	15 days	45 days
Package 3	2	20 days	15 days	35 days
Package 4	2	25 days	15 days	40 days
Package 5	2	25 days	15 days	40 days

The total time specified in the last column of the table above for each package begin from the date of issuance of the Letter of Award.

Your bid shall be valid for a time period of ninety (90) days after the bid opening. **The work shall be executed under the instructions and full-time supervision of NESPAK engineers/geologists and the successful bidder shall mobilize to the site on two days' notice after issuance of Letter of Award/Acceptance.** Pick and Drop (residence to site and site to residence as well as movement at site from one investigation point to another as per requirement of site) of consultant's staff via 4x4 vehicles (one vehicle for each package separately) shall be arranged by the contractor.

The coordinates and ground elevations of all the investigation points by total station or differential GPS shall have to be provided to NESPAK before completion of investigation at site by the Contractor. The approved laboratory, where testing is to be carried out, shall be pursued by the successful bidder for timely completion of the assigned laboratory testing. The successful bidder shall be responsible for providing borehole logs, summary of laboratory test results and detailed laboratory test results to NESPAK, within the contract period. **A premium of up to 25 % will be admissible on the official rates of the soil laboratory, selected for testing of samples. This premium has been allowed as compensation to the Contractor for making advance payment to the laboratory and later following-up for obtaining test results in time. The name of the laboratory should be provided on page 2 of 2 (Annexure-I).**

The basis of payment shall be the actual work carried out and approved by the Engineer, as measured by the Contractor and certified by the Engineer and valued at the rate and prices as quoted by you in your bid.

Bidders are required to submit separate bid securities for each package, in the amounts specified in the table below, at the time of bid submission. The bid securities must be in the form of a pay order or bank draft, payable in favor M/s NESPAK.

Package No.	Bid Security Amount (Rs.)
Package 1	50,000
Package 2	150,000
Package 3	100,000
Package 4	100,000
Package 5	100,000

Your **most competitive** sealed bids (**inclusive of all taxes**) in accordance with the BOQ and qualification criteria, should reach the office of the undersigned by 1400 hours on or before January 13, 2025. Technical bids would be opened on the same day at 1430 hours after their receipt in the presence of those bidders who wish to be present.

Financial bids would be opened after evaluation of Technical bids, at a time, date and venue announced and communicated to the technically responsive bidders in advance. However, the final decision to accept/reject any or all the bids as per PPRA rules solely lies with the undersigned. The entire work shall be carried out in accordance with the requirements of the General Bidding Documents for Geotechnical Investigations available at NESPAK website (www.nespak.com.pk).

for National Engineering Services Pakistan (Pvt.) Limited


(KAMRAN YOUSAF)

General Manager/Head
Geotechnical & Geoenvironmental Engineering Division

FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE

GEOTECHNICAL INVESTIGATIONS

Package 1: Construction Materials 0-60 km

Package 2: Tunnels 0-60 km

Package 3: Trackway, Stations and Structures 0-20 km

Package 4: Trackway, Stations and Structures 20-40 km

Package 5: Trackway, Stations and Structures 40-60 km

1. Qualification Criteria

Qualification will be based on the criteria given in the following paras regarding the Applicant's experience, personnel and equipment capabilities, financial position and litigation history, as demonstrated by the Applicant's responses in the Forms attached as Annex-A to this Document. The Employer reserves the right to waive minor deviations, if these do not materially affect the capability of an Applicant to perform the contract by the Applicant.

Experience and resources of the Company intended to be employed as sub-contractor shall not be taken into account in determining the Applicant's compliance with the qualifying criteria. However, for joint venture, collective experience, resources and financial soundness of all partners shall be considered.

The bidders may quote for one, multiple, or all five packages. The bidder must meet the qualification requirements specified in the attached criteria for each package they bid on, including demonstrating adequate equipment, personnel and financial resources to complete the works for all awarded packages simultaneously and on time.

1.1 General Information

The Applicant shall provide general information of his firm as per the format specified in the Application Form A-1 attached in Annex-A.

1.2 Experience of the Firm

The Applicant shall meet the following minimum criteria:

- 1) Successful experience as contractor in the execution of at least five (5) projects involving bulk of geotechnical investigations within the last three (03) years. This experience should specifically be of geotechnical investigations of similar nature. The Applicant will supply information as per the format specified in the Application Form A-2 attached in Annex-A.

1.3 Personnel Capabilities

The Applicant must have in his employment, suitably qualified and experience personnel to fulfill the positions tabulated below. The Applicant will supply information as per the format specified in the Application Form A-3 attached in Annex-A.



Sr. No.	Position	Qualification*	No.					Min. Experience (years)
			Package -1	Package -2	Package -3	Package -4	Package -5	
1	Technical Manager	B.Sc. Civil Engg.	1					5
2	Site Geologist/ Supervisor / Engineer	M. Sc. Geology/ B.Sc. Civil Engg. / B.Sc. Geological Engg.	2	2	2	2	2	2
3	HSE Supervisor	HSE Certification course	1					1
4	Driller	Literate	-	2	2	2	2	3
5	Skilled Labor	-	As Required	As Required	As Required	As Required	As Required	-

1.4 Equipment Capabilities

The Applicant should own or have assured access to the following key items of equipment in full working order, and must demonstrate that, based on known commitments, these will be available for deployment on the proposed works.

Sr. No.	Equipment Type & Characteristics	Minimum Number Required				
		Package-1	Package-2	Package-3	Package-4	Package-5
1	Straight Rotary Drilling rig complete in all respects including drilling rods, bits, mud pumps etc. along with at least one stand-by rig. The equipment shall be sufficient to complete the investigations within the time schedule	-	2	2	2	2
2	Percussion Boring Set (>250 mm diameter), complete in all respects including tripod, chisel / bit etc.	-	2	2	2	2
3	Casing sets having various diameters for all types of boring at least 100 m in length with casing bits	-	2	1	1	1
4	Standard penetration test equipment complete in all respects including all rods,	-	2	2	2	2



Sr. No.	Equipment Type & Characteristics	Minimum Number Required				
		Package-1	Package-2	Package-3	Package-4	Package-5
	split spoon sampler, hammer and containers etc.					
5	Core barrels (double tube and triple tube) including coring and casing bits.	-	2	2	2	2
6	Shelby/Denison/Pitcher samplers	-	2	2	2	2
7	UDS tubes & Split Spoon Samplers	-	As Required	As Required	As Required	As Required
8	Hydraulic jacks with all accessories for the extraction of casings	1	1	1	1	1
9	Electrically operated sounder for groundwater level measurement	-	1	1	1	1
10	Testpit excavation equipment complete in all respect	2	-	1	1	1
11	Field density test apparatus (with 6 and 12 inches dia. cone) complete in all respect	2	-	1	1	1
12	Piezometer complete in all respect	-	-	2	2	2
13	Field permeability test/water pressure test equipment	-	As required	As required	As required	As required
14	Wooden box for the preservation of undisturbed soil and rock samples	-	As required	As required	As required	As required
15	Transport for mobilization of equipment	As required	As required	As required	As required	As required

The Applicant will supply information as per the format specified in the Application Form A-4 attached in Annex-A.

1.5 Financial Capabilities

The Applicant shall meet the following minimum criteria:

- 1) Annual turnover, which is also termed as income from contracting for procurement of geotechnical investigations and is defined as billing for works completed during the last three (3) years of at least Rs. 20 million. Documentary proofs of the same shall be submitted in the form of letter of awards, completion certificates, etc.

The Applicant shall also provide evidence of financial health such as bank account statements, available line of credits, etc., to show the soundness of the Applicant's financial position for



procurement of geotechnical investigations works. The Applicant will provide annual turnover of the geotechnical investigation works carried out by him during the last three years. The Applicant will supply annual turnover information as per the format specified in the Application Form A-5 attached in Annex-A.

1.6 Litigation History

The Applicant should provide accurate information on any litigation or arbitration resulting from Contracts completed or under execution over the last three (03) years. The Applicant will supply information as per the format specified in the Application Form A-6 attached in Annex-A. A consistent/ overwhelming history of litigation against the Applicant may result in rejection of the application. In case an Applicant claims Nil litigation, he shall submit the same statement on the letter head of his company.

1.7 Application of Health, Safety and Environmental Standards

The Applicant should provide the HSE Policies and supporting documentary evidence for the following:

- i) First Aid Box
- ii) Personnel Protective Equipments (PPEs)
- iii) Standard Operating Procedures (SOPs)
- iv) Health, Safety and Environmental (HSE) Policies
- v) HSE staff

The Applicant will supply information as per the format specified in the Application Form A-7 attached in Annex-A.



Application Form A-1

Page ___ of ___ Pages

General Information

All individual Applicants applying for qualification are requested to complete the information in this form. Nationality information (if applicable) is also to be provided for foreign owners as required under the PEC Bye-Laws as a Partnership.

1.	Name of Firm	
2.	Head Office Address	
3.	Telephone	Contact Person: Name: Title: Cell No.
4.	Fax	E-mail
5.	Place of Incorporation/Registration Certificates of the firm*	Year of incorporation/registration

*** Registration certificates must include:**

- Valid registration with Pakistan Engineering Council (PEC)
- Valid registration with Federal Board of Revenue (FBR)
- Valid registration with concerned Provincial Revenue Authority (PRA)
- Proof of active taxpayer of FBR & PRA



Experience of the Firm

Name of Applicant: _____

Sr. No.	Name of Project	Value of Geotech Contract* (Pak Rs.)	Contract Duration

**Attach copy of Letter of Awards / Project Completion Certificates for any five (5) latest projects involving bulk of geotechnical investigations within the last three (03) years.*



Personnel Capabilities

Name of Applicant: _____

Sr. No.	Name of Person	Qualification	Designation/ Position*	Total Experience

**Attach CVs of the Key Staff Members.*

Equipment Capabilities

Name of Applicant: _____

Sr. No.	Equipment Description	Capacity	Number of Equipment	Working Condition a) Very good b) Good c) Satisfactory	Current Location



Financial Capabilities*Name of Applicant:* _____

Year	Annual Turnover (in PKR)
2022 – 2023	
2021 – 2022	
2020 – 2021	

Note: Financial soundness certificate from the bank(s) as specified in section 1.5 must be provided by the Applicant



Litigation History*Name of Applicant:* _____

Year	Award for or against Applicant	Name of Client, cause of litigation, and matter in dispute	Disputed amount (current value Pak Rs. or equivalent)



**Health, Safety and Environmental (HSE) Policies Personal Protective Equipment (PPE) and
Standard Operating Procedures (SOP) of the Contractor**

Name of Applicant: _____

The Applicant should provide the following policies/supporting documentary evidence as required in Para 1.7.

A. HSE Policies

Please attach HSE Policies

B. Details of PPE Available with the Contractor

Sr. No.	Type of PPE	Total Number

C. Details of SOPs of the Contractor

Please attach the copies of SOPs



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 1: GEOTECHNICAL INVESTIGATION FOR CONSTRUCTION MATERIALS (0-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
A.	FIELD INVESTIGATIONS				
A1	Sampling from Rock Quarries in the closest proximity of the Muree Glass Train proposed alignment (minimum weight 60-120 kg), labelling and packing, storage into proper sampling bags and transportation to the Engineer's approved laboratories for checking the suitability for source approval	No.	4		
A2	Sampling from Borrow areas for embankment / earth fills and subbase in the closest proximity of the Muree Glass Train proposed alignment, (minimum weight 60-100 kg), labelling and packing, storage into proper sampling bags and transportation to the Engineer's approved laboratories for checking the suitability for source approval.	No.	10		
A3	Sampling from Fine Aggregate Sources in the closest proximity of the Muree Glass Train proposed alignment, (minimum weight 60 kg), labelling and packing, storage into proper sampling bags and transportation to the Engineer's approved laboratories for checking the suitability for source approval	No.	4		
A4	Collection of water samples from various points of river/ nullah or any other source to check the suitability of water to be used in concrete and other civil works	No.	5		
A5	Excavation of thirty (30) testpits (1.5m x 1.5m) upto a maximum depth of 1.0 m along the proposed alignment of Muree Glass Train in overburden soils below existing ground level including backfilling of pits to original condition.	L.M.	30		
A6	Performance of field density tests by sand replacement method in testpits generally @ 1 tests/pit at selected horizons ,including determination of in-situ bulk and dry density and collection of small disturbed samples in moisture tins for moisture content determination in laboratory by oven drying method as well as labelling, packing, storage & transportation to an approved testing laboratory	No.	30		
A7	Collection of composite bulk soil samples from testpits (minimum weight 60-100 kg) including their labelling, packing, storage & transportation to an approved laboratory.	No.	50		
	Sub-Total A	Rs.			

This BOQ is for Construction Material Investigations Studies for checking the suitability and source approval of various materials. During construction supervision; testing of all materials will be continued with a specific frequency or as specified by the Engineer.

The Contractor shall arrange transport (one well-conditioned 4x4 vehicle) for Engineer's supervisory staff for site duties (from residence to drilling site, movement from point to point and back to residence).

Contractor will be responsible for arrangement of Personnel Protective Equipments (PPEs) such as safety helmets and jackets for NESPAK site supervisory / visiting staff.

Considering the Muree Glass Train scope of work, number of sources and lab testing for suitability check are mentioned in BOQ. This SOW may be changed keeping in view actual ground conditions.

All soil / aggregate / water samples must be labelled, sealed, and transported to Engineer's approved labs, is the responsibility of the contractor.



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE

PACKAGE 1: GEOTECHNICAL INVESTIGATION FOR CONSTRUCTION MATERIALS (0-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate	Amount
B.	LABORATORY TESTING			(Rs.)	(Rs.)
B1	Sieve analysis	No.	60		
B2	Sieve analysis with F.M.	No.	6		
B3	Liquid and plastic limits	No.	20		
B4	Specific gravity	No.	10		
B5	Water Absorption	No.	10		
B6	Loss Angeles Abrasion Test (500 Rev)	No.	6		
B7	Clay Lumps and Friable Particles	No.	6		
B8	Sodium Sulphate Soundness Test	No.	6		
B9	Sand Equavalent Test	No.	6		
B10	Modified AASHTO Compaction	No.	15		
B11	3-Point Soaked CBR	No.	15		
B12	Petrography	No.	8		
B13	Chemical Analysis of Coarse and Fine aggregate and soil Samples i/c sulphate content, chloride content, organic matter	No.	10		
B14	Complete chemical analysis of water samples i/c TDS, Cl, SO4 & pH	No.	5		
	Sub-Total B	Rs.			

Name of Laboratory:

*Full saturation of the specimen, slow rate of loading and multi-reversal conditions should be observed.

Total Cost (A+B)



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 2: GEOTECHNICAL INVESTIGATION FOR TUNNELS (0-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
A.	FIELD INVESTIGATIONS				
A1	Mobilization and demobilization of at least two (2) straight rotary/heavy percussion drilling rigs at site including setting-up & shifting from one investigation point to another. The equipment shall be capable to complete the investigations within the time schedule.	L.S.	Job		
A2	Execution of six (6) boreholes employing straight rotary/heavy percussion drilling methods. The target borehole depth will be approximately 80 m in overburden soils below NSL or up to the bedrock, whichever is met earlier. Subsequent backfilling of boreholes to their original position by cement-sand-bentonite mix.	L.M.	30		
A3	Continuous core drilling (NX size in general and HQ size if directed by the Engineer based on rock conditions) in bedrock up to a depth of 80 m below rock strike level, including labelling, preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.	L.M.	220		
A4	Performance of Standard Penetration Tests (SPTs) in boreholes generally at 1 m depth interval or as necessary along with collection of SPT samples, including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	20		
A5	Collection of undisturbed soil samples from boreholes through Shelby/Denison/Pitcher samplers, including their waxing, labelling, packing, storage & transportation to an approved testing laboratory.	No.	10		
A6	Performance of water pressure tests in boreholes.	No.	15		
A7	Collection of water samples (if encountered) from boreholes/testpits including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	4		
	Sub-Total A	Rs.			

Establishment of coordinates and ground elevations of all the boreholes & testpits using **TOTAL STATION** are included in the scope of work. The coordinates should be provided with reference to a permanent local bench mark.

The Contractor shall arrange transport (one well-conditioned 4x4 vehicle) for Engineer's supervisory staff for site duties (from residence to drilling site, movement from point to point and back to residence).

All the undisturbed soil samples shall be stored and transported as per ASTM standards. The area and clearance ratios of the sampling tubes should be as per ASTM requirements.

The preferred method of drilling is straight rotary drilling. Percussion boring will be allowed only in case of presence of gravelly soils subject to approval by the Engineer.



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE

PACKAGE 2: GEOTECHNICAL INVESTIGATION FOR TUNNELS (0-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate	Amount
B.	LABORATORY TESTING			(Rs.)	(Rs.)
B1	Sieve analysis	No.	20		
B2	Hydrometer analysis	No.	2		
B3	Liquid and plastic limits	No.	8		
B4	Shrinkage limit	No.	2		
B5	Specific gravity	No.	20		
B6	Bulk density	No.	20		
B7	Moisture Content	No.	20		
B8	Water Absorption	No.	4		
B9	Porosity	No.	4		
B10	Direct Shear	No.	4		
B11	Hoek Shear Box	No.	8		
B12	Unconfined Compression with stress strain measurement	No.	6		
B13	Uniaxial Compression	No.	20		
B14	Point Load	No.	10		
B15	Elastic modulus	No.	2		
B16	Hoek Triaxial	No.	6		
B17	Petrography	No.	6		
B18	Brazillian Split Cylinder	No.	8		
B19	Slake Durability Index	No.	8		
B20	Complete chemical analysis of water samples i/c TDS, Cl, SO4 & pH	No.	4		
	Sub-Total B	Rs.			

Name of Laboratory:

*Full saturation of the specimen, slow rate of loading and multi-reversal conditions should be observed.

Total Cost (A+B)



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 3: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND STRUCTURES (0-20 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
A.	FIELD INVESTIGATIONS				
A1	Mobilization and demobilization of at least two (2) straight rotary/heavy percussion drilling rigs at site including setting-up & shifting from one investigation point to another. The equipment shall be capable to complete the investigations within the time schedule.	L.S.	Job		
A2	Execution of four (4) boreholes employing straight rotary/heavy percussion drilling methods. The target borehole depth will be ranging from 20 to 40 m in overburden soils below NSL or up to the bedrock, whichever is met earlier. Subsequent backfilling of boreholes to their original position by cement-sand-bentonite mix.	L.M.	30		
A3	Continuous core drilling (NX size in general and HQ size if directed by the Engineer based on rock conditions) in bedrock up to a depth of 25 m below rock strike level, including labelling, preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.	L.M.	90		
A4	Performance of Standard Penetration Tests (SPTs) in boreholes generally at 1 m depth interval or as necessary along with collection of SPT samples, including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	24		
A5	Collection of undisturbed soil samples from boreholes through Shelby/Denison/Pitcher samplers, including their waxing, labelling, packing, storage & transportation to an approved testing laboratory.	No.	6		
A6	Installation of two (2) stand pipe piezometers (GI Pipe) of 30 m length in already drilled boreholes after washing / reaming of boreholes as directed by the engineer, including monitoring of water levels, twice a week, during the investigation.	L.M.	60		
A7	Monitoring of installed piezometers bi-weekly for six (6) months following the completion of geotechnical investigation.	L.S.	Job		
A8	Excavation of three (3) testpits up to a maximum depth of 3 m below top of ground or up to rock strike level, whichever is met earlier, including backfilling of pits to original condition.	L.M.	9		
A9	Extraction of hand-cut block samples (30cm*30cm*30cm) from testpits including their preservation, labeling, packing, storage and transportation to an approved testing laboratory.	No.	3		
A10	Performance of water pressure tests in boreholes.	No.	4		
A11	Collection of water samples (if encountered) from boreholes/testpits including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	2		
	Sub-Total A	Rs.			

Establishment of coordinates and ground elevations of all the boreholes & testpits using **TOTAL STATION** are included in the scope of work. The coordinates should be provided with reference to a permanent local bench mark.

The Contractor shall arrange transport (one well-conditioned 4x4 vehicle) for Engineer's supervisory staff for site duties (from residence to drilling site, movement from point to point and back to residence).

All the undisturbed soil samples shall be stored and transported as per ASTM standards. The area and clearance ratios of the sampling tubes should be as per ASTM requirements.

The preferred method of drilling is straight rotary drilling. Percussion boring will be allowed only in case of presence of gravelly soils subject to approval by the Engineer.



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 3: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND
STRUCTURES (0-20 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate	Amount
B.	LABORATORY TESTING			(Rs.)	(Rs.)
B1	Sieve analysis	No.	20		
B2	Hydrometer analysis	No.	4		
B3	Liquid and plastic limits	No.	8		
B4	Shrinkage limit	No.	2		
B5	Specific gravity	No.	2		
B6	Bulk density	No.	15		
B7	Moisture Content	No.	15		
B8	Water Absorption	No.	2		
B9	Porosity	No.	2		
B10	*Direct Shear Test (Peak, fully softened and residual strength)	No.	2		
B11	Direct Shear	No.	2		
B12	Hoek Shear Box	No.	4		
B13	UU Triaxial Compression	No.	2		
B14	Unconfined Compression with stress strain measurement	No.	4		
B15	Uniaxial Compression	No.	10		
B16	Point Load	No.	4		
B17	Elastic modulus	No.	2		
B18	Hoek Triaxial	No.	2		
B19	Petrography	No.	2		
B20	Brazilian Split Cylinder	No.	2		
B21	Slake Durability Index	No.	2		
B22	Consolidation Test with Swell Pressure measurement	No.	4		
B23	Sulphate content of soil	No.	4		
B24	Chloride content of soil	No.	4		
B25	Organic matter content of soil	No.	4		
B26	Complete chemical analysis of water samples i/c TDS, Cl, SO4 & pH	No.	2		
	Sub-Total B	Rs.			

Name of Laboratory:

*Full saturation of the specimen, slow rate of loading and multi-reversal conditions should be observed.

Total Cost (A+B)



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 4: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND STRUCTURES (20-40 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
A.	FIELD INVESTIGATIONS				
A1	Mobilization and demobilization of at least two (2) straight rotary/heavy percussion drilling rigs at site including setting-up & shifting from one investigation point to another. The equipment shall be capable to complete the investigations within the time schedule.	L.S.	Job		
A2	Execution of six (6) boreholes employing straight rotary/heavy percussion drilling methods. The target borehole depth will be ranging from 20 to 40 m in overburden soils below NSL or up to the bedrock, whichever is met earlier. Subsequent backfilling of boreholes to their original position by cement-sand-bentonite mix.	L.M.	40		
A3	Continuous core drilling (NX size in general and HQ size if directed by the Engineer based on rock conditions) in bedrock up to a depth of 25 m below rock strike level, including labelling, preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.	L.M.	120		
A4	Performance of Standard Penetration Tests (SPTs) in boreholes generally at 1 m depth interval or as necessary along with collection of SPT samples, including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	30		
A5	Collection of undisturbed soil samples from boreholes through Shelby/Denison/Pitcher samplers, including their waxing, labelling, packing, storage & transportation to an approved testing laboratory.	No.	10		
A6	Installation of two (2) stand pipe piezometers (GI Pipe) of 30 m length in already drilled boreholes after washing / reaming of boreholes as directed by the engineer, including monitoring of water levels, twice a week, during the investigation.	L.M.	60		
A7	Monitoring of installed piezometers bi-weekly for six (6) months following the completion of geotechnical investigation.	L.S.	Job		
A8	Excavation of three (3) testpits up to a maximum depth of 3 m below top of ground or up to rock strike level, whichever is met earlier, including backfilling of pits to original condition.	L.M.	9		
A9	Extraction of hand-cut block samples (30cm*30cm*30cm) from testpits including their preservation, labeling, packing, storage and transportation to an approved testing laboratory.	No.	3		
A10	Performance of water pressure tests in boreholes.	No.	6		
A11	Collection of water samples (if encountered) from boreholes/testpits including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	3		
	Sub-Total A	Rs.			

Establishment of coordinates and ground elevations of all the boreholes & testpits using **TOTAL STATION** are included in the scope of work. The coordinates should be provided with reference to a permanent local bench mark.

The Contractor shall arrange transport (one well-conditioned 4x4 vehicle) for Engineer's supervisory staff for site duties (from residence to drilling site, movement from point to point and back to residence).

All the undisturbed soil samples shall be stored and transported as per ASTM standards. The area and clearance ratios of the sampling tubes should be as per ASTM requirements.

The preferred method of drilling is straight rotary drilling. Percussion boring will be allowed only in case of presence of gravely soils subject to approval by the Engineer.



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 4: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND
STRUCTURES (20-40 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate	Amount
B.	LABORATORY TESTING			(Rs.)	(Rs.)
B1	Sieve analysis	No.	25		
B2	Hydrometer analysis	No.	4		
B3	Liquid and plastic limits	No.	10		
B4	Shrinkage limit	No.	2		
B5	Specific gravity	No.	2		
B6	Bulk density	No.	20		
B7	Moisture Content	No.	20		
B8	Water Absorption	No.	4		
B9	Porosity	No.	4		
B10	*Direct Shear Test (Peak, fully softened and residual strength)	No.	2		
B11	Direct Shear	No.	4		
B12	Hoek Shear Box	No.	4		
B13	UU Triaxial Compression	No.	2		
B14	Unconfined Compression with stress strain measurement	No.	6		
B15	Uniaxial Compression	No.	15		
B16	Point Load	No.	6		
B17	Elastic modulus	No.	2		
B18	Hoek Triaxial	No.	2		
B19	Petrography	No.	2		
B20	Brazilian Split Cylinder	No.	2		
B21	Slake Durability Index	No.	2		
B22	Consolidation Test with Swell Pressure measurement	No.	6		
B23	Sulphate content of soil	No.	6		
B24	Chloride content of soil	No.	6		
B25	Organic matter content of soil	No.	6		
B26	Complete chemical analysis of water samples i/c TDS, Cl, SO4 & pH	No.	3		
	Sub-Total B	Rs.			

Name of Laboratory:

*Full saturation of the specimen, slow rate of loading and multi-reversal conditions should be observed.

Total Cost (A+B)



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 5: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND STRUCTURES (40-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
A.	FIELD INVESTIGATIONS				
A1	Mobilization and demobilization of at least two (2) straight rotary/heavy percussion drilling rigs at site including setting-up & shifting from one investigation point to another. The equipment shall be capable to complete the investigations within the time schedule.	L.S.	Job		
A2	Execution of six (6) boreholes employing straight rotary/heavy percussion drilling methods. The target borehole depth will be ranging from 20 to 40 m in overburden soils below NSL or up to the bedrock, whichever is met earlier. Subsequent backfilling of boreholes to their original position by cement-sand-bentonite mix.	L.M.	40		
A3	Continuous core drilling (NX size in general and HQ size if directed by the Engineer based on rock conditions) in bedrock up to a depth of 25 m below rock strike level, including labelling, preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.	L.M.	120		
A4	Performance of Standard Penetration Tests (SPTs) in boreholes generally at 1 m depth interval or as necessary along with collection of SPT samples, including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	30		
A5	Collection of undisturbed soil samples from boreholes through Shelby/Denison/Pitcher samplers, including their waxing, labelling, packing, storage & transportation to an approved testing laboratory.	No.	10		
A6	Installation of two (2) stand pipe piezometers (GI Pipe) of 30 m length in already drilled boreholes after washing / reaming of boreholes as directed by the engineer, including monitoring of water levels, twice a week, during the investigation.	L.M.	60		
A7	Monitoring of installed piezometers bi-weekly for six (6) months following the completion of geotechnical investigation.	L.S.	Job		
A8	Excavation of three (3) testpits up to a maximum depth of 3 m below top of ground or up to rock strike level, whichever is met earlier, including backfilling of pits to original condition.	L.M.	9		
A9	Extraction of hand-cut block samples (30cm*30cm*30cm) from testpits including their preservation, labeling, packing, storage and transportation to an approved testing laboratory.	No.	3		
A10	Performance of water pressure tests in boreholes.	No.	6		
A11	Collection of water samples (if encountered) from boreholes/testpits including their labelling, packing, storage & transportation to an approved testing laboratory.	No.	3		
	Sub-Total A	Rs.			

Establishment of coordinates and ground elevations of all the boreholes & testpits using **TOTAL STATION** are included in the scope of work. The coordinates should be provided with reference to a permanent local bench mark.

The Contractor shall arrange transport (one well-conditioned 4x4 vehicle) for Engineer's supervisory staff for site duties (from residence to drilling site, movement from point to point and back to residence).

All the undisturbed soil samples shall be stored and transported as per ASTM standards. The area and clearance ratios of the sampling tubes should be as per ASTM requirements.

The preferred method of drilling is straight rotary drilling. Percussion boring will be allowed only in case of presence of gravely soils subject to approval by the Engineer.



FEASIBILITY STUDY FOR TOURIST GLASS TRAIN FROM RAWALPINDI TO MURREE
PACKAGE 5: GEOTECHNICAL INVESTIGATION FOR TRACKWAY, STATIONS AND
STRUCTURES (40-60 KM)

BILL OF QUANTITIES

Sr. No.	Description	Unit	Qty.	Rate	Amount
B.	LABORATORY TESTING			(Rs.)	(Rs.)
B1	Sieve analysis	No.	25		
B2	Hydrometer analysis	No.	4		
B3	Liquid and plastic limits	No.	10		
B4	Shrinkage limit	No.	2		
B5	Specific gravity	No.	2		
B6	Bulk density	No.	20		
B7	Moisture Content	No.	20		
B8	Water Absorption	No.	4		
B9	Porosity	No.	4		
B10	*Direct Shear Test (Peak, fully softened and residual strength)	No.	2		
B11	Direct Shear	No.	4		
B12	Hoek Shear Box	No.	4		
B13	UU Triaxial Compression	No.	2		
B14	Unconfined Compression with stress strain measurement	No.	6		
B15	Uniaxial Compression	No.	15		
B16	Point Load	No.	6		
B17	Elastic modulus	No.	2		
B18	Hoek Triaxial	No.	2		
B19	Petrography	No.	2		
B20	Brazillian Split Cylinder	No.	2		
B21	Slake Durability Index	No.	2		
B22	Consolidation Test with Swell Pressure measurement	No.	6		
B23	Sulphate content of soil	No.	6		
B24	Chloride content of soil	No.	6		
B25	Organic matter content of soil	No.	6		
B26	Complete chemical analysis of water samples i/c TDS, Cl, SO4 & pH	No.	3		
	Sub-Total B	Rs.			

Name of Laboratory:

*Full saturation of the specimen, slow rate of loading and multi-reversal conditions should be observed.

Total Cost (A+B)

