CEYLON PETROLEUM STORAGE TERMINALS LIMITED

NATIONAL COMPETITIVE BIDDING

BIDDING DOCUMENT

FOR

RECTIFICATION OF UNSTABLE EMBANKMENT AREA BEHIND THE TANK FARM AT ZONE 01 AT CPSTL KOLONNAWA INSTALLATION

KPR/61/2025

Employer:
Chairman
Ceylon Petroleum Storage Terminals Limited
Oil Installation, Kolonnawa

Engineer:
Engineering Manager
Engineering Function
Ceylon Petroleum Storage Terminals Limited
Oil Installation, Kolonnawa

Issued to :……..

Issued by :…….

Date :…….

October 2025

CONTENTS

VOLUME - 01

SECTION 01 : ***INSTRUCTIONS TO BIDDERS***

SECTION 02 : ***STANDARD FORMS (CONTRACT)***

SECTION 03 : ***CONDITIONS OF CONTRACT***

SECTION –

- ***INSTRUCTIONS TO BIDDERS***

INSTRUCTIONS TO BIDDERS

Instructions to Bidders applicable to this contract are that given in Section-I of the Standard Bidding Document for Procurement of Works. CIDA Publication No. ICTAD/SBD/01, Second Edition ,January 2007, published by the Construction Industry Development Authority (CIDA), "Savsiripaya", 123, Wijerama Mawatha, Colombo 07.

Instructions to Bidders shall be read in conjunction with the Bidding Data provided under section-5 of the Bidding Document (Volume 2)

Instructions to Bidders will not be a part of the contract.

SECTION – 2

STANDARD FORMS

Form of letter of acceptance

Form of agreement

Form of performance security

Form of advance payment security

FORM OF LETTER OF ACCEPTANCE

[LETTER HEADING PAPER OF THE PROCURING ENTITY]

---------- *[date]*

To: ----------

[name and address of the Contractor]

This is to notify you that your bid dated ---------- *[insert date]* for the construction and remedying defects of the ---------- *[name of the Contract and identification number]* for the Contract price of ----------[*name of currency]* ---------- ----------[*amount in figures and words]* as corrected in accordance with Instructions to Bidders and / or modified by a Memorandum of Understanding, is hereby accepted.

The adjudicator shall be ---------- *[name and address of the Adjudicator, if agreed]* / shall be appointed by the Construction Industry Development Authority (CIDA)**.**

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

The Start Date shall be: ---------- *(fill the date as per Conditions of Contract).*

The amount of Performance Security is: ---------- *(fill the date as per Conditions of Contract).*
The Performance Security shall be submitted on or before ---------- (fill the date as per

Conditions of Contract).

Authorized Signature : ----------

Name and title of Signatory: ----------

Name of Agency: ----------

STANDARD FORM: AGREEMENT

This AGREEMENT, made the ----------[day] *day of* ----------[month] *20*-------- [year] between ----------[name and address of Employer] (hereinafter called "the Employer") of the one part, and ---------- *[name and address of Contractor]* (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer desires that the Contractor execute ----------*[name and identification number of Contract]* (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties thereto have caused this Agreement to be executed the day and year aforementioned in accordance with laws of Sri Lanka.

…….	……..
Authorized signature of Contractor	Authorized signature of Employer
COMMON SEAL	COMMON SEAL

In the presence of:
Witnesses:

1.	Name and NIC No.	:	……
	Signature	:	……
	Address	:	……
2.	Name and NIC No.	:	……
	Signature	:	……
	Address	:	……

FORM OF PERFORMANCE SECURITY
(UNCONDITIONAL)

……
(Issuing Agency's Name and Address of Issuing Branch or Office)

Beneficiary: **Ceylon Petroleum Storage Terminals Limited , Oil Installation, Kolonnawa**

Date: …….

PERFORMANCE GUARANTEE NO. : ……

We have been informed that ……
……..…… *(Name of Contractor)* (hereinafter called "the Contractor") has entered into Contract No. …….. (Reference No. of the Contract) dated ……. With you, for the …… [*name of the contract and brief description of works*](hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we ……..……
……. *(name of agency)* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ……..……. *(amount in figures)*
……..……..……
…….. *(amount in words)* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the ……. day of …… 20……. *(insert date, 28 days beyond the intended Completion Date)* and any demand for payment under it must be received by us at this office on or before that date.

……
Signature (s)

FORM OF ADVANCE PAYMENT SECURITY

……
……
(Name and Address of Agency, and Address of Issuing Branch or Office)

Beneficiary : **Ceylon Petroleum Storage Terminals Limited , Oil Installation, Kolonnawa**

Date: …….

ADVANCE PAYMENT GUARANTEE NO.: ……..

We have been informed that ……
……..……..……. *(Name of Contractor)* (hereinafter called "the Contractor") has entered into Contract No. …….. (Reference No. of the Contract) dated …… With you, for the …...…… [*name of contract & brief description*] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum……*(amount in figures)* ……..…… *(amount in words)* to be made against an advance payment guarantee.

At the request of the Contractor, we ……
…… *(name of issuing agency)* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of …….. *(amount in figures)* …… *(amount in words)* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation in repayment of the advance payment under the Contract.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor.

This guarantee shall expire on ……. …… *(insert date, 28 days beyond the expected expiration Date of the contract)*

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

…….
Signature(s)

SECTION – 3

- ***CONDITIONS OF CONTRACT***

CONDITIONS OF CONTRACT

Condition of Contract that will be applicable for this Contract is that given in Section 3 of the Standard Bidding Document for Procurement of Works "CIDA PUBLICATION NO. – ICTAD/SBD/01" Second Edition January 2007 published by the Construction Industry Development Authority (CIDA).

Conditions of Contract shall be read in conjunction with Contract data provided under Section-5 of the Bidding Document (Volume 2).

VOLUME - 02

	INVITATION FOR BIDS
SECTION 04 :	**FORM OF BID AND QUALIFICATION INFORMATION**
SECTION 05 :	**SCHEDULE**
SECTION 06 :	**SPECIFICATIONS**
SECTION 07 :	**BILL OF QUANTITIES AND DAY WORK SCHEDULES**
SECTION 08 :	**STANDARD FORMS (BID)**

Invitation for Bids (IFB)

CEYLON PETROLEUM STORAGE TERMINALS LIMITED

PROPOSED RECTIFICATION OF UNSTABLE EMBARKMENT AREA BEHIND THE TANK FARM AT ZONE 01 AT KOLONNAWA INSTALLATION.
KPR/61/2025

The Chairman, Departmental Procurement Committee (minor) (DPC), on behalf of the ***Ceylon Petroleum Storage Terminals Limited, Oil Installation, and Kolonnawa*** now invites sealed bids from eligible and qualified bidders for **Proposed Rectification of Unstable Embarkment area behind the tank farm at Zone 01 at Kolonnawa Installation**.

The work consists of Earthwork, Drain Construction, Concrete work, Soil nailing etc. The Construction period is **120 Calendar Days**.

1. Bidding will be conducted through **National Competitive Bidding (NCB)**.
2. To be eligible for contract award, the successful bidder shall not have been blacklisted and shall meet the following requirements

   CIDA registration required,

Specialty	Grade
Building Construction/ Irrigation work	C5 or above

3. Qualification requirements to qualify for contract award include
   (a) Experience Required

   The bidder should have completed at least 03 projects as the main contractor with similar nature (**Slope Stabilizing Works including soil nailing and Retaining walls**) and complexity during last five years.

   (b) Average annual volume of construction work performed in last 5 years shall be at least Rs. 40 million.

   (c) Required amount of Credit Facilities shall be at least Rs. 40 million specifically for the project.

   (d) The bidder should have following technical staff:

   i. 01 Site Engineer - Degree in B.Sc Engineering, (Associate member of the Institute of Engineers in Sri Lanka and 10 years' experience or NDT/NDES with 15 years' experience (Part time) in Similar nature of work.

   ii. Technical Assistant I– Civil (Full time at site) – Diploma Qualified person with minimum 5 years experience in similar nature of works

4. Interested bidders may obtain further information from the Manager Procurement of the Ceylon Petroleum Storage Terminals Limited, Tele Phone +94 11 2572156, 2572155 and Tele Fax: +94 11 2074299 and Email: procure@cpstl.lk and inspect the bidding documents free of charge during any working days from 0900 hrs to 1500 hrs. at the address given below. However, the bidders can inspect the bidding document (excluding drawings) from CPSTL website; www.cpstl.lk.

5. A complete set of Bidding Documents in English language may be purchased by interested bidders may obtain the Bidding Documents through any of the following methods:

(a) In-Person Collection:

By submitting a written application to The Manager (Procurement), Procurement Function Ceylon Petroleum Storage Terminals Limited (CPSTL),1st Floor, New Administration Building Oil Installation, Kolonnawa, between **01.12.2025** and **15.12.2025**, on working days from 0900 hrs to 1400 hrs, Along with your request, you must provide proof of payment of a non-refundable fee of LKR 10,000.00. Payment can be made:

- In cash at the Cash Counter, Old Administration Building, CPSTL, Kolonnawa, or
- By bank transfer to the CPSTL account (details given below), and submit a copy of the bank slip or transfer confirmation.

(b) By Email Request:

Making a cash payment of the non-refundable fee of LKR 2,000.00 to the CPSTL bank account (bank details provided below), and Sending proof of payment (a copy of the bank slip or transfer confirmation), along with a written request on company letterhead, via email to procure@cpstl.lk , between 01.12.2025 and 15.12.2025, on working days from 0900 hrs to 1400 hrs. Upon receipt of the non-refundable fee in the CPSTL account, the full set of bidding documents will be issued via email by the Procurement Function.

[Your reference details (Applicant Name, Company Name, Tender Number [KPR/61/2025]) should be stated in your receipt.]

Account Details

Account Holder: Ceylon Petroleum Storage Terminals Limited, Oil Installation, Kolonnawa,, Wellampitiya,

Account Details

Account Holder	:	Ceylon Petroleum Storage Terminals Limited, Oil Installation, Kolonnawa,, Wellampitiya,
Account No	:	004-1-001-9-0208672
Bank & Branch	:	People's Bank Corporate Branch No. 91, All Ceylon Hindu Congress (ACHC) Building, Sir Chittampalam A. Gardiner Mawatha. Colombo 02
Swift code	:	PSBKLKLX
Bank code	:	7135
Branch code	:	004

Bidding Document (excluding drawings) available on the web is only for viewing purposes, and Bids shall be submitted using a Hard Copy of the Bidding Document purchased from CPSTL

6. A pre-bid meeting will be held at 1000 hrs on **09.12.2025** at the Engineering Function, Kolonnawa.
7. Bids shall be submitted on the bidding document obtainable from Procurement Function and duly filled bidding documents may be sent by post/courier under registered cover or sealed cover to reach The Chairman, Department Procurement Committee (Minor), C/o Manager Procurement, Ceylon Petroleum Storage Terminals Limited, Procurement Function, 01st Floor, New Building, Oil Installation, Kolonnawa, Wellampitiya or could be deposited in the tender box kept at the main entrance of CPSTL, on or before 1400 hrs. on **16.12.2025.**
8. In case the bidders are unable to submit the original bids as above, they could submit the scanned copy of the duly filled bidding documents in PDF format via email to tenders@cpstl.lk to reach on or before 1400 hrs. on 16.12.2025 subject to following conditions.
    i. Submission of the bid via email is at the bidder's own discretion.

ii. If the bidder intends to submit a bank guarantee or bank draft as the bid security (instead of a direct deposit to the CPSTL bank account), the original bank guarantee / draft must be sent or hand-delivered to the above address by 1400 hrs. on **16.12.2025.**

iii. The title and closing date of the tender must be indicated as the subject of the email.

iv. The size of an email (including attachments) must not exceed 20 MB. If the attachment exceeds 20 MB, the bidder must split the attachments and send them as separate emails (e.g., 01 of 03, 02 of 03, 03 of 03).

v. Direct links to external sites or shared folders (e.g., Google Drive) are strictly prohibited.

vi. Do not CC or BCC any other official or personal email IDs of CPSTL staff.

vii. The original bid document must be securely kept and submitted to the Manager Procurement upon request. However, the original bid document will only be used for filing purposes and not for verification against the e-bid.

9. Bids will be closed at 1400 hrs. on **16.12.2025** and will be opened immediately thereafter at the office of Manager Procurement, in the presence of the authorized only one representative of the bidder who chose to attend

10. Bids shall be valid up to **17.03.2026** from the deadline for Bid Submission.

11. All bids shall be accompanied by a Bid Security of **Rs. 400,000.00 (Rupees Four Hundred Thousand Only)**. Bid Security shall be valid up to **14.04.2026** from deadline for Bid Submission. Bid Security should be submitted on or before the bid opening time at 1400 hrs. on **16.12.2025**

12. Any of the following party who wishes to submit a bid, shall register himself at the Department of Registrar of Companies www.drc.gov.lk (e-ROC) as per the Public Contracts Act, No. 03 of 1987 for every public contract value exceeding Sri Lankan Rupees Five million (LKR 5,000,000).

    i. An agent, sub-agent, representative or nominee must be registered prior to the closing of the Bid/Tender.

    ii. If the tender applicant and the tenderer is the same party he must be registered prior to the award of the tender.

    However, this registration will be verified by CPSTL at the preliminary evaluation of Bids. In case of failure to meet this legal requirement, the Bid shall be rejected.

    Contact details of the Registrar: Department of Registrar of Companies, "Samagam Medura", No. 400, D R Wijewardena Mawatha, Colombo 10 / Tel.: +94-11-2689208 / +94- 11-2689209 / Email: registrar@drc.gov.lk (Contact details may vary from actuals & CPSTL does not take any responsibility in this regard)

The address(es) referred to above is (are):

The Chairman
Departmental Procurement Committee (Minor),
C/O Manager Procurement,
Ceylon Petroleum Storage Terminals Limited
Procurement Function, 1st floor, New Building,
Oil Installation, Kolonnawa,
Wellampitiya.
Telephone: +94 11 2572156, +94 11 2572156
Fax : +9411 2074299 Email : procure@cpstl.lk

SECTION – 4

- ***FORM OF BID***
- ***QUALIFICATION INFORMATION***

FORM OF BID

Name of Contract: Proposed Rectification of Unstable Embarkment area behind the tank farm at Zone 01 at Kolonnawa Installation.

To: **The Chairman,**
Department Procurement Committee (minor)
C/O Manager Procurement,
Ceylon Petroleum Storage Terminals Limited,
Procurement Function, new Building,
Oil Installation, Kolonnawa, Wellampitya.

Gentleman,

1. Having examined the Standard Bidding Document – Procurement of Works (ICTAD/SBD/01 – Second Edition – January 2007), Specifications, Drawings and Bill of Quantities and addenda for the execution of the above – named Works, we/I the undersigned, offer to execute and complete such Works and remedy any defects therein in conformity with the aforesaid Conditions of Contract, Specification, Drawings, Bill of Quantities and addenda for the sum of Sri Lankan Rupees…… ……(LKR ……..…… ……..) or such other sums as may be ascertained in accordance with the said Conditions.
2. We/I acknowledge that the schedule forms part of our Bid.
3. We/I undertake, if our Bid is accepted, to commence the Works as stipulated in the Contract Data, and to complete the whole of the Works comprised in the contract within the time stated in the Contract Data.
4. We/I agree to abide by this bid for the period of ……. stated in the Sub-Clause 15 of Instructions to Bidders or any extended period and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
5. Unless and until a formal agreement is prepared and executed this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
6. We accept/ we do not accept the Adjudicator.
7. We/I understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this ……day of …….. 20…. in the capacity of ……
…..……. duly authorized to sign tenders for and on behalf of
…..……..……..……..……..……

(IN BLOCK CAPITALS)

Signature: ……
Name : ……
Designation: ……
Address :…….
Email : ……
Telephone no. : ……

Witness :……
(*Name & Signature*)

Address : …….

…….

Qualification Information

(To be completed and submitted by the bidder, with the Bid)

CIDA Registration	
Registration number	*(attach copies of relevant pages from the registration book)*
Grade	C5 or above
Specialty	Building Construction (**Slope Stabilizing Works including soil nailing and Retaining walls**)
Expiry Date	
Blacklisted Contractors	
Have you been declared as a defaulted contractor by NPA or any other Agency? (Yes/No)	
IF yes provide details	
VAT Registration Number	
Construction Program	*(attach as annex)*
Legal status	*(attach relevant status copies, as annex)*
Value of Construction works performed in last 5 years	*(attach copies of Certificate of Completion etc. and other documents such as profit-loss and income expenditure statement)*
Year 2024	
Year 2023	
Year 2022	
Year 2021	
Year 2020	
Value of similar works completed in last 5 years (indicate only the three largest projects)	1. Value _____ Year …….. 2. Value _____ Year …….. 3. Value _____ Year ……. (*attach copies of Certificate of Completion etc., as annex)*
Major items of construction equipment proposed	1. Type _____Capacity …… 2. Type _____Capacity …… 3. Type _____Capacity …….... 4. Type _____Capacity ……. 5. Type _____Capacity …….
Qualification and experience of key staff – Site & Head Office (Permanent, Contract basis & Consultants)	i. 01 Site Engineer - Degree in B.Sc Engineering, (Associate member of the Institute of Engineers in Sri Lanka and 10 years' experience or NDT/NDES with 15 years' experience (Part time) in Similar nature of work. ii. Technical Assistant I– Civil (Full time at site) – Diploma Qualified person with minimum 5 years' experience in similar nature of works (Attach relevant CV's)
Other information requested under ITB Clause 4.1	Detailed Method Statement *(attach as annex)*

Signature of the Bidder : ……..

SECTION 5

- ***BIDDING DATA AND CONTRACT DATA***

Bidding Data

Instructions to Bidders
Clause Reference

(1.1) The Employer:

Name: The Chairman

Address: Ceylon Petroleum Storage Terminals Limited,
Oil Installation,
Kolonnawa.

"Proposed Rectification of Unstable Embarkment area behind the tank farm at Zone 01 at Kolonnawa Installation."

The scope of work of the contractor is defined in general and shall include the following, but not limited to the same. The bidder shall also carry out all the related work that are not listed in this document, but required for completion of the entire work as specified in this Bidding Document.

(i) The work consists of Earthwork, Drain Construction work, Concrete work, Soil Nailing etc.

(ii) The Contractor shall procure of all materials, equipment, machineries, tools, consumables that are necessary for completion of above works. Loading, handling and transportation of all materials from the supply point to store at work site / Contractor's store as per the requirement of the job.

(iii) The Contractor shall do the all type testing for construction and submit the reports to CPSTL.

(iv) The Contractor shall also carry out the jobs that are not specifically mentioned in this Bidding Document but required for successful completion of the job in all respects as per the standards, drawings and codes.

(1.2) Intended Completion Date is **120 Calendar Days** from the Start Date.

(1.3) The office for collection of bid forms is

Manager Procurement,
Ceylon Petroleum Storage Terminals Limited,
Procurement Function, New Building,
Oil Installation, Kolonnawa, Wellampitiya,
Sri Lanka.

The non-refundable fee is Rupees **10,000.00.**

The Bid forms will be issued **from 01.12.2025** ***up to 15.12.2026*** *during office days from* 0900 hrs. to 1400 hrs.

(2.1) The source of funds is **CPSTL**

(4.2) The registration required

CIDA registration required

Specialty	Grade
Building Construction/ Irrigation work	C5 or above

(4.3) The following information shall be provided in Section 4:

- CIDA registration
  - Registration number
  - Grade
  - Specialty
  - Expiry date
- Copy of Business Registration
- VAT registration number (if applicable)
- Form PCA 03 (if applicable)
- Construction program
- Legal status (Sole proprietor, Partnership, Company etc.)
- Authentication for signatory in the form of Power of Attorney (Specifically for this Bid)
- Total monetary value of construction work performed for each of the last five years
- Experience in works of a similar nature and size for each of the last ten years
- Major items of construction equipment proposed to carry out the Contract
- Qualifications and experience of key site management and technical personnel proposed for the Contract
- Any other

(4.4) (a) Experience Required

The bidder should have completed at least 03 projects as the main contractor with similar nature and complexity during last five years.

(b) Average annual volume of construction work performed in last 5 years shall be at least Rs. 40 million.

(c) Required amount of Credit Facilities shall be at least Rs. 40 million specifically for the project.

(d) Following technical staff:

i. 01 Site Engineer - Degree in B.Sc Engineering, (Associate member of the Institute of Engineers in Sri Lanka and 10 years' experience or NDT/NDES with 15 years' experience (Part time) in Similar nature of work.

ii. Technical Assistant I– Civil (Full time at site) – Diploma Qualified person with minimum 5 years' experience in similar nature of works

This is the minimum requirement and the successful bidder shall assign all other necessary staff to enable compliance with all other contractual

stipulations.

(7.1) Site visit

Prior to submitting a bid, bidders shall familiarize themselves and shall be deemed to have done so. The bidders shall inform Engineering Manager, Engineering Function, Oil Installation, CPSTL, Kolonnawa (Tel. +94-11-2572214, Fax No. 0094-11-2531328) at least 02 days in advance with their names, NIC Numbers/Passport Numbers so that the CPSTL will arrange required permits for the site visit.

The bidders are advised to limit the number of persons, for the visit, due to the security reasons at the Kolonnawa Terminal area. Site visit will be permitted during 0830 – 1600 hrs. except Sundays and mercantile holidays. The cost of such visits shall be borne by the bidder.

(9.1) Employer's address for the purpose of clarification is;

Name: Manager Procurement

Address: Ceylon Petroleum Storage Terminals Limited,
Procurement Function, New Building,
Oil Installation, Kolonnawa,
Wellampitiya.

Telephone: 0112572156
Fax: 0112074299
Email: procure@cpstl.lk

(11.1) The language of the bidding document shall be English.

(13.3) VAT component shall not be included in the rates. The amount written in the Form of Bid shall be without VAT. However, VAT component shall be shown separately at the end of the BOQ.

(13.4) The Contract is **not subjected** to price adjustment in accordance with Clause 47 of the Conditions of Contract.

(14.1) Not Applicable

(15.1) The Bid shall be valid up to **17.03.2026** from the deadline for Bid submission

(16.1) Bid shall include a Bid Security using the form included in Section 9.

(16.2) Bid Security shall be:

- For an amount **Rs. 400,000.00** (Rupees Four Hundred Thousand Only).
- Valid up to **14.04.2026** from the deadline for Bid Submission
- Securities and Guarantees shall be on demand guarantees issued by a commercial bank operating in Sri Lanka with the valid license issued by the monetary board of Sri Lanka-Central bank of Sri Lanka

(17.0) Pre-Bid meeting

Venue: Engineering Function Ceylon Petroleum Storage Terminals Limited Oil Installation, Kolonnawa, Wellampitiya.

Date: **09.12.2025**

Time: 1000 a.m.

(19.2) a The Employer's address for the purpose of Bid submission is

The Chairman
Departmental Procurement Committee (Minor),
C/O Manager Procurement,
Ceylon Petroleum Storage Terminals Limited
Procurement Function, 1st floor, New Building,
Oil Installation, Kolonnawa,
Wellampitiya.

Telephone: +94 11 2572156, +94 11 2572155
Fax : +9411 2074299
Email : procure@cpstl.lk

(19.2) b Contract name: Proposed Rectification of Unstable Embarkment area behind the tank farm at Zone 01 at Kolonnawa Installation.

Contract no. KPR/61/2025

(20.1) The deadline for submission of Bids shall be 1400 **hrs. on 16 / 12/ 2025**

(28.1) Not applicable

(30.0) Not applicable

(33.0) Prior to the notification of award, in accordance with Clause 33.0, the standstill period and applicable appeal process shall be applied as follows,

STANDSTILL PERIOD & APPEALS

- **Intension to award the contract:**
  CPSTL shall notify unsuccessful bidders in writing, either by post and/or email, regarding the DPC's intention to award the contract to the successful bidder.

- **Standstill Period:**
  There shall be a minimum interval of **ten (10) working days** between the submission date of the CPSTL notification of the intention to award the contract to the successful bidder and the actual award of the contract. This interval is referred to as the Standstill Period.

- **Debriefing for Unsuccessful Bidders:**
  Unsuccessful bidders may request a debriefing from CPSTL in writing, either by post and/or email, no later than the **third (3rd) working day** of the Standstill Period.

CPSTL shall conclude the debriefing process no later than the **fifth (5th) working day** of the Standstill Period.

- **Submission of Appeals:**
  Any bidder, whether successful or unsuccessful, who wishes to appeal the contract award decision must submit a written appeal to the Chairman, Department Procurement Appeal Committee (DPAC) before the expiry of the Standstill Period.

  Each appeal must be accompanied by a non-refundable cash deposit of Sri Lanka Rupees Ten Thousand (LKR 10,000/=), which shall be paid to the CPSTL Cashier. The payment receipt must be submitted along with the appeal. The DPAC shall only consider appeals supported by proof of such deposit.

  All appeals must be hand-delivered to CPSTL, and an acknowledgment of receipt must be obtained.

It is the sole responsibility of the appellant to ensure that the appeal includes all relevant supporting documents to substantiate the grievance.

(34.0) The amount of Performance Security is 5% of the Initial Contract Price.

(36.0) The Adjudicator proposed by the Employer is an Adjudicator selected from the pool of Adjudicators of Construction Industry Development Authority (CIDA).

Fees and types of reimbursable expenses to be paid to the Adjudicator shall be on a case-to-case basis and shall be equally shared by the Contractor and the Employer.

Contract Data

(Please note that the Clause nos. given hereunder are that of Conditions of Contract)

(1.1) The Employer

Name: The Chairman
Address: Ceylon Petroleum Storage Terminals Limited,
Oil Installation, Kolonnawa,
Wellampitiya.

Employers Representative
Name: Manager Procurement
Address: Ceylon Petroleum Storage Terminals Limited,
Procurement Function, New Building,
Oil Installation, Kolonnawa,
Wellampitiya.

(1.1) The Engineer

Name: Engineering Manager
Address: Engineering Function,
Ceylon Petroleum Storage Terminals Limited,
Oil Installation, Kolonnawa,
Wellampitiya.

(1.1) The scope of work of the contractor is defined in general and shall include the following, but not limited to the same. The bidder shall also carry out all the related work that are not listed in this document, but required for completion of the entire work as specified in this Bidding Document.

(i) The work consists of Earthwork, Drain Construction work, Concrete work, Soil Nailing etc.

(ii) The Contractor shall procure of all materials, equipment, machineries, tools, consumables that are necessary for completion of above works. Loading, handling and transportation of all materials from the supply point to store at work site / Contractor's store as per the requirement of the job.

(iii) The Contractor shall do the all-type testing for construction and submit the reports to CPSTL.

(iv) The Contractor shall also carry out the jobs that are not specifically mentioned in this Bidding Document but required for successful completion of the job in all respects as per the standards, drawings and codes.

(1.1) The Site is located in CPSTL Oil Installation Kolonnawa, Wellampitiya.

(1.1) The Start Date shall be 14 Days from the Letter of Acceptance.

(8.1) Schedule of other contractors**:** None

(9.1) Schedule of Key Personnel:

Minimum persons with qualifications and experience to be defined,

	Designation	Qualification	Experience
i.	Site Engineer (01nr)	Bsc. Engineering	10 years in similar nature of work or
	Technical Officer (01nr)	NDT/NDES	15 years in similar nature of work
ii.	Technical Assistant (01nr)	Diploma Qualified	05 years in similar nature of work

(13.1) The minimum insurance covers shall be:

(a) The minimum cover for insurance of the Works, Plants and Materials is 110% of Initial Contact Price

The maximum deductible for insurance of the Works and of Plant and Materials is 5% of initial Contract Price.

(b) The cover for loss or damage to Equipment is Contractor's responsibility.

(c) The minimum cover for insurance of other property (other than the Site) is Rs. 3,000,000.00.

(d) The minimum cover for personal injury or death,

for third party and employees of the Employer and other persons engaged by the Employer in the Works is Rs. 1,000,000.00 per person, per event.

(13.2) The minimum cover for personal injury or death of workmen or other employees of the contractor engaged in the works is Rs. 1,000,000.00 per person.

(17.1) The Intended Completion Date for the whole of Works shall be **120 Calendar Days** from the Date of Commencement of Works

Working Hours

i. Normal working hours of CPSTL from Monday to Friday is from 0730 hrs. to 1645 hrs.

ii. In the work program Saturday also can be considered as a working day and from Monday to Friday up to 1800 hrs. also can be considered as a working hour by the contractor. But to work on Saturday and up to 1800 hrs. the contractor is required to obtain prior permission since the offices are normally closed on Saturdays and after 1645 hrs.

iii. However, working on statutory holidays, Sundays and after 1800 hrs. on working days will be permitted on prior approval.

iv. Provided always that provision of above (iii) shall not be applicable in the cause of any work which it is customary to carry out, outside the normal working hours by rotary or double shifts.

(19.1) Special Safety Conditions and Security

i. Fire barriers to be erected and Fire blanket are to be laid before starting hot work at site where ever required.

ii. The work/workers should conform to the Fire & Safety rules and regulations of CPSTL and they should wear safety belts when working at high elevations.

iii. Before work of any nature is commenced in any area it is necessary to obtain excavation permits, safety certificates and if the work involves sparks or flames a hot work permit from the Fire & Safety Section of the CPSTL, Kolonnawa depending on nature of work. All precautions stipulated in these documents must be adhered by the contractor and his employees. If the work cannot be completed in the period for which these documents are valid, the work shall be discontinued until the documents have been renewed.

iv. The Oil Installation Kolonnawa is security-restricted area and all contractor's personnel shall abide by the security regulations prevailing and those which might be enforced as and when necessary due to changed circumstances.

v. All contractor's personnel and their vehicles will be required to obtain gate passes before enter in to the Oil Installation Kolonnawa. Safety clearances to be obtained before enter to the premises.

vi. All contractor's personnel should possess valid police clearance certificate (Police Report) to obtain gate passes.

vii. The contractor shall, except if and so far as the contract provides otherwise, indemnify the CPSTL against all losses and claims in respect of injuries or damage to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution of the works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to:

a. the permanent use or occupation of land by the works or any part thereof;

b. the right of the CPSTL to execute the works or any part thereof on, over, under, in or through any land;

c. injuries or damage to persons or property resulting from any act or neglect of the CPSTL, his agent, servants or other Contractors, not being employed by the Contractor, or for or in respect of any claims proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the damage or injury.

(21.1) The Site Possession Date shall be **14 Days** from Letter of Acceptance.

(27.1) The Contractor shall submit a program for the Works within **14 Days** of delivery of the Letter of Acceptance.

(27.3) The Program will be updated **Monthly.**

If any time should it appear to the Engineer that the actual progress of the work does not conform to the approved program, the contractor shall produce, at the request of the Engineer a revised program showing the modifications to the previously approved program necessary to ensure completion of the work within the stipulated time of completion.

(27.4) The amount to be withheld for late submission of a program is an amount equivalent to 5% of the Initial Contract Price.

(35.1) The Defects Liability Period is **120** Calendar Days.

(39.2) Not applicable.

(46.1) All Payments shall be made in Sri Lanka Rupees.

(47.1) The Contract Price is **not subjected** to price adjustment.

(48.1) The retention from each payment shall be **10%** percent of the certified work done.

The limit of retention shall be **5%** percent of the Initial Contract Price.

(49.1) The liquidated damages for the whole of the Works shall be **1/1000th of Initial Contract Price per Day.**

(50.1) The maximum amount of liquidated damages for the whole of the Works shall be **10%** of the Initial Contract Price.

(51.1) Advance payment is 20% of the Initial Contract Price excluding provisional sums and contingencies.

(52.1) The amount of Performance Security is **5 %** of the Initial Contract Price.

The Performance Security shall be valid until 28 days beyond the completion date of Defects Notification Period.

Performance Security acceptable to the Employer according to the given format in the bidding document shall be an unconditional on demand bank guarantee obtained from a commercial bank operating in Sri Lanka with the valid license issued by the monetary board of Sri Lanka - Central bank of Sri Lanka.

(60.1) The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is **25% of Initial Contract Price.**

(63.7) The attendance fee payable to the Contractor on nominated sub-contract work shall not exceed 8%.

SECTION 6

- ***SPECIFICATIONS***

SPECIFICATIONS

The Works under this Contract shall be executed in accordance with the Specifications given in the following documents issued by the Institute for Construction Training and Development (ICTAD), "Savsiripaya", Wijerama Mawatha, Colombo 07.

Publication No.:	Description:
* SCA/4(Vol. I)	Specifications for Building Works, Vol. (I), Sri Lanka. 3rd Edition (revised) – July 2004.
* SCA/4(Vol. II)	Specifications for Building Works Vol. (II), Sri Lanka. 2nd Edition (revised) – October 2001.
* SCA/3/2	Specifications for Water Supply Sewerage and Storm Water Drainage Works, SriLanka. 2nd Edition (revised) – April 2002.
* SCA/8	Specifications for Electrical & Mechanical works associated with Building and Civil Engineering, Sri Lanka. 2nd Revised Edition – August 2000.

It is implied that the eligible bidders are fully acquainted with the above documents and therefore, those will not be issued to the bidders in this bidding document.
However, the bidders may purchase the same if necessary from ICTAD. "Savsiripaya", Wijerama Mawatha, Colombo 07.

SPECIFICATIONS FOR GENERAL REQUIREMENTS & CIVIL WORKS

6.0 GENERAL

This specification shall be read in conjunction with the other documents, which form the Contract Agreement for the Works. Notwithstanding the subdivision of the specification under different headings each and every part of it shall be deemed supplementary to and complementary every other part thereof.

All materials and workmanship shall be in accordance with the appropriate current Sri Lankan Standards or where such standards are not available the relevant British Standards shall be applicable. Where such standards are in conflict with this specification the interpretation in accordance to this specification shall prevail.

6.1 Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Engineer at least 14 days prior to the date when the Contractor desires the Engineer's consent. In the event the Engineer determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.

6.2 Definitions

In this specification the terms 'approved', 'approval' and 'required' mean 'approved by the Engineer', 'approval of the Engineer' and 'required by the Engineer' respectively.

6.3 Scope of Work

The works to be executed under this Contract comprise the following.

(a) The provision at site of all necessary labour, materials plant & equipment, tools instruments etc. together with personnel of all types of skills for the mobilization execution with supervision demobilization and removal of plant tools etc. and other resources provided by the Contractor there from.

(b) The execution of all necessary surveys for the setting out of demarcated land area and for required completion of works.

(c) The maintenance of proper site records, preparation and submission of calculations. Drawings progress reports etc. to the Engineer as required under this Contract Agreement.

(d) Complete the construction works including all temporary works in accordance to the requirements under this Contract Agreement and as required by the Engineer.

(e) The testing of required tests in accordance to the specifications therein and as directed by the Engineer.

(f) All other works associated with the above for the completion of the Works as specified in contract.

6.4 Site Security

The Contractor shall provide all necessary fencing, hoardings, watching and lighting for the security of site and safeguarding the Works. The shelters, guard house and other facilities to be provided for the watchmen to do their duty in an efficient manner. Altering, shifting and adapting same from time to time shall also be the responsibilities of the Contractor. All costs in connection with this shall be borne by the Contractor.

6.5 Advertisement

The Contractor shall allow no advertisement to be placed on any hoarding, scaffolding or fencing erected in connection with the Works without the permission of the Engineer.

6.6 Temporary Works

The Contractor shall submit to the Engineer details, particulars, drawings etc., of all temporary works necessary for the Works for latter's information. The Engineer reserves the right to call for technical justification of the Contractor's proposals and to order any necessary modifications. But the Contractor shall be solely responsible for the stability and safety of all temporary works and for the quality of the permanent works resulting from the Temporary Works eventually adopted.

6.7 Flammable stores

All petroleum, explosives and flammable materials shall be stored in fireproof buildings and such precautions taken with regard to sitting and fire risks as the Engineer may direct. The Contractor shall make all arrangements with the licensing authority for the necessary license.

6.8 Soil Conditions

6.8.1 Unexpected ground conditions

The Contractor shall report immediately to the Engineer any circumstance, which indicates that in the Contractor's opinion the ground conditions differ from those expected by him from his interpretation of the site investigation reports.

6.9 Setting out

All the dimensions given in the drawings should be checked at the site by the Contractor prior to commencing all work. In the event of any discrepancies the Contractor shall inform the Engineer and request well in advance and prior to commencing work. The Contractor shall employ a suitable responsible officer for site setting out works in accordance with the drawings.

All survey marks and pegs shall be clearly identifiable with accurate records kept onsite by the Contractor that must be related to Bench Marks. In this regard Contractor must maintain accurate survey instruments at the sites at all times for any checking of level that the Engineer or his representative may desire.

6.10 Scope of Supply by CPSTL

Construction Utilities

6.10.1 Electricity and drinking water can be supplied to the contractor to undertake this work. The prospective contractor is required to indicate his requirements of electrical power and water from the CPSTL in his offer for evaluation purposes.

6.10.2 The maximum available electrical power supply available to the contractor is 45kVA, 400V AC, 4 wire (TPN), 50Hz and will be subjected to following 05 conditions.

i. Electrical power supply will be provided by CPSTL on the request of the Contractor and charge according to the applicable tariff system, or the Contractor shall have to arrange his own power source.

ii. The Electrical Section of CPSTL will provide terminating point to feeding cables through a suitable circuit isolating and interrupting devices such as a circuit breaker or a switch fuse at convenient location, within 150 m from the tank shell. This switch gears will remain the property of CPSTL and contractor has no access to it.

iii. The maximum load that the CPSTL electrical section can feed will be 63A, 3 Phases.

iv. Power supply will be energized after inspection by the Electrical Engineer of CPSTL provided all requirements in follows are satisfied.

(a) Contractor shall use his own feeder cables and temporary power distribution board sufficiently rated to power the equipment and machinery used at site, conforming to CEB regulations in consultation / supervision of Electrical Engineer of CPSTL.

(b) Contractor's power distribution board should consist of adequate over current and earth leakage protective devices for safety of men and machinery.

(c) Contractor shall install the feeder cables from the metering point up to the temporary power distribution board as per the instruction & approval of the CPSTL Electrical Engineer.

(d) It is the responsibility of the contractor to maintain his switch gear and cable network in good condition, so as to provide, complete safety to men and machinery.

(e) All portable electrical appliances used inside the tank shall be at low voltage, 110V, 1 Phase and should be fed through a center earthed transformer.

(f) The whole electrical installation of the contractor should conform to IEE wiring regulations (16th Edition) published by the Institution of Electrical Engineers (I.E.E), London.

v. CPSTL will reserve the right to disconnect the power supply to the Contractor without prior notice, if any of the foresaid conditions are violated.

6.10.3 Water supply will be provided by CPSTL on the request of the Contractor and charge according to the meter. If the available water head is not sufficient to cater the requirement, it shall be arranged by contractor as his own.

6.11 Contractor's Scope of Supply

Contractor shall supply construction manpower, equipment, materials, consumables and other requisites as follows;

6.11.1 Supply of all materials for successful completion of the project.

6.11.2 Supply of all consumables such as reinforcement, sand, metal, shuttering, welding electrodes, gas for cutting, grinding discs, temporary erection materials and all other consumables necessary for the proper execution of the job.

6.11.3 Supply of all construction equipment such as concrete mixers, welding machines, metal cutting equipment, air compressors, cranes, soil compacting and cutting equipment, material transportation vehicles, rigging equipment, jacks, scaffolding materials, planks, corrugated metal sheets, fire blankets and tools and other equipment where necessary.

6.11.4 Supply of all inspection and testing equipment to perform necessary inspection and testing.

6.11.5 All direct requirements of field equipment the contractor intends to mobilize at site.

6.11.6 Contractor shall submit detailed method statement as per Qualification Information as stated in Bid Document.

6.11.7 All drawings, method statements, time schedules, as built drawings and other related documents shall be prepared and submitted by the contractor.

6.11.8 Quality assurance records shall be maintained by the contractor and these records shall be given to Engineer upon completion of each job.

6.11.9 The Contractor shall submit the required securities, bonds and insurance covers as per the requirements.

6.11.10 Construction Utilities (Electrical)

i. Contractor shall use his own feeder cables and temporary power distribution board sufficiently rated to power the equipment and machinery used at site, conforming to CEB regulations in consultation / supervision of Electrical Engineer of CPSTL

ii. Contractor's power distribution board should consist of adequate over current and earth leakage protective devices for safety of men and machinery.

iii. Contractor shall install the feeder cables from the metering point up to the temporary power distribution board as per the instruction & approval of the CPSTL Electrical Engineer.

iv. It is the responsibility of the contractor to maintain his switch gear and cable network in good condition, so as to provide, complete safety to men and machinery.

v. The whole electrical installation of the contractor should conform to IET wiring regulations (17^{th} Edition) published by the Institution of Engineering and Technology (I.E.T), London.

6.11.11 Quality of Materials

The Contractor shall supply all material to be used under the scope of this contract with a proven quality.

6.11.12 Test Reports

The Contractor shall furnish three (03) copies of test reports pertaining to the completed work.

6.11.13 Materials

Bidders are specifically cautioned to the following minimum considerations, which will be reviewed by the Engineer prior to approving any materials.

6.11.14 Safeguarding the Materials and Equipment

CPSTL shall not be responsible for theft damage or loss of any of the materials and equipment during the construction/installation. Materials and equipment shall be covered and protected against dirt, water, moisture, sand and chemical or mechanical injury. Upon completion of all works the materials and equipment shall be thoroughly cleaned, adjusted and tested to demonstrate its proper operation to the Engineer.

All materials and equipment shall be properly and adequately protected by the contractor before, during, and after installation. Material or Equipment damaged due to inadequate attention of the Contractor shall not be accepted and the client reserves the right to request replacements for such equipment at the handing over. Replacement of items damaged due to unavoidable circumstances during removal shall be paid on measure and pay basis. It is the responsibility of the Contractor to clean the installation at close of work every day and also to hand over a clean and neat installation at completion.

6.11.15 As-Built Drawings

The Contractor shall maintain a complete set of drawings at the site on which details shall be marked exact locations of all installations complete with dimensions. The termination and equipment layout shall be marked during the installation and the Contractor shall obtain the approval of such sketches and hand over to the Engineer for the preparation of As-Built Drawings.

6.11.16 Samples

Samples of all the materials should be handed over to the Engineer and approval obtained before commencing the work. The work shall be carried out using such fittings and accessories.

7.0 SOIL NAILING AND HORIZONTAL DRAINS

7.1 SOIL NAILING

7.1.1 Description

This work shall consist of soil nailing, construction of nail heads, laying of protective net, hydro seeding/planting and other associate works. The work shall be carried out in accordance with this Specification and in conformity with the Drawings or as directed by the Engineer.

Unless otherwise approved by Engineer, the Contractor performing the soil nailing works described in this Specification shall have experience in soil nailing of a minimum of 5 years. The Contractor's on-site supervisors shall have a minimum of 3 years' experience in installing soil nails with Contractor's organization.

Full-time supervision by a qualified Engineer or Technician shall be accorded to all soil nailing works especially all the inspection checks and quality control tests.

7.1.2 Materials

The materials used for soil nailing shall meet the requirements of the following, unless otherwise specified.

a. Reinforcement for Soil Nailing Soil Nail (Re-bar)

Unless otherwise shown on Drawings, reinforcement bars (re-bars) for soil nails shall be deformed Y25 or Y32 bars (SLS-375 – Ribbed Steel Bars for the Reinforcement of Concrete with minimum yield strength of 460 MPa), threaded and fully hot-dip galvanized in conformance with requirements of AS 1214 (Hot-dip galvanized coatings on threaded fasteners) or EN ISO 10684 and AS 4680 (Hot-dip galvanized (zinc) coatings on fabricated ferrous articles) or EN ISO 1461 with minimum average coat thickness of 85 μm or 600 g per square meter.

Thread

The nail bars or re-bars shall be threaded at the exposed end (nail head) for 300 mm length of nail to facilitate fixing of galvanized washer, overlap locking washers, nuts, MS bearing plates at the exposed end. Cut thread properties around steel bars shall be as per ISO metric coarse pitch threads pursuant to EN ISO 898-1. Proper machinery shall be used to cut threads around rebar to the precise dimensions such as the pitch and the diameter to the satisfaction of the Engineer.

If applicable, the nail bar shall be extended using coupler: coupling end shall be threaded for a length shown in the drawings or as instructed by the Engineer and fixed of galvanized coupler at the end of the nail bar. The criteria for coupling threads shall be as specified for the nail head threads above. Minimum threaded diameter shall not be less than 3mm from the soil nail bar diameter.

Nut

Minimum length of nuts shall be 55 mm and 45 mm for nail bar diameters 32 mm and 25 mm respectively. The tightening nuts shall be of minimum strength grade 8 of BS 4190 or EN ISO 898-2 and tested according to the respective standards. The nut shall be tested to ensure it meets the proof load of at least the load corresponding to the tensile strength of the rebar or 150 kN whichever is maximum without failure to BS 4190 or EN ISO 898-2 accordingly.

Coupler

Only soil nails of more than 12 m long shall have re-bars spliced or coupled. The bar coupler shall be capable of developing at least 95% of the load corresponding to the tensile strength of the re-bar, tested pursuant to ISO 15835-2, ISO 15835-1 accordingly, and certified by the manufacturer. Test certificates from a reputable or accredited laboratory, approved by the Engineer, to show compliance with the specification shall be submitted to the Engineer for verification and approval before commencement of works.

The threaded length of coupler shall not be less than 2 times of diameter of soil nail at each end. An additional 5 mm unthreaded length shall be kept at the middle of the coupler in between the threaded portions. Threaded nail shall be fitted at least over a length of two times of diameter of soil nail reinforcement into each reinforce bar at the splice.

Threaded part of nail shall not remain outside of the coupler after tightening. All requirements stated herein has been illustrated in the detailed drawing of the coupler.

Corrosion Protection

All steel components for soil nails including re-bar, re-bar thread, nuts, couplers, etc., shall be hot-dip galvanized in conformance with requirements of AS 1214 or EN ISO 10684 (Hot-dip galvanized coatings on threaded fasteners) and MS bearing plates, washers shall be hot-dip galvanized in conformance with requirements of AS 4680 or EN ISO 1461 (Hot-dip galvanized (zinc) coatings on fabricated ferrous articles) with minimum average coat thickness of 85 μm or 600 g per square meter.

Where the thick protective coating is interfering the coupler/ nut assembly, the coupler/ nut thread shall be over-tapped pursuant to the tolerances in AS 1214 or EN ISO 10684 accordingly. Where over tapping is carried out, the next higher grade of coupler/ nut to that specified shall be used.

b. Grout Tube

Grout tubes shall have a minimum internal diameter of 12 mm for the core and outer annulus grouting and shall be made from high-density polyethylene with a wall thickness of at least 2.0 mm or its equivalent to AS 4131. Tubing shall be of adequate strength to resist damage during both installation and grouting.

Grout tubes shall extend to the lowest portion of the drilled hole to ensure thorough grout penetration and shall be securely fixed to the steel reinforcement to prevent displacement or dislodging.

c. Cement Grout

Cement used for grouting shall conform to requirements of Sub-section 902.1 of the Specification and shall be Ordinary Portland Cement (OPC) complying with (BS EN 196 or BS EN 197). Only fresh cement, free of lumps and less than three months old shall be used. Adequate stocks of cement shall be stored at the mixers to ensure continuous and uninterrupted grouting operations.

Grout shall consist of cement, water and approved grout fluidifier pursuant to ASTM C937. Water cement ratio shall be 0.40 to 0.45, and unless otherwise stated in the design drawing, minimum cube strength of 7 day strength and 28 day strength shall be 20 MPa and 30 MPa respectively (BS 1881/ASTM C942). Sand shall not be used for drill holes of less than 200 mm diameter unless otherwise approved by the Engineer in writing.

Water used in grout shall be clean and free from oil, acid, alkali, organic or vegetable matter and from any ingredients harmful to steel or cement grout. Water shall not contain more than 500 mg/l of chloride ions.

Additives or admixtures shall not be used without the approval of the Engineer. Suitable additives or admixtures shall be used to improve flow-ability and to control bleeding or shrinkage problems. Admixtures shall comply with the requirements of AS 1478/ ASTM C494 and shall not be deleterious to the properties of the grout or any other soil nail components. Admixtures containing calcium chloride, methocell, ligno-sulphonate and aluminates shall not be used. Expansive admixtures where used shall be of the pre-hardening type and not include iron or aluminium powders. Any chemical reactions between grout constituents or materials in contact with the grout shall not produce gases.

Grout shall be thoroughly mixed by a suitable high-speed colloidal mixer (> 100 rpm) until a homogeneous grout, free from un-dispersed cement and lumps and bleeding is obtained. The grout, after mixing for a few minutes, shall be transferred through a 1.2 mm wire cloth/sieve into a storage tank attached with a paddle agitator to prevent sedimentation, to remove lumps. Final mixture of this grout shall be high bleed resistance, low shrinkage, and high fluidity and shall conform to the performance requirements outlined in Table 701-1 below.

Table 7.1-1: Performance requirements for Cement Grout

Property	Test Method	Criteria	Detail
Bleeding	ASTM C940	Final bleeding < 0.5%	Measured when two successive readings show no further expansion or bleeding
Volume change	ASTM C1090	Maximum height change @ 1 day & 28 days 0.1% and 0.3%	
Early expansion	ASTM C940	< 2% at 3 hours	Temperature tolerances are 20 °C ± 5 °C
Fluidity	ASTM C939	Immediately after mixing: Efflux time < 20 s 45 minutes after mixing: Change in efflux time < ± 3 s	Target efflux time for the site conditions shall not vary from nominated value by more than ± 2s.

The total sulphate (SO_3), chloride and nitrate contents of the grout shall not exceed 4%, 0.1% and 0.1% respectively, expressed as a percentage between the respective ion content and the cement content by mass in the grout. The total sulphate (SO_3) and chloride contents shall be determined by the method described in AS 1012.20. The total nitrate content shall be determined by the method described in ASTM D 4327-03.

Submit the grout mix proportions and types of additive or admixture (if used) together with test results at least 14 days for the Engineer's approval prior to the commencement of grouting work at site. Unless otherwise requested by the Engineer, cube tests shall be made at the rate of 1 set of cubes with other tests specified as per Section 802: Table 802-1. The times of day at which samples are taken shall be chosen at random. At least one sample shall be taken on each day.

d. Centralisers

Centralisers shall be manufactured from materials that have no deleterious effects to the reinforcing system and shall not corrode. The centralisers shall be of a shape that permits the free flow of grout but still performs the centralising function acceptable to the Engineer. Centralisers shall not be highly compressible, brittle, bulky or cause decoupling of the grout or de-bonding of the grout/steel-reinforcement interface to the satisfaction of the Engineer.
Plastic slip-on centralisers shall not use, or rely on the grout tube spirally wound around the soil nail to act as centraliser. Centralisers shall be firmly fixed to the nails.

Centralisers shall be provided at intervals not exceeding 1 m along the soil nailing bar, with the first and last centraliser fixed 0.3 m from each end of nail to ensure that the rebar is centered within the drill hole. Centralisers shall be sized to position the rebar within 5 mm of the centre axis of the drill holes and to allow tremie pipe (about 12 mm diameter) insertion to the bottom of the drill hole. The centralizers shall have to be produced by a reputable manufacturer with PP (Polypro Pylene) or PVC (Poly Vinyl Chloride).

Suitability of the method of assembly and fixing of the centralisers, grout pipes, etc., shall be determined by carrying out trials at site at the presence of Engineer until no damages and no distortion of centralisers and grout pipes are observed during inserting and withdrawing of the soil nails. In addition, pull-out checks as specified in Sub section 701.6 a. shall also be carried out during the installation of working soil nails.

e. Tor steel

Unless otherwise shown on Drawings, reinforcement bars (re-bars) for nailing, pillows, beams, and other structures shall be as per Section 602.

f. Cement

Cement used shall conform to requirements of Section 902 of the Specifications and to the provisions of the following British Standards or the corresponding Sri Lanka Standard:

BS EN 197-1 Ordinary Portland Cement (ordinary and rapid hardening) BS EN 197-1 Portland – Blast furnace cement

The Contractor shall provide suitable means of storing and protecting the cement against dampness. Fully covered storage areas with floors protected from rising dampness shall be provided. Bagged or bulk cement which has become partially set or which contains lumps of caked cement shall be rejected. The use of cement reclaimed from discarded or used bags will not be permitted.

g. Coated Metallic Mesh

The Contractor shall get prior approval for the method for fixing of metallic mesh. The Contractor shall obtain approval from the Engineer for the manufacturer specification including technical data sheet of Coated Metallic Mesh acceptable to the Engineer, prior to supplying the material. In addition, the Contractor shall submit Material Test Certificate (MTC) acceptable to the Engineer during the supply of material.

Test requested by the Engineer for selected samples shall be carried out by the Contractor, on his own cost, to ensure quality of the material as per Section 802: Table 802-1. Coated Metallic Mesh shall conform to the property requirements set out in Table 701-2 and Table 701-3 accordingly

Table 7.1-2: Coated Metallic Mesh properties for Embedded Grid Beam Method

	Property	Requirements	Reference
1	Mesh shape	Rhomboid	
2	Tensile strength of mesh (main direction)	50 kN/m (min)	To EAD 230025-00-0106
3	Tensile strength of mesh (secondary direction)	25 kN/m (min)	To EAD 230025-00-0106
4	Tensile strength of wire	800 MPa (min)	To EN 10218-1
5	Diameter of steel wire	2 mm (min)	To EN 10218-2
6	Mesh width (opening size)	45 - 80 mm	Diameter of the inscribed circle
7	Corrosion protection	HD Galvanized/ Galvanized or Zinc aluminum alloy coated to (Class A) (Zn95Al5)	To EN 10244-2
8	Coating mass	210 g/m^2 (min)	To EN 10244-2

Table 7.1-3: Coated Metallic Mesh properties for Isolated Nail Head/ Bearing Plate Method

	Property	Requirements	Reference
1	Mesh shape	Rhomboid	
2	Tensile strength of mesh (main direction)	100 kN/m (min)	To EAD 230025-00-0106
3	Tensile strength of mesh (secondary direction)	45 kN/m (min)	To EAD 230025-00-0106
4	Tensile strength of wire	800 MPa (min)	To EN 10218-1
5	Diameter of steel wire	3 mm (min)	To EN 10218-2
6	Mesh width (opening size)	60 - 80 mm	Diameter of the inscribed circle
7	Bearing resistance against puncturing	Min 100 kN	To EAD 230025-00-0106
8	Corrosion protection	HD Galvanized/ Galvanized or Zinc aluminum alloy coated to (Class A) (Zn95Al5)	To EN 10244-2
9	Coating mass	250 g/m^2 (min)	To EN 10244-2

Table 7.1-4: Coated Metallic Mesh properties for Non-Embedded Grid Beams

1	Mesh construction	Interlocking of steel wire which provide approximately square meshes	BS EN 10223-6 (Steel wire chain link fencing)
2	Tensile strength of wire	350 MPa (min)	To EN 10218-1
3	Diameter of steel core wire	2.8 mm (min)	To EN 10218-2
4	Mesh width (opening size)	45 - 55 mm	Distance measured at right angles internally between adjacent parallel wires
5	Corrosion protection	HD Galvanized/ Galvanized or Zinc aluminum alloy coated to (Class A) (Zn95Al5)	To EN 10244-2
6	Coating mass	250 g/m^2 (min)	To EN 10244-2

h. Connection Clips

HD Galvanized/ Galvanized or Zinc aluminum alloy coated to (Class A) EN 10244-2 connection clips of minimum diameter ≥ mesh wire diameter shall be used to connect two wire mesh sheets. The mesh connection shall be tested to EAD 230025-00-0106 to ensure tensile strength of mesh in both main and secondary directions is achieved through the proposed clip arrangement.

Test requested by the Engineer for selected samples shall be carried out by the Contractor, on his own cost, to ensure the quality of the material.

i. Shotcrete

Material used for the shotcrete mix shall be as specified in the "ACI 506R-05 – Guide to Shotcrete" and as acceptable to the Engineer unless otherwise specified

Aggregate for shotcrete shall comply with the requirements of ASTM C33. The combined aggregate shall meet the gradations given in Table 701-5. Aggregate failing to meet the limits in Table 701-5 may be used if preconstruction testing proves satisfactory results as acceptable to the Engineer.

Table 7.1-5: Grading limits for combined aggregates

Sieve Size Confirming to ASTM	Percent by weight passing individual sieve	
	Fine aggregate	Course aggregate
3/4 in.	-	-
1/2 in.	-	100
3/8 in.	100	90 to 100
No. 4	95 to 100	70 to 85
No. 8	80 to 98	50 to 70
No. 16	50 to 85	35 to 55
No. 30	25 to 60	20 to 35
No. 50	10 to 30	8 to 20
No. 100	2 to 10	

The shotcrete shall have a minimum cement content of 380 kg/m^3 as discharged from the nozzle. Special additives or combination of additives as required for the process may be used subject to their approval by the Engineer.

Cement used shall conform to requirements of Section 902 of the Specifications and to the provisions of the following British Standards or the corresponding Sri Lanka Standard:

BS EN 197-1 Ordinary Portland Cement (ordinary and rapid hardening)

BS EN 197-1 Portland – Blast furnace cement

The Contractor shall provide suitable means of storing and protecting the cement against dampness. Fully covered storage areas with floors protected from rising dampness shall be provided. Bagged or bulk cement which has become partially set or which contains lumps of caked cement shall be rejected. The use of cement reclaimed from discarded or used bags will not be permitted.

j. Nail Heads and Bearing Plates (outer)

Where shown on the Drawings, nail heads and bearing plates shall conform to the following:

(i) Nail head and bearing plate components (including nuts, washers, etc.) shall be fabricated from Grade S355J according to EN 10025-2.

(ii) All nail head components and the bearing plates shall be hot-dip galvanized to AS 4680 or EN ISO 1461, or galvanized by an alternative process approved by the Engineer, with a minimum coating thickness of 85 microns.

(iii) The holes in MS bearing plate shall be drilled perpendicular to the face of MS plate and the center of the hole shall be at a position of within 2 mm from the center of the MS plate. The total annular clearance between the galvanized rebar diameter and the plate-hole diameter shall not exceed 1 mm.

Where indicated, provide the bearing plate with holes for the secondary grout injection and the return flow which ensure that no void exists between the primary grout surface and the bearing plate.

k. Boundary Rope

Boundary Rope shall conform to the property requirements set out in Table 701-6 unless otherwise specified in the Drawings. Tests requested by the Engineer for selected samples shall be carried out by the Contractor, on his own cost, to ensure the quality of the material. Wires/ropes shall be in accordance with EN 12385-4.

Table 7.1-6: Boundary Rope Propertie

	Property	**Requirements**
1	Rope diameter	10 mm (min)
2	Construction	WSC
2	Minimum breaking load	60 kN
3	Tensile strength grade	1750 N/mm^2 (min)
4	Corrosion protection	HD Galvanized/ Galvanized or Zinc aluminum alloy coated to (Class A) EN 10244-2
5	Coating mass	210 g/m^2 (min)

i. Coir Mesh

Coir net shall be meshed fabric of strand made of coir fiber. The required mesh size shall approximately 15 x12 mm and the required diameter of the strand shall approximately 4 ~ 7 mm. The requirement of coir net as follows:

Table 7.1-7: Coir Mesh Properti

Base Material	***Tensile Strength (kN/m)**	**Unit Weight(g/m^2)**	**Strand Thickness(mm)**	**Eye Size(mm)**
Machine Spun Coir fiber with inner cotton thread	6~30	300~1500	4~7	15x12

**Tensile Strength: Strength of the 1 m long wire*

Test requested by the Engineer for selected samples shall be carried out by the Contractor, on his own cost, to ensure quality of the material.

m. Dowels

The dowels shall be of mild steel as specified in Sub section 606 and shall be fully hot-dip galvanized in conformance with AS 4680 or BS EN ISO 1461 to minimum average coating thickness of 85 micro-meters or 600 g per meter square surface.

7.1.3 Materials Handling and Storage

Cement shall be stored properly to prevent moisture degradation and partial hydration. Cement that has been caked and lumpy shall be rejected and discarded.

Contractor shall suitably protect steel reinforcement, UPVC pipes, nail head components and bearing plates against mechanical damage, weld splash, contamination by marine spray and gross industrial atmospheric contamination. Store steel reinforcement and UPVC pipes in straight lengths. All soil nail components shall be stored in clean and dry conditions.

Galvanized steel reinforcement shall be carefully handled to avoid punctures, fractures or wear of the galvanizing. Dragging bare or galvanized steel reinforcement across abrasive surfaces or through deleterious materials such as surface soil shall be avoided.

Damage to the re-bar as a result of abrasion, cuts, nicks, welds and weld splatter shall be causes for rejection. Re-bars shall be clean from dirt, rust and other deleterious substances prior to installation. Heavy corrosion or pitting of re-bars shall be cause for rejection. Threaded end of re-bars to which bearing plate and nuts will be attached, shall be protected by some protective wrap during handling, installation, grouting and guniting.

7.1.4. Method Statement

a. General

The Contractor shall submit Construction Program and Method Statement at least 21 days before the commencement of the soil nailing works. Contractor shall not start the soil nailing work without an approved Construction Program and Method Statement.
The Method Statement and Construction Program shall include, but not be limited to, the following information:

(i) Names and resumes of suitably experienced personnel who shall supervise and carry out the work.
(ii) Method of installation of the soil nails, including drilling with or without working platform, cleaning, supporting the drill holes; and grouting and testing of the nails together with construction/excavation sequence. Only pneumatic, rotary and rotary percussion drilling with air as fluid and flushing agent shall be permitted.
(iii) Method for installing instrumented soil nails with strain gauges if any, providing conduits for wires and avoiding damage to wires between soil nails and readout box.
(iv) Proposed grout mix proportions and the method of grout production.
(v) Results of the trial grouting mix for anchor bars and soil nails that verify your proposed grout mix proportions and the method of grout production.
(vi) Detailed method of facing construction such as applying shotcrete, grid beam or pillow.
(vii) Detailed method of fixing the coated metallic mesh and bearing plates with or without working platform.
(viii) Coir mesh material laying process and Detailed method of vegetation
(ix) Proposed construction program and construction sequence.

b. Trial or Preliminary Soil Nail (Test Nail)

The Contractor shall be fully responsible of providing all necessary and suitable resources and materials to complete all the trial soil nails strictly according to this Specification. The Contractor shall install the trial or preliminary soils nails (test nails) and carry out the verification pull-out test (Sub section 701.6 a.) at locations selected by the Engineer before commencement of installation of working soil nails. Number of pull-out tests shall be 2 % of the total number of working soil nails subject to a minimum of two.

c. Construction Sequence

Installation of permanent nails shall be commenced once testing of the Test Nails (refer to Section 701.6 a.) has been completed. Unless otherwise shown on the Drawings or directed by the Engineer, soil nail slopes shall be constructed in an incremental, "top-down" manner in accordance with the following sequence;

(a) For each construction stage, excavate the face of the cut over the width and depth/height as approved in the Method Statement.

Unless the context requires otherwise, excavation of each "lift" shall not exceed a total depth of 2 m, and ~~also~~ shall not be continued more than 0.5 m below the row of soil nails to be installed, or the full depth of excavation in the case of the lowest row of soil nails.

The exposed slope face after each excavation "lift" shall be inspected by a Geotechnical Engineer attached to the Engineer before the installation of the soil nail structure.

(a) Installation and testing of soil nails together with installation of horizontal drains shall commence immediately after excavation is completed. The time the exposed excavated face is left unsupported shall be kept to a minimum to prevent any deterioration of the excavated face.

(b) Construction of the facing i.e. shotcrete or grid-beam or pillow over the exposed face at the current construction stage (lift) may commence once the soil nails and drainage have been installed. Make allowance for supporting the facing during placement of concrete/ shotcrete and for lapping of facing reinforcement to ensure a continuously reinforced face.

(c) Construction of subsequent rows of soil nails and concrete facing shall be carried out in a similar manner, one row at a time.

(d) Excavation for subsequent rows of soil nails shall not commence until the nail/anchor installation of the preceding row is fully completed and time has elapsed for the facing to gain sufficient strength to self-support to permit further excavation to proceed. Excavation of subsequent lifts shall only take place when the completed facing of the previous lift has achieved sufficient strength to be self-supporting. This time period shall not be less than 72 hours, unless otherwise approved by the Engineer.

Construction sequence specified in the Contract Documents without the approval of the Engineer.

7.1.5. Construction Requirement

a. General

Installation of the soil nails shall be carried out by qualified and experienced personnel. Soil nail shall be assembled in a workshop, or on site under shelter, by trained personnel. Identify the assembled soil nails using clear markings and handle them with care.

b. Set Out and Drilling

Rotary or rotary-percussion drilling equipment shall be used for drilling to ensure minimal re-molding of in-situ materials within the drill holes. Drilling fluids other than air shall not be used, unless otherwise approved by the Engineer.
Holes for galvanized soil nails shall be minimum 100 mm in diameter or as shown on the Drawings.
During the drilling operation, the ground conditions encountered on a drill hole log together with all changes in ground type and notes on water levels encountered and drilling rates shall be recorded. Records shall also be kept on the bearing and inclination of the formed drill hole as well as geometric details and the cleaning procedure in the drill hole log.

On completion of drilling, the drill hole shall be cleaned of all loose and deleterious material and protect or seal the drill hole opening to prevent the entry of foreign matter. Cleaning shall be carried out by flushing with air or compressed air using side jet bits, so as to ensure removal of all drill cuttings from the walls and bottom of the drill hole while avoiding excessive air pressure. Reinforcement shall only be installed in a clean hole free of debris and foreign matter.

Unless otherwise approved by the Engineer, no drilling shall be carried out at a place within 10 m radius of any freshly grouted soil nails including soil nails for pull-out tests, within 12 hours of the completion of grouting.

The drill holes for the soil nails shall have adequate clearance from the nearby structures and shall be constructed within the following tolerances:

(a) Deviation in alignment of the drill hole shall not exceed 2°. Deviation from straightness shall not exceed 20 mm in any 3.0 m length of hole. Entry point of the drill holes shall be within ±50 mm of its design position on the cut face.

(b) The depth of the holes as shown in drawings shall be within a tolerance of – 0, +100 mm.

(c) An allowance for over drilling (600 mm maximum) should be added to the depth where debris cannot be removed from the bottom of the hole.

(d) The maximum deviation of the diameter of the drill holes from the design diameter is –0, +10 mm.

c. Insertion and Grouting

i. Insertion of Soil Nails

Prior to soil nail installation, the drill hole shall be cleaned of debris by air flushing methods as stated above.

Insert soil nails in one careful operation at a controlled rate to avoid dislodgment of material from the wall of the drill hole and to ensure that centralizers and spacers are not displaced. If any damaged soil nail or soil nails with damaged galvanized coating during installation, shall be replaced. Insertion and grouting shall occur as soon as practicable following drilling, but in any event shall be completed within 12 hours after completion of drilling.
After inserting about 75 % of the total design length into the drill hole; the rebar shall be withdrawn to check the conditions of the centralizers and contamination of rebar. Such pull-out check shall be carried out on at least 1 % of the nails especially for those drill holes that have been left for more than 2 hours after completion of drilling.

Grouting shall not be carried out without prior approval of the Engineer.

ii. Grouting Equipment

Grouting equipment for soil nail installation shall be of a type, quantity and size which is suitable for the grouting required and is approved by the Engineer. Equipment shall be always kept clean and in good working order.

The equipment shall include:

(a) A purpose designed high speed mechanical stirrer capable of producing grout free of lumps within a mixing time of 2 minutes. Mixers shall be fitted with a water volume measuring device for batching purposes

(b) A holding tank fitted with an agitator to provide continuous agitation of the grout at > 100 rpm. The tank shall be fitted with a dipstick to allow continuous measurement of the volume of grout in the tank;

(c) Flow meter and pressure gauge to check the intake grout volume and the required pressure.

The pump used for grout injection shall be of the positive displacement type (i.e. it shall be actuated by a piston or screw) fitted with a bypass back to the agitator tank to allow a standby pump to be brought into operation immediately in the event of breakdowns during grouting operations.

iii. Grout Mixing

Batching of the dry materials shall be by weight. Measure the amount of water used with a calibrated flow meter or a measuring tank.

Grout shall be mixed by adding initially approximately two-thirds of cement to the water, followed by the additive if any, and then the remaining one-third of cement. Mixing shall be done for a sufficient time to produce a grout of uniform consistency.

The grout mixing process shall utilize a recirculating system where the grout is continuously discharged and recharged into the mixing unit during the mixing period. After mixing, grout shall be kept continuously agitated.

Grout shall be passed through a nominal 1.2 mm wire cloth/sieve to ensure a uniformly mixed grout prior to injection. Grout shall be used as soon as possible after mixing and in any case within 30 minutes of adding cement, unless approved retarding agents are used.

Grout pumps shall be efficient and capable of running continuously for the duration of the grouting operation. Pump shall be capable of pumping the specified grout at a rate appropriate to that required for the operation.

Any alternative mixing procedures proposed by the Contractor shall be approved by the Engineer before application.

iv. Grouting

Grouting shall be carried out by use of supply lines directly connecting the pumps to the down-hole grout tubes. Grout shall be injected through a grout tube to the bottom of the hole, at an injection pressure of not more than twice the overburden pressure measured at the top of the soil nail. The grout tubes shall have a minimum internal diameter of 12 mm to ensure that blockages shall not occur during grouting operations and shall also be sufficiently robust to ensure that they are not damaged during handling.

During the grouting operation, the grout shall displace all air and water and fill the hole in a continuous operation until the emerging grout is of the same consistency as the grout being pumped in. The grout level shall then be checked by sitting for 5 minutes and top-up grout introduced if necessary to ensure that the soil nail is fully grouted.

Remaining void at the top of the drill hole shall be plugged flush to the slope faces using a dry-packed 1:3 cement: sand mix. Grout that has overflowed from the hole shall be discarded and disposed as waste to the satisfaction of the Engineer.
Alternative methods to ensure that soil nails are fully grouted may include over-pouring the grout using a PVC tube extended sufficiently to allow for grout losses and prevent the formation of a horizontal construction joint in the grout. The choice of method shall be adapted to the geology of the material and the extent of grout loss encountered. The degree of rock fracturing or presence of fill shall be used to assess the affect grout loss.
Soil nail shall be protected from accidental disturbance after grouting has been completed to ensure that damage of the grout/soil and grout/nail bond does not occur.

v. Loss or Leakage of Grout

If, during the grouting of any hole, the grout take increases suddenly by a significant amount, Engineer shall be immediately informed with drilling records and grouting records.

If, during the grouting of any hole, grout is found to flow from adjacent grout holes in quantities which in the opinion of the Engineer are sufficient to interfere seriously with the grouting operation or to cause appreciable loss of grout, the adjacent holes shall be temporarily capped and the rebar shall be removed from the grouted hole. Grouting, re-drilling and re-grouting the hole shall be done subsequently.

If, during the grouting of any hole, grout is found to flow from joints in the geological formation at the Site or any other locations, plugging or caulking the leaks shall be done in a manner agreed by the Engineer.

vi. Fitting of Galvanized Nuts and Bearing Plates

The bearing plate shall be fitted at the head of the soil nail concentrically to the steel reinforcement with a tolerance of 5 mm and perpendicular to the steel reinforcement with a tolerance of 3°.

The methods used for bedding the bearing plate shall ensure void-free contact over the full area of the plate. Locking tight the nuts on soil nails shall be done after the grout has attained a minimum compressive strength of 20 MPa.

vii. Construction Conformity Record

Submit conformity records for each soil nail installation. The record shall include the following:

a. Soil nail identification number
b. Bearing, inclination, position, depth, and diameter of the formed drill hole
c. Soil/rock type encountered with depth during drilling
d. Water levels
e. Drilling rates
f. Cleaning procedure
g. Type and age of cement
h. Concentration and type of additive (if any)
i. Water/cement ratio
j. Bleed characteristics of grout
k. Flowability characteristics of grout

l. Mixing equipment used
m. Mixing time
n. Size of grout pipe and length
o. Method of grouting
p. Time intervals between completion of soil nail hole drilling and start of grout injection
q. Time of completing grout injection
r. Volume of grout injected
s. Average injection pressure
t. Times and details of any interruptions
u. Test specimens taken and 7 and 28 days grout strength obtained
v. Estimated elastic extension for Suitability Test and Acceptance Tests

d. Isolated Nail Head Construction

Two types of isolated nail heads, as Bearing Plate Method and Concrete Pillow Method, shall be used with Coated Metallic Mesh. Properties of Coated Metallic Mesh shall be as specified in Table 701-3.

i. Bearing Plate Method

Nail head consist with Bearing Plate shall be firmly fixed to the Soil Nail on top of coated metallic mesh without leaving any gaps by a nut, as shown in Drawings. Mesh shall be stretched sufficiently to achieve minimum slack.

Nail head with steel plate shall be in a plane normal to the nail axis clamped down with galvanized nut and washers/wedge washer to the clamping down forces of 0.2 kNm (min) or as shown in the design Drawings, using a calibrated torque wrench. Bearing Plate installation shall only be carried out after the grout have reached at least 7-days strength (> 20 MPa). The galvanized thread of the rebar and the nuts shall be coated with approved zinc- rich paint before/after tightening. Bearing plate shall be fully touch with coated metallic mesh and ground without leaving any gap between bearing plate and mesh with ground.

ii. Concrete Pillow Method

Nail head consist with two parts; namely, concrete pillow and steel plate fixed to the pillow by a nut, as shown in Drawings.

Excavation for soil nail head shall be done to dimensions showing in the Drawings or as instructed by the Engineer. All necessary accessories as shown in the Drawings to be installed and in-situ construction with Concrete C30/20 shall be carried out as shown in the Drawings or as instructed by the Engineer.

Nail head with steel plate shall be in a plane normal to the nail axis clamped down with galvanized nut and washers/wedge washer to the clamping down forces of 0.2 kNm (min) or as shown in the design Drawings, using a calibrated torque wrench. Nail head construction shall only be carried out after the grout have reached at least 7-days strength (> 20 MPa). The galvanized thread of the rebar and the nuts shall be coated with approved zinc- rich paint before/after tightening.

Measures to protect the newly constructed nail head against erosion such as cover the nail head with tarpaulin, etc., shall be carried out until the slope is properly protected (by guniting, etc.)

Where instructed by the Engineer, the Contractor shall uncover a maximum of 3 selected soil nail heads from the batch of soil nail head cast on any one day for examination to ensure compliance of specifications. If defective workmanship is found in any one of the 3 selected and examined nail heads, all the nail heads cast in that day shall be recasted to the Engineer's satisfaction.

e. Grid Beam

Excavation for beam shall be done to dimensions showing in the Drawings or as instructed by the Engineer. No excavation is necessary for non-embedded Grid Beams. All necessary accessories as shown in the Drawings to be installed and in-situ concrete C30/20 shall be carried out as per the drawings or as instructed by the Engineer.
Steel plate connected to the nail shall be in a plane normal to the nail axis and clamped down with galvanized nut and washers/wedge washer to the clamping down forces of 0.2 kNm (min) or as shown in the design Drawings, using a calibrated torque wrench. Beam construction shall only be carried out after the grout have reached at least 7-days strength (> 20 MPa). The galvanized thread of the re-bar and the nuts shall be coated with approved zinc- rich paint if damage the hot dip galvanized paint before/after tightening.
Measures to protect the newly constructed beams against erosion such as cover the beams with tarpaulin, etc., shall be carried out until the slope is properly protected.

Where instructed by the Engineer, the Contractor shall uncover selected beams to ensure compliance of specifications. If defective workmanship is found in selected and examined beams, all the nail beams cast in that day shall be recast to the Engineer's satisfaction.

For the desired properties of the Coated Metallic Mesh to be used for the construction of grid beams shall be as specified in Table 701-2.

Smooth finish formwork shall be used as described in Section 605.3 c., at the places where the grid beam is fully or partially exposed or constructed on slope surfaces.

f. Coir Mesh

For Isolated Nail Head Methods and Grid Beam Method; a coir mesh shall be laid on the top of the top soil prior to proceeding with grassing/hydro seeding/planting as approved by the Engineer. The Contractor shall include the Coir mesh material laying process in method statement for the Engineer's approval.

g. Coated Metallic Mesh

For Isolated Nail Head Methods and Embedded Grid Beam Method; Coated Metallic Mesh shall be installed immediately after laying of the Coir mesh material with/without vegetation cover, as shown in the Drawings or as instructed by the Engineer. Laying of wire mesh shall be done from top to bottom. Bearing plates shall be tightened to the nails after laying the wire mesh as specified. The Contractor shall include the wire mesh and bearing plates fixing procedure in method statement for the Engineer's approval.

For Non-Embedded Grid Beam Method, wire meshes shall be laid along the slope and interconnected appropriately using connection clips or any other method approved by the Engineer, before initiating construction of Grid Beams.

h. Boundary Beam

Boundary beam shall be constructed where Isolated Nail Head Methods and the Grid Beam Method are used as shown in the drawings or as instructed by the Engineer. Excavation for boundary beam shall be done to dimensions showing in the Drawings or as instructed by the Engineer. In-situ construction with concrete C30/20 shall be carried out as shown in the Drawings or as instructed by the Engineer.

i. Shotcreting

The surface of the slopes can be shotcreted after soil nail installation to protect the surfaces from weathering and erosion instead of grassing or hydro-seeding or planting. The shotcrete shall be reinforced with galvanized wire mesh 50mm x 50mm made of diameter not less than 2 mm (SWG–14).
Slope should be prepared appropriately prior to shotcreting by removing loose or shattered rock, rock debris, soil or other loose material from the surface. Immediately prior to shotcreting, the surface shall be cleaned by an approved

method such as brooming. The surface shall be left damp, but all free water shall be removed by an approved method.

Beams connecting the nail heads shall be provided with reinforcement specified in the drawings and shall be shotcreted with the same mix. The mesh shall be securely fastened with nails, staples or other types of surface anchors and to the installed soil nail plates and supported with approved spacers so that the mesh is located centrally within the shotcrete coating. Fiber or needle reinforced concrete is not an acceptable alternative to steel reinforcing fabric. A cover of minimum 50 mm of shotcrete shall be provided to the mesh at all edges. Laps in the mesh shall not be less than 200 mm.

The shotcrete shall be carried out as specified in the "ACI 506R-05 – Guide to Shotcrete" and guidance of the Engineer's representative. The shotcrete shall have a minimum cement content of 380 kg/m^3 as discharged from the nozzle and shall have a minimum compressive strength of 30 MPa at 28 days when tested by means of 75 mm diameter cores (BS 1881: Part 120) taken from test panels and from in place shotcrete. Special additives or combination of additives as required for the process may be used subject to their approval by the Engineer.

Shotcrete shall only be applied by nozzle only using wet mix, men experienced and skilled in the work and in the presence of the Engineer's representative. Application shall be built up making several passes of the nozzle over the working area. The nozzle shall be held so that the stream of material shall impinge as nearly as possible perpendicular to the surface being coated and the velocity of discharge from the nozzle, the distance of the nozzle from the surface and the amount of water in the mix shall be regulated so as to produce a dense coating with

minimum rebound of the material and no sagging as acceptable to the Engineer's representative. Rebound material shall be removed by air jet or other suitable means from the surface as work proceeds and disposed of.

Construction joints shall be kept to a minimum. The joint edge shall not taper more than 45^o to the slope face and shall be cleaned and wetted by air-water jet before continuing application.

Adjoining areas not required to be shotcreted shall be protected from splash and spray rebound. Splash or rebound material on these adjoining surfaces shall be removed by air-water jet or other suitable means as work proceeds.

Prior to applying any shotcrete the Contractor shall submit to the Engineer for his approval, details of his proposed procedure, plant, materials and mix proportions. Concrete transport trucks shall not be used to mix shotcrete/concrete.

Curing shall commence within one hour of the application of shotcrete and may be by water or membrane curing (curing agent). In water curing, the surface of the shotcrete shall be kept continuously wet for at least seven days. Membrane curing agent shall consist of the application of an approved colorless curing compound to the surface of the shotcrete acceptable to the Engineer.

Short and long horizontal drains shall be installed in shotcreting area prior to shotcreting as per the Drawings or as instructed by the Engineer in accordance with the Section 702 of the Specification unless otherwise instructed by the Engineer.

Integrity of the shotcrete for hollow areas shall be checked by sounding with a hammer not more than 24 hours after placement. Alternative methods shall be used with the approval of the Engineer.

Defective areas shall be rectified by removal and replacement with fresh material with the area to be treated being a minimum of 300 mm x 300 mm and subject to the approval of the Engineer. Remove and replace shotcrete which lacks uniformity, exhibits segregation, honeycombing, or lamination or shows evidence of other defects (e.g. dry patches, sand pockets or sagged slumped material) with fresh shotcrete.

7.1.6. Test and Standards of Acceptance

Soil Nail General

Soil nails shall undergo two types of testing, namely, Suitability Test for test nails and Acceptance Test for permanent/working nails.

The purpose of Suitability Test on test nails is to confirm that the bond strength is achieved and that the reinforcement will perform as designed prior to permanent/working soil nail installation. The Acceptance Test on permanent/working nails is a measure of quality control. Tests shall be carried out for soil nails under the direction and guidance of the Engineer. Pull-out test arrangement shall be shown in Figure 701-1 with minimum of 3 number of dial gauges.

The number of test nails to be assessed by Suitability Test shall be 2 % of the permanent/working nails with a minimum of 2 tests.

A total of 3% of permanent/working nails shall be subjected to Acceptance Test. The locations of the test nails shall be approved by the Engineer.

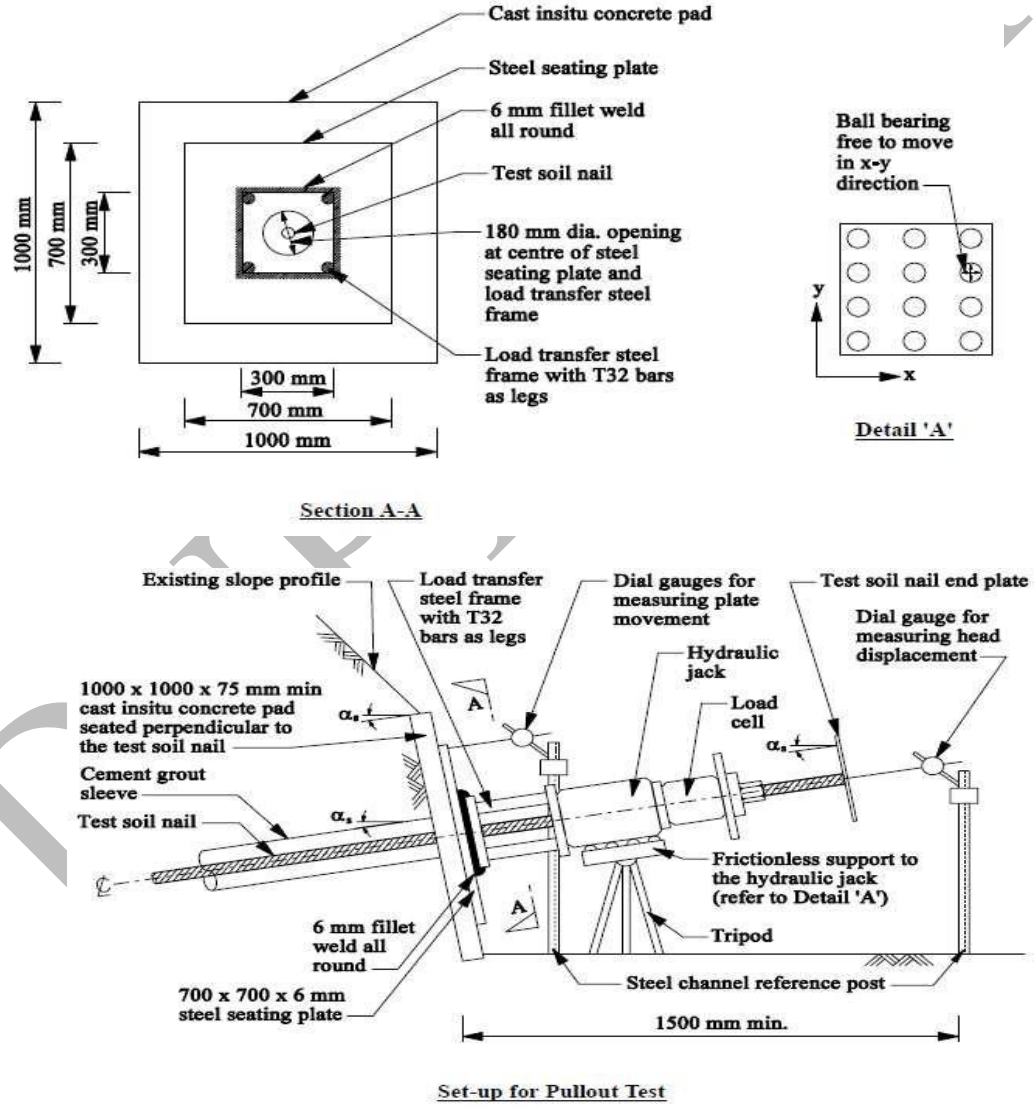

Figure 7.1-1: Pull-out test arrangement

Suitability (Pull-Out) Test

Prior to the installation of permanent/working nails, Suitability Test nails shall be installed to the satisfaction of the Engineer. The tests shall establish adequacy of the soil nail installation with respect to bond stresses between the nail and soil for the various ground conditions which apply and shall involve subjecting soil nails to axial pull- out loads until failure occurs, or to 80% of the ultimate tensile strength (UTS) of the soil nail rebar.

These nails shall have a minimum bond length of 3 m unless otherwise shown on the Drawings. A minimum de-bonded zone of 1 m length of soil nail shall be provided immediately behind the facing in order to prevent influence on the test result from the load test reaction system. This de-bonded length requirement shall be waived if the load test reaction system shall not exert any pressure on the slope surface within a metre radius from the circumference of the test nail drill hole.

The soil nails subject to Suitability Test are additional to the permanent/working nails shown on the Drawings. The Contractor shall inform to the Engineer, intention to carry out Suitability Test at least 3 days earlier.

Test the soil nails subject to Suitability Test to pull-out failure or to 200% of the design working load, whichever is lower.

Adjust the reinforced bar diameter or strength grade, if necessary, to ensure that the test load does not exceed 80% of the UTS of the soil nail bar. The test nails shall be installed in an identical manner, including time delays between various operations, and at locations with ground conditions representative of that of the permanent/working nails and as approved by the Engineer.

Injected grout shall have achieved a compressive strength of 30 MPa (i.e. 28 days strength) before performing the Suitability Test.

Soil nails subjected to Suitability Tests shall be loaded in the load increments specified by the Engineer and held at these loads for the period specified in Table 701-8 at the respective peak loads given by the Engineer unless otherwise specified by the Engineer.:

Table 7.1-8: Suitability Test – Load Increments and Minimum Periods of Observation

Loading Cycle	**Test Loads (% of Design Working Load)**	**Minimum Period of Observation at Peak Test Load (minutes)**
1	10 → 60 → 10	10
2	10 → 100 → 10	60
3	10 → 150 → 10	10
4	and thereafter the load is 200% of the Design Working Load. The test load shall be limited to 80% of the ultimate tensile strength of soil nail rebar.	180

The rate of load application shall be in the range of 3 to 5 kN/minute. At each load cycle, the load shall be held at the peak test load for the period of observation as specified in Table 701-8. The head movement shall be recorded at 1, 2, 3, 5, 6, 10, 20, 30, 50, 60, 90, 120, 150 and 180 minutes inside each cycle.
The Suitability Test shall be considered successful if all the following are satisfied:

(a) A total creep movement of less than 2 mm between the 6 and 60 minutes readings is measured during Cycle 4; and

(b) A total creep movement of less than 1mm between the 60 and 180 minutes readings is measured in Cycle 4; and

(c) The creep rate is linear or decreasing, when plotted against the logarithm of time throughout Cycle 4.

If the test nail cannot be pulled out within 80% of the ultimate tensile stress of the soil nail rebar, the bar shall be cut-off flush with the finishing ground and the remaining part of the drill hole shall be grouted.

When directed by the Engineer, the entire test nail shall be extracted from the drill hole for inspection. Unless otherwise directed by the Engineer, the void caused by the extraction of the soil nail shall be filled with grout.

If the extracted soil nail indicates that full penetration of grout into the drill hole has not been achieved, or any other test result indicates that the soil nail has not been constructed in accordance with this Specification, the Contractor shall submit revised soil nail construction procedures (such as drilling method, grout mix design and grouting techniques) to the Engineer for approval.
In such instances, Suitability Test shall be repeated on a replacement test nail. Any modifications of construction procedures, replacement nails and associated tests shall be done the Contractor's own cost.

Acceptance Test

A total of 3% of permanent/working nails, unless otherwise approved by the Engineer, shall be subjected to Acceptance Test. Of these, half shall be in the top row, a quarter in the middle row and a quarter in the bottom row. The Engineer shall nominate the locations of soil nails subject to Acceptance Test. The Engineer may direct additional locations for Acceptance Test if necessary.

A minimum de-bonded zone of 1 m length of soil nail shall be provided immediately behind the facing in order to prevent influence on the test result from the load test reaction system. This de-bonded length requirement shall be waived if the load test reaction system shall not exert any pressure on the slope surface within a metre radius from the circumference of the test nail drill hole.

Acceptance Test shall be carried out in the presence of the Engineer prior to the application of facing to the exposed ground. Injected grout shall have achieved a compressive strength of 30 MPa (i.e 28 days strength) before performing Acceptance Test. The maximum applied load during the acceptance test shall not exceed 80% of the ultimate tensile strength of the soil nail rebar.

Soil nails subject to acceptance tests shall be loaded to the load increments and held for periods specified in Table 701-9 at the respective peak loads.

Table 7.1-9: Acceptance Test – Load Increments and Minimum Periods of Observation

Load Increment (% of Working Load of each test nail as shown in Drawings)	**Minimum Period of Observation at Peak Test Load (minutes)**
25	5
50	5
100	5
150	180 (creep test)
100	5
50	5
25	5

The above stages constitute one full cycle of testing.

The rate of load application shall be in the range of 3 to 5 kN/minute. At each load cycle, the load shall be held at the peak test load for the period of observation as specified in Table 701-9. The displacement shall be recorded at the beginning and the end of the observation period. For the creep portion of the test, record movements at 1, 2, 3, 5, 6, 10, 20, 30, 50, 60, 90, 120, 150 and 180 minutes.

The acceptance test shall be considered successful if all of the following are satisfied:

(a) A total creep movement of less than 2 mm between the 6 and 60 minutes readings is measured in Creep Test hold period; and

(b) A total creep movement of less than 1 mm between the 60 and 180 minutes readings is measured in Creep Test hold period; and

(c) The creep rate is linear or decreasing, when plotted against the logarithm of time throughout Creep Test hold period.

Where a test nail does not meet the acceptance criteria, test shall be repeated using an additional 2 soil nails in the vicinity of the nonconforming soil nail. If any soil nail fails an Acceptance Test, pertinent nail shall be abandoned and completely removed from the drill hole by a method acceptable to the Engineer. Unless otherwise instructed by the Engineer, the drill hole shall be filled by grouting. If the failed soil nail cannot be pulled out within 80% of the UTS of the soil nail bar, the bar shall be cut-off flush with the finishing ground and the remaining part of the drill hole shall be grouted. An additional soil nail shall be installed adjacent to the abandoned one for additional test. All additional work resulting from failed Acceptance tests shall be performed at Contractor's own cost.

Testing and Measuring Equipment

Displacements shall be measured using three dial gauges mounted on a tripod or fixed to a rigid support that is independent of the jacking mechanism and the soil nail. The dial gauge shall be capable of measuring to an accuracy of 0.01 mm. Dial gauges shall be set up so as to avoid any misalignment and eccentricity to the direction of movement of the soil nail, and zeroed after alignment and initial load has been applied.

A stable datum shall be established to measure the movement at the bar head. Movements of the bar head shall be measured relative to the datum to an accuracy of ±0.1 mm.

A hydraulic jack, with a minimum travel of 150 mm, shall be used to apply the load. The load shall be applied to the soil nail via a load bridge to ensure that the surface reaction is clear of the soil nail. The test load shall be measured with an accuracy of ±1 kN. A centre hole load cell shall be added in series with the jack for use during tests.

The hydraulic jack, pressure gauge and load cell shall be calibrated as a set. Calibration certificates, which shall be less than 12 months old, shall be submitted to the Engineer for the jack, pressure gauge and load cell prior to the soil nail testing. The identification numbers on the field test equipment shall match the identification numbers on the calibration data sheets. Care shall be taken to ensure that the load cell is properly aligned with the axis of the soil nail bar and the jack.

The calibration certificate shall be accompanied by the related calibration curve and tabulated record of hydraulic pressure against jack load. The calibration shall be performed for the loading and unloading operations of the jack over its full working range.
Details of the installation, load measuring and movement measuring devices shall be submitted to the Engineer for approval prior to testing.

Records of Tests

Keep records of any Suitability Test and Acceptance Test carried out. These records shall include:

(a) Date
(b) Soil nail number
(c) Number of tests carried out
(d) Load/ extension measurements
(e) Any variations from the specified procedure
(f) Details of test results
(g) Any unforeseen or unusual conditions encountered
(h) Time intervals between completion of test soil nail hole drilling and start of grout injection

The soil nail head and bearing plate movements shall be tabulated and plotted on a graph for assessment together with all other relevant information.

b. Grout

Cube test strength results (according to ASTM C942 and test cube size should be 50 mm) shall be provided prior to commencement of work to demonstrate that the mix meets the design minimum strength. Cube strength shall be obtained from six grout cubes (after seven days and twenty eight days respectively – three cubes for each test). Seven days cube strength should be tested in order to confirm 28 days cube strength of 30 MPa. Number of test samples shall be decided by the Engineer. Bleeding < 0.5 % when two successive readings show no further expansion or bleeding. In addition, the water shall be re-absorbed within 24 hours (ASTM C940-98), Flow cone efflux test time < 20 seconds, (ASTM C939-02).
For cubes tested at an age of 28 days the cube strength shall conform to the following requirements:

a) The average strength determined from any group of four consecutive test cubes shall exceed the specified characteristic strength by at least 0.5 times the current margin
b) Each individual test result shall be greater than 85% of the specified characteristic strength.

If the average strength of any group of four consecutive test cubes fails to meet the first requirement (a) then all grout mixed in all batches from the first batch to the last batch from which samples were taken to make the test cubes, together with all the intervening batches shall be deemed not to comply with the strength requirements.
If only one cube fails to meet the second requirement (b) then that result may be considered to represent only the particular batch of grout from which that cube was taken.
The Contractor shall take such remedial action as the Engineer may order, including the removal of the relevant cement grout, and shall, before proceeding with the grouting, submit details of the action proposed to ensure that the cement grout complies with the requirements of the Specification for the Engineer's approval.

Acceptance criteria shall be that the average 28 days compressive strength of 3 cubes exceeds the characteristic strength of the cement grout and that the difference between the greatest and least strength is not more than 20 percent of the average.

The 7 days test results shall generally be made use of as an indicator of the strength at 28 days and unless otherwise decided by the Engineer, no decision regarding non-acceptance of the concrete shall be made using these results.

c. Shotcrete

Test cube strength results (of 75 mm dia. core) shall be provided prior to commencement of work to demonstrate that the mix meets the design minimum strength. Cube strength shall be obtained from six shotcrete cores (after seven days and twenty-eight days respectively – three cubes for each test). Seven days cube strength should be tested in order to confirm 28 days cube strength of 30 MPa. Number of test samples shall be decided by the Engineer.
For cubes tested at an age of 28 days the cube strength shall conform to the following requirements:

a) The average strength determined from any group of four consecutive test cubes shall exceed the specified characteristic strength by at least 0.5 times the current margin

b) Each individual test result shall be greater than 85% of the specified characteristic strength.

If the average strength of any group of four consecutive test cubes fails to meet the first requirement (a) then all shotcrete mixed in all batches from the first batch to the last batch from which samples were taken to make the test cores, together with all the intervening batches shall be deemed not to comply with the strength requirements.

If only one cube strength fails to meet the second requirement (b) then that result may be considered to represent only the particular batch of shotcrete from which that cube was taken.

The Contractor shall take such remedial action as the Engineer may order, including the removal of the relevant shotcrete, and before proceeding with the shotcreting, shall submit details of the action proposed to ensure that the shotcrete complies with the requirements of the Specification for the Engineer's approval.
Acceptance criteria shall be that the average 28 days compressive strength of 3 cores exceeds the characteristic strength of the shotcrete and that the difference between the greatest and least strength is not more than 20 percent of the average.

The 7 days test results shall generally be made use of as an indicator of the strength at 28 days and unless otherwise decided by the Engineer, no decision regarding non-acceptance of the concrete shall be made using these results.

7.1.7. Measurement and Payment

a. Measurement

Platform

Temporary works, such as temporary platform preparation prior to soil nailing shall be paid as a Lump sum item as indicated in the Bills of Quantities. Payment shall be made as;

60% of the lump sum under this item shall be certified upon the establishment of temporary platform for soil nailing works. 30% of the amount upon progress of soil nailing works as approved by the Engineer and the remaining 10% shall be paid when the temporary platform has been totally removed and site has been cleaned by the Contractor.

Soil Nails

The measurement shall include for drillings, nail bar and grouting, and the quantity shall be measured in linear meter along the nail starting from interface between facing (i.e. bottom of shotcrete face, grid beam face, pillow face or bearing plate) and soil to the tip of the nail (i.e. only the grouted length shall be measured for payment). No payment shall be made for the nail inside the nail head. Payment shall be made only for the grouted length of the soil nail reinforcement.

Coated Metallic Mesh for Bearing Plate Method

Coated Metallic Mesh shall be measured in Sq.m including dowels, boundary ropes, boundary rope anchors, nut and washers to be used to fix wire mesh to the nail head and connection clips to be used at connections of wire meshes. No payment will be given for lapping of the Coated Metallic Mesh.

Bearing Plate for Bearing Plate Method

Bearing plate soil nail head shall be measured in numbers including excavation, nut and washers as specified, including fixing against Coated Metallic Mesh and to the nail head.

Concrete Pillow

Soil nail heads including concrete pillow shall be measured in numbers including excavation, form work, reinforcement bars, fixing of MS bearing plate, nut and washers inside the head, insitu concrete C30/20 and plate, nut, washer to be used to fix Coated Metallic Mesh to the nail head.

Grid Beam

Concrete and tor steel required for beams in grid beam structure shall be measured in linear meters including nail heads and reinforcements. No separate payment for excavation, formwork and dowels will be paid and cost shall be included in beam rate.

Coated Metallic Mesh

Coated Metallic Mesh (excluding Bearing Plate Method) shall be measured in Sq.m including dowels, boundary ropes (if required), boundary rope anchors (if required) and connection clips to be used at connections of wire meshes. No payment will be given for lapping of the Coated Metallic Mesh.

Boundary Beam

Concrete and tor steel required for boundary beam shall be measured in linear meter. No separate payment for excavation and dowels will be paid and cost shall be included in beam rate.

Coir Mesh

Coir mesh shall be measured in Sq.m. No payment of lapping of the Coir mesh.

Shotcrete

Shotcrete face shall be measured in square meters including net and dowels. Area of the nail heads connecting beams shall be deducted from the total shotcreting area.

Shotcrete – Nail Head Connecting Beam

Nail heads connecting beams in shotcrete face shall be measured in linear meters including nail heads, reinforcements, dowels and shotcreting.

Pull-out Test

Pull-Out tests shall be measured in numbers and pull out tests are required for test nails prior to the commencement of work for design verification and acceptance of construction work at site. Pull-Out tests shall be performed for 2% as test nails and 3% as acceptance of construction work at site of the total number of working soil nails subject to a minimum of two and three.

b. Payment

Soil Nails

The quantities determine for soil nails as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including drilling, drilling through incidental boulders, fabrication and installation of all accessories for soil nails and grouting.

Coated Metallic Mesh for Bearing Plate Method

The quantities determine for Coated Metallic Mesh for Bearing Plate Method as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, materials for Coated Metallic Mesh, dowels, boundary ropes, boundary ropes anchors, fabrication and installation of all accessories of the Coated Metallic Mesh unless otherwise specified.

Bearing Plate for Bearing Plate Method

The quantities determine for bearing plates as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including fabrication, galvanizing and installation of all accessories to soil nails against the metallic mesh.

Concrete Pillow

The quantities determine for nail heads including pillow as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, formwork, reinforcement, concreting required for concrete pillow construction and fabrication and installation of all accessories of the nail head.

Grid Beam

The quantities determine for grid beams as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, formwork, reinforcement, concreting required for grid beam construction and fabrication and installation of all accessories of the grid beams along with dowels. No separate payment shall be made for the overlapping area of the beams at connections.

Coated Metallic Mesh

The quantities determine for Coated Metallic Mesh (excluding Bearing Plate Method) as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, materials for Coated Metallic Mesh, dowels, boundary ropes, boundary ropes anchors, fabrication and installation of all accessories of the Coated Metallic Mesh.

Boundary Beam

The quantities determine for boundary beams as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, formwork, reinforcement, concreting required for boundary beam construction and fabrication and installation of all accessories of the boundary beams along with dowels. No separate payment shall be made for the overlapping area of the beams at connections.

Coir Mesh

The quantities determine for Coir Mesh as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, materials for coir mesh, laying of coir mesh.

Shotcrete

The quantities determine for shotcrete as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, shotcreting, net and construction and fabrication and installation of all accessories of the shotcrete face along with dowels.

Shotcrete – Nail Head Connecting Beam

The quantities determine for nail heads connecting beams as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools and incidentals necessary for completion of the work including preparation of slope, reinforcements, nail heads, shotcreting

and construction, fabrication and installation of all accessories of the connecting beams along with dowels. No separate payment shall be made for the overlapping area of the beams at connections.

Pay Item	Description	Pay Unit
701(1)	Temporary working platform for soil nailing works	Lump Sum
701(2)a	Soil nails (more than 12m length) inserted into bore hole with grouting and coupling (specify the nail dia. and hole dia.).	Linear meter
701(2)b	Soil nail (less than or equal to 12m length) inserted into bore hole with grouting (specify the nail dia. and hole dia.).	Linear meter
701(3)	Concrete Pillow method including excavation, form work, reinforcement bars, fixing of MS bearing plate, nut and washers inside the head, insitu concrete C30/20 and plate, nut, washer to be used to fix Coated Metallic Mesh to the nail head.	Numbers
701(4)a	Coated Metallic Mesh for Grid Beam method including connecting clips, and other necessary accessories	Square meter
701(4)b	Coated Metallic Mesh for Bearing Plate method including bearing plate, dowels, boundary ropes, boundary rope anchors, connecting clips, nut, washers and other necessary accessories	Square meter
701(4)c	Coated Metallic Mesh for Concrete Pillow Method including connecting clips, and other necessary accessories	Square meter
701(5)	Coir mesh	Square meter
701(6)	Concrete C30/20 boundary beams including slope preparation, excavation, formwork, RF and other necessary accessories	Linear meter
701(7)	Grid beam – concrete C 30/20 grid beams with nail heads including slope preparation, excavation, formwork, RF and other necessary accessories	Linear meter
701(8)	Shotcreting (wet mix) with concrete Grade 30	Square meter
701(9)	Nail heads connecting beams with nail heads in shotcrete face	Linear meter
701(10)	Pull-Out test for test nails and working nails	Numbers
701(11)	Bearing plate nailhead including nut washer for bearing plate method	Numbers
701(12)	Boundary rope (specify diameter) for bearing plate method	Linear meter
701(13)	Rope anchor (less than or equal to 12m length) inserted into bore hole with grouting (specify the nail dia. and hole dia.) for bearing plate method	Linear meter
701(4)a	Coated Metallic Mesh for Grid Beam method including connecting clips, and other necessary accessories	Square meter

7.2. HORIZONTAL DRAINS

7.2.1 Description

This Specification sets out the requirements for the drilling and installation of horizontal short or long drains in soil/rock into natural and man-made slopes. The work includes:

(a) The drilling of drain holes at specified locations, orientations and depths

(b) The installation of slotted UPVC pipes of specified diameter, thickness and length, wrapped in a geotextile filter fabric as directed by the Engineer

(c) The connection of the installed horizontal drains to the existing storm water drain network as shown on the Drawings.

7.2.2 Materials

The materials used for the horizontal drains shall meet the requirements of the following, unless otherwise specified.

a) The drain pipe shall be of rigid un-plasticized polyvinyl chloride (UPVC) complying with SLS 147 – PNT 11 unless otherwise specified.

Depending on the type used, and as specified in drawings, each drain comprises of an inner and outer pipe, and the outside diameters and the wall thickness of each nominal pipe size shall be as given in Table 702-1 below (with reference to Section 702.3 a. – Type 01, 02, 03).

Table 7.2-1: Pipe Diameters and Wall Thickness

	Outer Pipe [b]	**Inner Pipe**		
Nominal Diameter (mm) [a]	110	90	75	50
Minimum Mean Outside diameter (mm)	110	90	75	50
Minimum wall thickness (mm)	6.6	5.4	4.5	3.0

a - Size as in the Drawings, b - Exclusive for type 03 drains

A UPVC cap complying with the same standard shall be fitted to the upstream end of each drain pipe.

The pipes shall be provided with slots of width between 0.90 mm and 1.10 mm, extending to a minimum depth equal to 3/8 of the outside diameter of the pipe and a maximum depth equal to half the outside diameter of the pipe, and spaced at 25 mm apart (refer Figure 702-1).
The slots shall be cut in groups of twelve. Each set of twelve slots shall be at 30° to the horizontal and each alternate group shall be orientated to lie within the top 240° of the circumferences. In this fashion, the bottom 120° of the circumference of the pipe shall remain uncut over its entire length (see Figure 702-2).
In Horizontal Long drains, the pipe shall be un-slotted for a length of 1 m from the outlet end, or whatever length as directed by the Engineer.

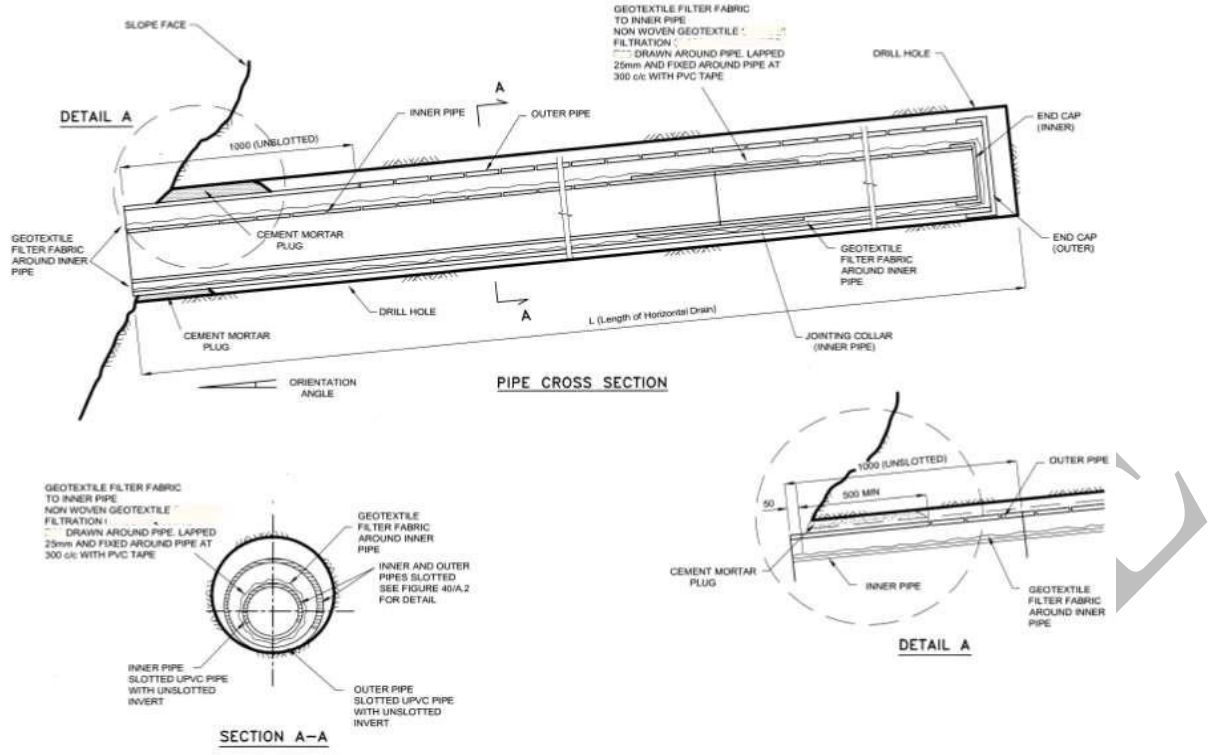

Figure 7.2-1: Type 3 – Horizontal Drain Detail

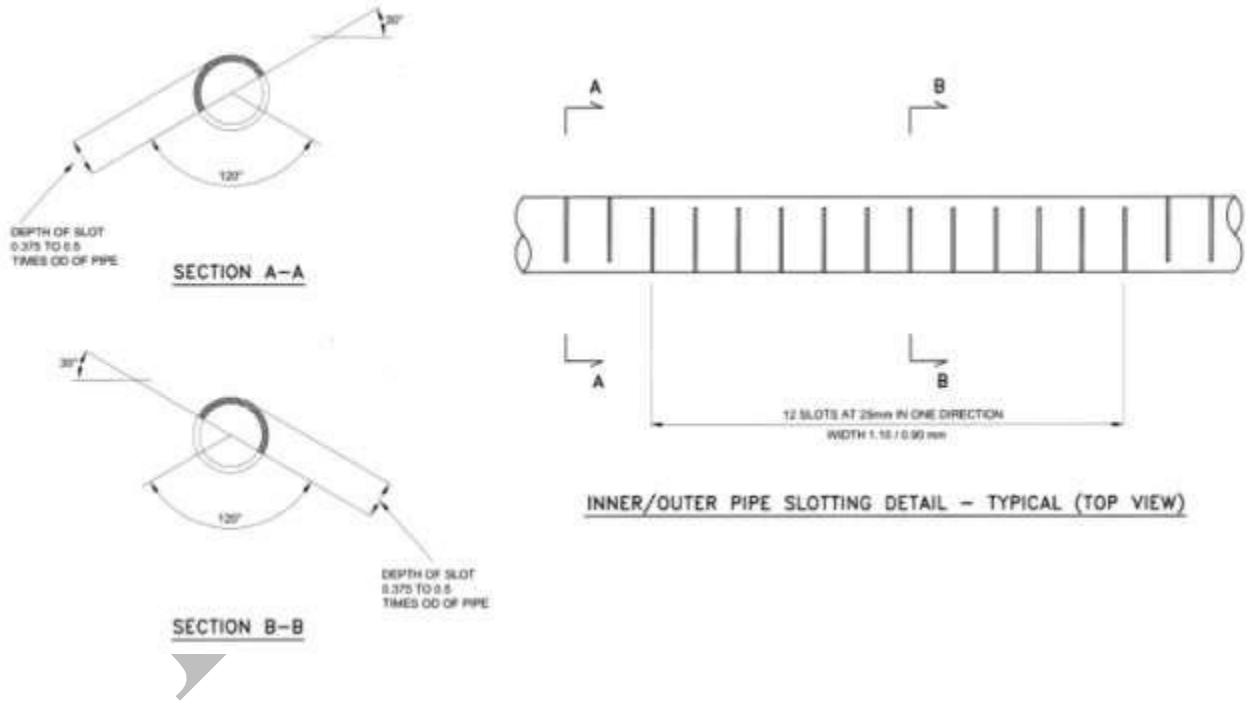

Figure 7.2-2: Horizontal Drain Perforation/slotting Detail

b) Geotextile shall be having physical and filtration properties specified in Section 905 : Table 905-1. The geotextile forming the filter fabric shall be a non-woven geotextile conforming to Specification, hydrophically treated to reduce surface tension and shall be abrasion resistant to resist damage during installation to the satisfaction of the Engineer.

7.2.3 Construction Requirements

a. General

Horizontal drain shall be constructed as shown in the Drawings or as directed by the Engineer. Following type of horizontal drains to be selected as per site condition.

1. Perforated pipe without filter fabric
2. Perforated pipe wrapped with filter fabric
3. Outer and inner perforated pipe and only inner pipe wrap with filter fabric

b. Location of Drain Holes

The locations, orientations and lengths of the drain holes shall be in accordance with the Drawings and or as directed by the Engineer.

The drain holes shall be set out as detailed. The maximum allowable tolerances for locating the position of drain holes shall be ± 100 mm vertically, ± 300 mm horizontally. Facilities shall be provided to enable the inspection of the drain hole locations by the Engineer.

c. Drilling

Only rotary or rotary-percussion drilling equipment shall be used to carry out drilling. Effective dust suppression or containment devices shall be provided in accordance with the Construction Safety Plan.

Drilling of holes shall be carried out in a manner which does not affect the stability of the cut batter. In particular, due care shall be taken to avoid the introduction of large volumes of water into the slope. Drilling lubricants other than air shall not be used. Ground water outflow resulting from the drilling process shall be directed to a holding tank to enable settlement of the sediment resulting from the drilling. The holes for the horizontal drains shall be drilled to an inclination of 10° dipping towards the exposed slope face or to the inclinations shown on the Drawings. Drill holes shall be at least 125mm in diameter in the case of Type 03 drains to allow installation of the slotted outer UPVC pipe. For Type 01 and 02 drains, drill hole shall be of a diameter which allows the installation of inner UPVC pipe with or without geotextile wrap as specified without any obstruction. Holes shall be smooth, clean and true to size.

Holes shall be drilled in a straight alignment. Maximum permissible deviation of the holes shall not exceed 2° (as measured on a horizontal plane). Deviation from straight shall not exceed 20 mm in any 3 m length of hole.

Any hole which is more than 1° from the specified inclination angle is not acceptable and shall be re-drilled, unless the Engineer authorizes acceptance of the particular hole.

d. Temporary Casing

In the case of drill holes penetrating through material likely to collapse, temporary casing shall be installed to protect the drill holes from caving in whilst drilling is in progress. The casing shall be retracted after each UPVC pipe has been successfully installed.
The Contractor shall be responsible for determining whether temporary casing is required. If extraction of the casing results in damage to an installed UPVC pipe, a new hole shall be drilled and/or another UPVC pipe shall be re-installed at the discretion of the Engineer and at the Contractor's own cost.

Any abandoned hole(s) shall be backfilled and properly sealed at the Contractor's own cost, subject to the approval of the Engineer. The Contractor can propose alternative procedures for supporting collapsible material during drilling and the installation of the UPVC pipe.

Drill holes shall be cleared of all deleterious material on completion of drilling. Cleaning shall be carried out by flushing with water, or water in conjunction with air, using side jet bits, so as to ensure removal of all drill cuttings from the walls and bottom of the drill holes.
An additional drill hole length of 100 mm shall be provided to leave space for the deposition of cuttings that cannot be flushed out of the end of the drill hole.

e. Installation of Drain Pipes

Unless directed otherwise by the Engineer, when Type 03 is used; an outer and an inner UPVC drain pipe shall be installed in each drill hole, with the un-slotted 120° of the circumference section of the pipe facing the underside (refer Figure 702-1). Type 01 and 02 shall be installed as shown in Drawings or as directed by the Engineer.

The pipe shall be jointed either as spigot and socket joints, or as butt joints with a sleeve extending about 50 mm over the end of each pipe. Sleeve couplers shall not affect the drain installation process. Joints shall be secured with PVC solvent cement.
The upstream end of each pipe shall be sealed with a UPVC cap secured with PVC solvent cement.
The geotextile filter fabric shall be wrapped around the inner pipe with an overlap length of 25 mm and fixed with PVC tape at 300 mm centres.

After installation of an outer pipe, the annular space between the drilled hole and the outer pipe shall be tightly plugged with 1:3 cement:sand mortar for a length of at least 0.5 m at the outlet end of the hole.

Connect all drain pipes to the existing storm water network as shown on the Drawings.

7.2.4 Measurement and Payment

a. Measurement

For horizontal drains; drillings, PVC perforated pipe (PNT 11), end cap and filter fabric (Geo-textile) (if any) shall be measured by the linear meter.

b. Payment

The quantities determine for horizontal drains as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour, materials, tools, temporary casing and incidentals necessary for completion of the work including drilling, geotextile rapping (if any), fabrication and installation of horizontal drains.

Pay Item	Description	Pay Unit
702(1)	Type 01 - Horizontal drains of perforated PVC pipe (specify diameter)	Linear meter
702(2)	Type 02 - Horizontal drains of perforated PVC pipe with filter fabric (specify diameter)	Linear meter
702(3)	Type 03 - Horizontal drains of perforated PVC pipe with outer and inner pipes wrap with filter fabric (specify diameter)	Linear meter

7.3.1 Description

This work shall consist of installing maintaining and monitoring of Monitoring Equipment as specified in section 1300 The work shall be carried out in accordance with this Specification and in conformity with the Drawings or as directed by the Engineer.

7.3.2 Measurement and Payment

a. Measurement

Instrumentation shall be measured as a Provisional Sum item for the cost of providing, installation of the Monitoring Equipment.
Monitoring and testing shall be measured as a Lump Sum item for the cost of maintaining and monitoring of the Monitoring Equipment.

b. Payment

Payment shall be made as a Provisional Sum and shall be payable when the Contractor has completed the work satisfactory as per the section 1303.5.

Pay Item	Description	Pay Unit
703(1)	Instrumentation as per Section 1300	Provisional Sum
703(2)	Monitoring & testing as per Section 1300	Month

SECTION 7

- ***BILL OF QUANTITIES***

PREAMBLE TO THE BILL OF QUANTITIES

1. This Bill of Quantities contains pages numbered from 43 to 47. Bidders are requested to see that no page is missing, nor duplicate and that all TRADES are carried to SUMMARY at the end of the Bill of Quantities.
2. The Conditions of Contract, the Specifications and the Drawings are to be read in conjunction with the Bill of Quantities.
3. The cost of complying with all conditions, obligations and liabilities described in the Conditions of Contract, Specifications and the Bill of Quantities including all overhead charges and profit in carrying out the work as shown on the Drawings shall be deemed to be spread over and included in the prices of sums stated by the Bidder in the Bill of Quantities unless separately measured.
4. If the Bidder fails to price any items in the Bill of Quantities, then the cost of the work under such items shall be held to be spread over and included in the prices given against other items of work.
5. The quantities set out in the Bill of Quantities are provisional and cover the approximate scope of the work anticipated to be performed by the Contractor. The actual quantities used for final measurement purposes will be determined by the Engineer by measurement of the work completed by the Contractor.
6. Where trade names, brands and or Catalogue Numbers are referred to, sole preference to any material or equipment is not intended. Any other material or equipment may be used, provided that the characteristics of type, quality, appearance, finish, method of construction and / or performance is superior to the specified.
7. Whenever the method of measurement is not clear from the documents available, the principles as given in the Sri Lanka Standard 573, 1999 [Revision] Method of Measurement of Building Works shall be applicable.
8. Selected bidder shall comply with the arrangement of work in the buildings and be ready to work part by part as required by the Authorities of the Employer.
9. Items in the Bill of Quantities marked "PROVISIONAL SUM" shall be executed if they are the subject of a written instruction from the Engineer. The rate/amount to be paid for works under Provisional Sum Items may based on any one of the following methods or as approved by the Engineer.
   (i) Rates as in Bill Items of Invoice where applicable.
   (ii) Cost supported by purchase Invoice from State Organizations or approved suppliers + 12%
   (iii) Amount paid to the sub contractors as approved by the Engineer + 12%
   (iv) Reimbursement of actual cost on submission of the relevant documents acceptable to the Engineer plus 5% of the actual cost of obtaining the insurance policies and securities.
   (v) To be paid on signing of the formal contract agreement.
   (vi) 50% on completion of temporary buildings or structures, 40% in equal installments over the contract period and balance 10% on dismantling and removal on completion.
   (vii) Paid on satisfactorily completion of the item.
10. The unit and lump sum prices of the Bill of Quantities (referred to as the Contract Rates) shall, except in so far as is otherwise provided for under the Contract, be deemed to cover all obligations set out in the Contract, and all matters or things necessary for the proper completion and maintenance of the Works, and shall be fixed and binding upon the Contractor.

11. Unit prices when applied to the quantity of work performed under the Contract shall, and other sums specifically determined under the provisions of the Contract, constitute full remuneration to the Contractor under the Contract.

12. Each item shall be priced by the Bidder in Sri Lanka Rupees.

13. Rates for items in this Bill of Quantities shall be inclusive for hauling, transporting, loading, unloading, spreading, heaping, supporting, scaffolding, welding, and for laps, unless otherwise specifically stated.

14. Unless otherwise specifically stated in Bill of Quantities or herein, the following shall be deemed to be included with all items: -

    (i) Labour and all costs in connection therewith.
    (ii) Materials, goods and all costs in connection therewith.
    (iii) Tools, plants, hoisting plants and all costs in connection therewith.
    (iv) Waste of materials.
    (v) Square cutting.
    (vi) Establishment charges, overhead charges and profit.
    (vii) All setting out works.
    (viii) For providing of method statements, calculations, proposals by Contractor, shop drawings.

15. If bidders are anticipating to give any discount, it shall be marked separately in the space allocated in the summary of Bill of Quantities. Provisional Sums shall not be considered when calculating discount.

16. All materials, equipment supplied shall be new, unused without any defects.

17. All materials used in the Works shall be of the best quality of their respective kinds as specified and shall be obtained from sources and suppliers approved by the Engineer and shall comply strictly with the tests prescribed or, where tests are not laid down in this Specification, with the requirements of the latest issue of the relevant British Standards or other Standards approved by the Engineer.

18. Metric units are used throughout the Bill of Quantities for measurement purposes unless otherwise indicated. Abbreviations used in the Contract are as follows: -

L.S.	-	Lump Sum
P.S.	-	Provisional Sum
m	-	Metre
m^2	-	Square metre
kg	-	kilograms
nr	-	Numbers
Rs. Cts.	-	Sri Lankan Rupees and Cents
m^3	-	Cubic metre

GENERAL

It is the bidders' responsibility to see that the prices include for complying with all the requirements of the other documents whether specifically referred to in Bill of Quantities.

The bidder is advised to visit the site of the proposed work and it is the responsibility of the Tenderer to ascertain the conditions governing access to the site, the extent of working space storage area etc.

The rate for each item shall also include for all the following.

1. Labour and all connected cost.
2. Materials and goods including all connected cost.
3. Complying with regulations of the Municipal Council and/or any other relevant authority under which particular item of work is to be executed unless otherwise included in the preliminaries.
4. Plant and equipment unless and otherwise included in preliminaries.
5. Protecting and clearing.
6. In addition to above, the rate for item of work in substructure shall include for the works at depth extending below ground water table where applicable including excavation under water, removal and disposal of mud, stand and preparation of place to a condition suitable for proper execution of the work.

BILL OF QUANTITY **QUATATION NO: - E/ /2025**

CEYLON PETROLEUM STORAGE TERMINALS LIMITED - ENGINEERING FUNCTION.

JOB: PROPOSED RECTIFICATION OF UNSTABLE EMBARKMENT AREA BEHIND THE TANK FARM AT ZONE 01 AT CPSTL KOLONNAWA INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE (Rs.)	AMOUNT (Rs.)
1	**GENERAL PRELIMINARIES**				
1.1	**CONTRACTOR'S SITE ESTABLISHMENT**				
1.1.1	Establishment, maintenance and removal of contractor' s site facilities such as office stores services security etc.	item	6		
1.1.2	Mobilization and De-mobilization of plant equipment and machinery.	LS	1		
1.4	**SITE INVESTIGATION /TESTING**				
1.4.1	Site investigation and testing as directed by the Engineer.	PS	1	50,000.00	50,000.00
1.4.2	Allow for overhead and profit by the contractor for Site investigation and testing as directed by the Engineer.	item	1		
1.8.	**INITIAL CONDITION SURVEY**				
1.8.1	Allow lump sum for carrying out initial condition survey (crack survey) as directed by the Engineer.	LS	1		
1.9	**SETTING-OUT, CROSS SECTION SURVEY & DRAWINGS**				
1.9.1	Allow for initial survey, setting out work, working drawings, as-built drawings and cross sections.	LS	1		
	Total carried to summary				
2.1	**CLEARING AND GRUBBING**				
2.1.1	Clearing and grubbing inclusive of backfilling holes and trenches caused by removal of stumps and boulders.	m^2	1,625.00		
2.2	**REMOVAL OF TREES & STUMPS**				
2.2.1	Removal of trees: 300 ≤ Girth < 600 mm	nr	1.00		
2.3	**REMOVAL OF EXISTING STRUCTURES**				
2.3.1	Dismantle and remove rubble masonry structures (Provisional QTY)	m^3	10.00		

ITEM	DESCRIPTION	UNIT	QTY	RATE (Rs.)	AMOUNT (Rs.)
2.3.2	Dismantle and remove concrete (R/F or mass) structures (Provisional QTY)	m^3	10.00		
	Total carried to summary				
3	**EARTHWORK**				
3.1	**SLOPE EXCAVATION**				
3.1.1	Excavation of slope up to required angle and disposal– Un- suitable soil dispose away from site.	m^3	374.00		
3.1.2	Excavation of Boulders - 0.25 m^3 - 1.0 m^3 (Provisional Quantity).	m^3	5.00		
3.2	**EXCAVATION AND BACKFILL FOR STRUCTURES**				
3.2.1	Excavation for Drains and Catch pits and disposal of excavated soil away from site (Rate shall include Excavation and Backfilling for the working space with embankment type II material).	m^3	100.00		
	Total carried to summary				
4	**STRUCTURE CONSTRUCTION**				
4.1	**DRAIN TYPE 1**				
4.1.1	Concrete C25/20 for walls and base of drains. Rate shall include expansion joints.	m^3	11.50		
4.1.2	Tor – Steel reinforcement	kg	674.00		
4.1.3	Formwork for concrete sides of drains plain smooth finish.	m^2	40.00		
4.2	**DRAIN TYPE 2**				
4.2.1	Concrete C15/20 for beds poured on or against earth or un- blinded hardcore.	m^3	4.50		
4.2.2	Concrete C25/20 for walls and base of drains. Rate shall include expansion joints	m^3	40.00		
4.2.3	Tor – Steel reinforcement	kg	3,045.00		
4.2.4	Formwork for concrete sides of drains plain smooth finish.	m^2	327.00		
4.3	**CASCADE DRAIN**				
4.3.1	Concrete C15/20 for beds poured on or against earth or un- blinded hardcore.	m^3	0.50		

ITEM	DESCRIPTION	UNIT	QTY	RATE (Rs.)	AMOUNT (Rs.)
4.3.2	Concrete C25/20 for walls and base of drains. Rate shall include expansion joints	m^3	1.00		
4.3.3	Tor – Steel reinforcement	kg	50.00		
4.3.4	Formwork for concrete sides of drains plain smooth finish	m^2	12.00		
4.3.5	Supply and installed 16 mm hot dipped galvanized Mild steel dowels	m	5.00		
4.4	**CATCH PIT**				
4.4.1	Concrete C15/20 for beds poured on or against earth or un- blinded hardcore	m^3	0.10		
4.4.2	Concrete C25/20 for walls and base of drains. Rate shall include expansion joints	m^3	2.00		
4.4.3	Tor – Steel reinforcement	kg	30.00		
4.4.4	Formwork for concrete sides of drains plain smooth finish	m^2	6.00		
	Total carried to summary				
5.1	**SOIL NAILING**				
5.1.1	Allow lump sum for providing Tempory working platform for soil nailing work	LS			
5.1.2	25mm dia. reinforcement (less than or equal 12m length) inserted into 100mm dia. bore hole with grouting	m	1,592.00		
5.1.3	Concrete Pillow method including excavation, form work, reinforcement bars, fixing of MS bearing plate, nut and washers inside the head, insitu concrete C30/20 and plate, nut, washer to be used to fix Coated Metallic Mesh to the nail head.	nr	208.00		
5.1.4	Coated Metallic Mesh for Concrete Pillow Method including connecting clips, and other necessary accessories	m^2	825.00		
5.1.5	Concrete C30/20 boundary beams including slope preparation, Excavation, formwork, RF and other necessary accessories	m	180.00		
5.1.6	Supply and installation of hot dipped galvanized steel grouted dowels (16mm diameter)	m	572.00		

ITEM	DESCRIPTION	UNIT	QTY	RATE (Rs.)	AMOUNT (Rs.)
5.1.7	Pull-Out test for test nails (Test Nail)	nr	2.00		
5.1.8	Pull-Out test for working nails (Working Nail)	nr	2.00		
5.2	**HORIZONTAL DRAINS**				
5.2.1	Long drains with perforated Type 1000 PVC pipes (90mm dia) with filter fabric. Rate shall include for drilling through any type of soil associated work and disposal of drilled material away from the site as directed by the Engineer.	m	80.00		
5.3	**SLOPE PROTECTION BY VEGETATION**				
5.3.1	Supply and lay Coir Mesh	m^2	825.00		
5.3.2	Turfing/Planting/Seeding on slope stabilized surface and regular maintenance for three months	m^2	825.00		
	Total carried to summary				

BILL OF QUANTITIES
JOB: PROPOSED RECTIFICATION OF UNSTABLE EMBARKMENT AREA BEHIND THE TANK FARM AT ZONE 01 AT CPSTL KOLONNAWA INSTALLATION.

BOQ No: ENG/ /2025

No.	DESCRIPTION	AMOUNT (Rs.)
1	GENERAL PRELIMINARIES	
2	CLEARING AND GRUBLING	
3	EARTHWORK	
4	STRUCTURE CONSTRUCTION	
5	SOIL NAILING AND HORIZONTAL DRAINS	
SUB TOTAL (BILL N0 1-5)		
ADD 2.5% SSCL		
SUB TOTAL AMOUNT INCLUDING SSCL TAX		
ADD VAT 18%		
GRAND TOTAL INCLUDING TAXES (SSCL & VAT)		

VAT Registration No. :.....…… SSCL registered No :.....……

[Please attached copy of the SSCL registration & copy of the VAT registration (If applicable)]

Total amount in words:…….....……

…….…….....

Name of Bidder :…….…….....

Address :…….…….....

Email :…….…….....

Contact Number :…….…….....

…….. …….

Signature of Bidder Date

DAY WORK SCHEDULE

LABOUR

The contractor shall state the rate per hour irrespective of public holidays, etc. required for work ordered to be executed as Day work at the site of the works.

Day work rates quoted below shall also cover all the expenses of the contractor such as supervision, repairing and maintaining the tools necessary to each class of workman and particularly his profit & overheads without any taxes and / or Levies.

	DESCRIPTION OF LABOUR GRADES	RATE PER HOUR Rs.
I	Masons	
II	Carpenter	
III	Unskilled Worker	
IV		
	Any Other Grades	
V	Special skill worker	
VI	Driver	
VII		

PLANT & EQUIPMENT

The contractor shall state the rate per hour for use of plant in good working condition and include for the cost of fuel, lubricants, transport to and from site wages & allowances of the operators, any other expenses and contractor's profit & overheads without any taxes and / or Levies.

	DESCRIPTION OF PLANT & EQUIPMENT	RATE PER HOUR RS.
I	Tipper (…….Cu)	
II	Concrete Mixer (10/7 Cu. ft.)	
III	Poker Vibrator (35mm size) - with operator	
IV	Vibrator Roller (….Ton)	
	Any Other Plant and Equipment	
V	Concrete cutter	
VI		
VII		

SECTION – 8

- ***DRAWINGS***

LIST OF DRAWINGS

NO.	DRAWING TITLE	DRG NO.
01	Site Plan	01
02	Horizontal Drain Drawing	02
03	Soil Nailing Typical Drawing	03

SECTION – 9

- ***STANDARD FORMS (BID)***

FORM OF BID SECURITY

[this Guarantee form shall be filled in accordance with the instructions indicated in brackets]
---------- *[insert issuing agency's name, and address of issuing branch or office]*

Beneficiary: **The Chairman**
Ceylon Petroleum Storage Terminals Limited,
Oil Installation, Kolonnawa,
Wellampitiya.

Date: ---------- *[insert (by issuing agency) date]*

BID GUARANTEE No.: ---------- *[insert (by issuing agency) number]*
We have been informed that ---------- *[insert (by issuing agency) name of the Bidder]* (hereinafter called "the Bidder") has submitted to you its bid dated ----------*[insert (by issuing agency) date]* (hereinafter called "the Bid") for the ……. of *[insert name of Contract]* under Invitation for Bids No. ---------- *[insert IFB number]* ("the IFB").

Furthermore, we understand that, according to your conditions, Bids must be supported by a Bid Guarantee.
At the request of the Bidder, we ---------- *[insert name of issuing agency]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ---------- -------- *[insert amount in figures]* ---------- *[insert amount in words]* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn its Bid during the period of bid validity specified; or

(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or

(c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Form, if required, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This Guarantee shall expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the Contract signed by the Bidder and of the Performance Security issued to you by the Bidder; or (b) if the Bidder is not the successful bidder, upon the earlier of the successful bidder furnishing the performance security, otherwise it will remain in force up to ---------- *(insert date)*
Consequently, any demand for payment under this Guarantee must be received by us at the office on or before that date.

_____
[signature(s) of authorized representative(s)]

CHECK LIST FOR BIDDERS

CHECK LIST FOR BIDDERS

Bidders are advised to fill the following table.

ITEM	ITB Clause	YES (tick)	REFERENCE
Form of Bid			
Addressed to the **Employer?**	18		
Completed?	18		
Signed?	18		
Bid Securing Declaration Form (if required)			
Properly filled and signed	16		
Bid Security (if required)			
Address to the **Employer?**	16		
Format as required?	16		
Issuing Agency as specified?	16		
Amount as requested?	16		
Validity **28 days beyond** the validity of Bid?	16		
Qualification Information			
All relevant information completed?	4		
Signed?	4		
Addendum			
Contents of the addendum (if any) taken in to account?	10		
Bid package			
All the documents given in ITB Clause 12 enclosed in the original and copy?	12		
ITB Clause 19 followed before sealing the Bid package?	19		