Democratic Socialist Republic of Sri Lanka

Ministry of Agriculture, Land, Livestock and Irrigation

MAHAWELI AUTHORITY OF SRI LANKA

Integrated Watershed and Water Resources Management Project

PROCUREMENT OF WORKS UNDER NATIONAL COMPETITIVE BIDDING

BIDDING DOCUMENT

For

REHABILITATION & IMPROVEMENT OF OPERATIONAL & MAINTANANCE ROAD FROM KEKULUWELA TANK TO MUWAGAMMANA TANK (3+350km) IN SYSTEM "C"

Contract No: LK-MoMDE-465708-CW-RFB

April 2025

Name of the Bidder	

Contents of Bidding Documents

Invitation for Bids (IFB)

Ministry of Irrigation

MAHAWELI AUTHORITY OF SRI LANKA

BID NOTICE

Integrated Watershed and Water Resources Management Project (IWWRMP)

Project No: P166865, Loan No: IDA- 6621 LK

1. The Government of the Democratic Socialist Republic of Sri Lanka has applied for financing from the International Development Association towards the cost of **Integrated Watershed and Water Resources Management Project** and it intends to apply part of the proceeds of this credit to payment under the contracts mentioned in the schedule below.

2. On behalf of the Chairman, Department Procurement Committee of Mahaweli Authority of Sri Lanka, sealed Bids will be received by the **Director General, Mahaweli Authority of Sri Lanka, 9th Floor, No. 500, T.B. Jayah Mawatha, Colombo 10**, up to **11:00 hrs** on **30.04.2025** for the under mentioned improvement works.

Description of Work	Contract No.	CIDA Registration	Bid Security / Non-Refundable Tender Fee	Pre bid meeting
Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System "c" (Estimate Rs. 136.56Mn without VAT including Contingencies, Contract period 365 days)	LK-MoMDE-465708-CW-RFB	Grade: C4 or above Specialty: Road & Highway Works	Bid security value: Rs. 1,760,000.00 Validity: Up to 24.09.2025 Non Refundable Fee: Rs. 23,000.00	Date: 23.04.2025 Time: 10.00 am Venue: (Resident Project Manager's Office, System C)

3. To be eligible for contract award, the successful bidder shall not have been blacklisted and shall meet the requirements in Bidding Data.

4. Bidders, who have the Grade and field of registration under the CIDA scheme of registration mentioned in the above table against the work and in the case of the contract value is above Rs.5Mn. registered in Department of the Registrar of companies under the provision of public contract Act No.3 of 1987 only will be eligible for bidding. World Bank Procurement Guidelines and Procurement Regulations for IPF Borrowers – July 2016 Revised November 2017 and August 2018 shall also be applicable.

5. Prospective Bidders can obtain the Bidding Documents by a written request on a company/firm letter head, addressed to the **Deputy Director General (Technical Services), Mahaweli Authority of Sri Lanka, 3rd Floor, No. 500, T.B. Jayah Mawatha, Colombo 10** from **2025.04.03** up to **2025.04.29** from **9.30 hrs to 15.00 hrs** on working days, on payment of a non-refundable tender fee as given above per set of Bidding Documents Bidders are free to bid for more than one contract but selections will be made according to the capacity limits in the CIDA registration.

6. The Bidding documents may be available for inspection in **Deputy Director General (Technical Services) Office, Mahaweli Authority of Sri Lanka, 3rd Floor, No. 500, T.B. Jayah Mawatha, Colombo 10** for free of charge from **2025.04.03** up to **2025.04.29** from **9.30 hrs** to **16.00 hrs** on working days and in the **http//mahaweli.gov.lk** website.

7. Sealed Bids in **duplicate** clearly marked the contract name and the number on the top left corner of the envelope may be dispatched either by Registered Post or hand delivered or courier to the **Director General, Mahaweli Authority of Sri Lanka, 9th Floor, No. 500, T.B. Jayah Mawatha, Colombo 10** before **11.00 hrs** on **2025.04.30** Bids will be opened immediately thereafter. Bidders or their authorised representatives, not exceeding two (2) in numbers are permitted to be present at the opening of bids.

8. For further details, please contact Technical Services Division of Mahaweli Authority of Sri Lanka on Tel: **011-2689651, 011-2687475** email: **ddgts.masl@gmail.com**.

Director General
Mahaweli Authority of Sri Lanka

Section - 1

Instructions to Bidders

Note: ***Bidders are advised to refer Section 1 – Instructions to Bidders of Standard Bidding Document ICTAD Publication No. – ICTAD/SBD/02 – Second Edition-January 2007***

Section - 2

Bidding Data

Section 2 - Bidding Data

Instructions to Bidders Clause Reference	Entry
1.1	**Employer's Name and Address** **Name : Director General, Mahaweli Authority of Sri Lanka** **Address : 9th Floor, No. 500, T.B. Jayah Mawatha, Colombo 10**
1.1	**Scope of Works** **The works consists of Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''C''** **Located at Veheragala, Dolakanda**
1.2	**Time for Completion** The Time for Completion for the whole of works shall be **365 days**
2.1	**Source of funds** The source of funds is**: International Development Association (IDA)**
3	Substitute by the following: 3.1 The World Bank requires that the Government of Sri Lanka (including beneficiaries of World Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of World Bank-financed contracts, and refrain from Fraud and Corruption. 3.2 The World Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth below. 3.3 In pursuance to this policy, The World Bank: a. Defines, for the purposes of this provision, the terms set forth below as follows: i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party; ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation; iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including

	to influence improperly the actions of another party; iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; v. "obstructive practice" is: a. deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a World Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or b. acts intended to materially impede the exercise of the World Bank's inspection and audit rights provided for under paragraph 3.4 below. b. rejects a proposal for award if the World Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question; c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring mis-procurement, if the World Bank determines at any time that representatives of the Government of Sri Lanka or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without taking timely and appropriate action satisfactory to the World Bank to address such practices when they occur, including by failing to inform the World Bank in a timely manner at the time they knew of the practices; d. Sanctions, pursuant to the World Bank's Anti-Corruption Guidelines and in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework any firm or individual – determined at any time by the World Bank to have engaged in Fraud and Corruption in connection with the procurement process, selection and/or execution of a World Bank-financed contract; e. Requires that, for World Bank-financed operations to be implemented utilizing national procurement arrangements, as well as PPPs, agreed by the World Bank, bidders (applicants/proposers) and consultants submitting bids/proposals will be required to accept the application of, and agree to comply with, the Anti-Corruption

	Guidelines during the procurement process, selection and/or contract execution, including the World Bank's right to sanction as set forth in paragraph 2.2 d., and the World Bank's inspection and audit rights as set forth in paragraph 3.4. The Employer shall consult and apply the World Bank Group's lists of firms and individuals suspended or debarred. In the event the Employer signs a contract with a firm or an individual suspended or debarred by the World Bank Group, the World Bank does not finance the related expenditures and may apply other remedies as appropriate; and g. Requires that, when a United Nations (UN) agency is selected to provide goods, works, non-consulting services and technical assistance, the above provisions regarding sanctions on Fraud and Corruption shall apply in their entirety to all contractors, consultants, sub-contractors, sub-consultants, service providers, suppliers, and their employees, that signed contracts with the UN agency. 3.4 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the World Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the World Bank.
4.1	**Qualification Information** The following information shall be provided in Section 9 - Schedules: • CIDA registration Registration number …… Grade …… Specialty …… Expiry date **……** • VAT registration number ..……. • Attach construction program • Attach legal status (Sole proprietor, Partnership, Company etc.) • Attach authentication for signatory (Affidavit) • 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 10 years • Construction equipment • Staffing • Attach Work plan and method statement

4.2 (a)	**CIDA registration required** The registration required: **Specialty** **Road & Highway Works** **Grade** **C4 or above**
4.2 (b)	**Average annual volume of construction work performed in last 5 years** Average annual volume of construction work performed in last five years shall be at least **Rs. 175.0 Million**
4.2 (c)	Experience as a prime contractor in the construction of at least one work of a similar nature and complexity similar to work over the last 10 years Rehabilitation of **Highway works** of the value of at least Rs**. 82.0 Million (Excluding VAT)**
4.2 (d)	**Essential equipment** Proposals for the timely acquisition (own, lease, hire, etc.) of the following essential equipment **shall be;** **Type** **Capacity** 1. Excavator (120 HP) 2. Loader Backhoe (JCB) 76-90 Cube 3. Motor Grader 12ft Blade 4. Vibrating Roller 10 Ton 5. Tractor Bowser with Tailor 4000 liters 6. Tipper 3 Cube 7. Tractor With Tailor 0.75 cube 8. Pneumatic Road Roller (8-10 Ton) 9. Air Compressor 250 cfm 10. Bitumen Distributor 4500 L 11. Asphalt Paver (Crawler)

4.2 (e)

Qualifications and experience of the Contract Manager and other Key personnel

No.	Key Person	Qualifications & Experience	No of Person
1	Contract manager	BSc.(Engineering) or Equivalent plus at least 10 years' experience in similar projects after obtaining Full Membership of the Institution of Engineers Sri Lanka (Chartered Engineer) or equivalent	1
2	Site Engineer (Civil)	B.Sc. Civil Engineering degree or equivalent with 10years total experience and 5years similar work experience	1
3	Engineering Assistant (Civil)	NCT or equivalent with 8years total experience and 5years similar work experience	1
4	Environmental and Social Specialist/ Officer	Degree or equivalent Qualification in Relevant field	1
5	Health and Safety Specialist/ Officer	Degree or equivalent Qualification in Relevant field	1

The Bidder must demonstrate that it will have a suitably qualified Contract Manager and suitably qualified other key personnel in adequate numbers, as described in the table above.

4.2 (f)

Liquid assets and/or credit facilities required

The minimum amount of liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, **shall be not less than Rs. 25 Million**

10.1

Clarification of Bidding Documents

Employer's address for clarification of bidding documents is:

Name of Officer: ***Deputy Director General (Technical Services)***

Address: ***Mahaweli Authority of Sri Lanka***

3rd Floor

No. 500, T. B. Jayah Mawatha

Colombo 10

Phone: 011 269 6436

Telefax: 011 268 9651

13.1(A) (j) **13.1(B) (d)**	The Bidder shall submit the following additional documents in its Bid: ***[Note: list any additional document not already listed in ITB 13.1 that must be submitted with the Bid. The list of additional documents should include the following:]*** **Code of Conduct (ESHS)** The Bidder shall submit its Code of Conduct that will apply to Contractor's Personnel (as defined in Sub-clause 1.1.2.7 of the GC), to ensure compliance with its Environmental, Social, Health and Safety (ESHS) obligations under the contract. *[**Note: Complete and include the risks to be addressed by the Code in accordance with Schedule 10, e.g. risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender-based violence, sexual exploitation and abuse, illicit behavior and crime, and maintaining a safe environment etc**.]* In addition, the Bidder shall detail how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches. The Contractor shall be required to implement the agreed Code of Conduct. **Management Strategies and Implementation Plans (MSIP) to manage the (ESHS) risks** The Bidder shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key Environmental, Social, Health and Safety (ESHS) risks. ***[Note: insert name of plan and specific risk/s]****;* • *[e.g. Traffic Management Plan to ensure safety of local communities from construction traffic];* • [*e.g. Water Resource Protection Plan to prevent contamination of drinking water*]; • [*e.g. Boundary Marking and Protection Strategy for mobilization and construction to prevent offsite adverse impacts*]; • [*e.g. Strategy for obtaining Consents/Permits prior to the start of relevant works such as opening a quarry or borrow pit];* • *[e.g. Gender based violence and sexual exploitation and abuse (GBV/SEA) prevention and response action plan]*. The Contractor shall be required to submit for approval, and subsequently implement, the Contractor's Environment and Social Management Plan (C-ESMP), in accordance with the Particular Conditions of Contract Sub-Clause 4.1, that includes the agreed Management Strategies and Implementation Plans described here. *[Note: The extent and scope of these requirements should reflect the significant ESHS risks or requirements set out in Schedule 10 as advised by Environmental/Social specialist/s. The key risks to be addressed by the Bidder should be identified by Environmental/Social specialist/s, for example, from the Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP), Resettlement Action Plan (RAP), and/or Consent*

	Conditions (regulatory authority conditions attached to any permits or approvals for the project), up to a maximum of four. The risks may arise during mobilization or construction phases, and may include construction traffic impacts on the community, pollution of drinking water, depositing on private land and impacts on rare species etc. The management strategies and/or implementation plans to address these could include, as appropriate: mobilization strategy, strategy for obtaining consents/permits, traffic management plan, water resource protection plan, bio-diversity protection plan and a strategy for marking and respecting work site boundaries etc.]
14.4	**Adjustments for change in cost:** The Contract is subjected to price adjustment
16.1	**Period of Bid validity:** The Bid shall be valid up to **119 days** from the bid submission deadline date (date). The Bid shall be valid up to **27.08.2025**
17.1	**Amount of Bid security:** The amount of Bid Security is Sri Lanka Rupees**: One Million Seven Hundred and Sixty Thousands (LKR 1,760,000.00)** Bid security shall only be an unconditional guarantee issued by a bank recognized by the **Central Bank of Sri Lanka** in accordance with the format given
17.2	**Validity of Bid Security (147 days)** The Bid Security shall be valid up to **24.09.2025**
17.5	Add "and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security pursuant to ITB 35.1."
17.6 (c) (ii)	Add "and if required in the BDS, the Environmental, Social, Health and Safety (ESHS) Performance Security pursuant to ITB 35.1."
19.1	**Pre-Bid meeting** Venue, time, and date of the pre-bid meeting. Date: 23.04.2025 Time: 10.00hrs Venue: Resident Project Manager's Office, MASL, System C, Dehiattakandiya The Site Visit will be held at 10.00a.m. Starting from Medagama Block Office on ……. before the Pre- Bid meeting.
21.2 (a)	**Employer's Address for Bid submission** Employer's address for the purpose of bid submission is: ***Mahaweli Authority of Sri Lanka*** ***9th floor, No. 500, T. B. Jayah Mawatha*** ***Colombo 10***

21.2 (b)	**Identification number of Contract** Identification Number of the Contract is: **LK MoMDE-465708-CW-RFB**
22.1	Deadline for submission of Bids **Deadline for submission of Bids**: **30.04.2025**
25.1	Bid opening Venue, time, and date of bid opening ***Mahaweli Authority of Sri Lanka*** ***9th floor, No. 500, T. B. JayahMawatha*** ***Colombo 10*** ***Time : 10.00am*** ***Date : 30.04.2025***
31.1	**Preference for Domestic Bidders: Not Applicable**
35.1	Amount of Performance Security The Standard Form of Performance Security acceptable to the Employer shall be a Guarantee from an Agency accepted and stated in the Procurement Guidelines. The amount of the Performance Security is 7% of the Initial Contract Price. The Performance Security shall be valid 28 days beyond the Defect Liability Period until …… (date). The successful Bidder ***shall be*** required to submit an Environmental, Social, Health and Safety (ESHS) Performance Security within 14 Days of receipt of the Letter of Acceptance. The amount of the Environmental, Social, Health and Safety (ESHS) Performance Security is 3% of the Initial Contract Price. The Environmental, Social, Health and Safety (ESHS) Performance Security shall be valid until …… (date). Bid security shall only be an unconditional guarantee issued by a bank recognized by the Central Bank of Sri Lanka in accordance with the format given
37	Fees and types of reimbursable expenses to be paid to the Adjudicator shall be on a case to case basis and shall be shared equally by the Contractor and the Employer.

Section 3

Conditions of Contract

Note :

Bidders are advised to refer Section 3 – Condition of Contract of Standard Bidding Document ICTAD Publication No. – ICTAD/SBD/02 –second

Section - 4

Contract Data

Section 4 – Contract Data

Note: *The clause numbers referred are the clause numbers of Conditions of Contract. The Employer should insert relevant data for all the items marked with an **asterisk (*)** prior to the issue of the bidding documents. Where a number of Days are to be inserted, it is desirable for the number to be a multiple of seven, for consistency with the Conditions of Contract.*

Conditions of Contract Clause Number/s		
(*) 1.1.2.2 & 1.3	Employer's name and address	Name: ***Director General,*** ***Mahaweli Authority of Sri Lanka*** Address: ***Mahaweli Authority of Sri Lanka*** ***9th floor, No. 500, T. B. Jayah Mawatha*** ***Colombo 10***
	Employer's Representative	Name: ***Deputy Director General(Technical Services),*** ***Mahaweli Authority of Sri Lanka*** Address: ***Mahaweli Authority of Sri Lanka*** ***3rd floor, No. 500, T. B. Jayah Mawatha*** ***Colombo 10***
1.3	Contractor's name and address	Name: ……. Address: …….
(*) 1.1.2.4 & 1.3	Engineer's name and address	Name: ***Deputy Resident Project Manager (TS)*** Address: ***Resident Project Manager's Office (System C),*** ***Dehiaththakandiya.***
1.1.2.5 **Contractor's Personnel**	**Key Personnel** The following is added at the end of the sub-clause: "Contractor's Personnel includes Key Personnel as named in the Contract."	

1.1.2.9	Replace existing with Clause 1.1.2.9 with following: " Dispute Adjudication Board" (DAB) means three persons appointed under Sub Clause 19.2 (Appointment of the Dispute Adjudication Board) or Sub Clause 19.3 (Failure to Agree on the Composition of the Dispute Adjudication Board) of the Conditions of Contract.	
(*) 1.1. 3.3	Time for Completion of the Works	Time for Completion is **365 days**
(*) 1.1.3.7	Defects Notification Period	Defects Notification Period is **365 Days**
1.1.6.8	The following is added after Sub-Clause 1.1.6.7 "ESHS" means environmental, social (including sexual exploitation and abuse (SEA) and gender-based violence (GBV)), health and safety.	
(*) 2. 1	Right to access to the Site	**14 Days** after Letter of Acceptance
(*) 3.1	Engineer's Duties and Authority	The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions: (a) Clause 13, where the final effect of the variations increases the Contract Price (b) Sub-Clause ……

4.1 **Contractor's General Obligations**	Insert in the fifth paragraph after the words "*The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.*" "Notwithstanding Sub-Clause 8.1, the Contractor shall not carry out any Works, including mobilization and/or pre-construction activities (e.g. limited clearance for haul roads, site accesses and work site establishment, geotechnical investigations or investigations to select ancillary features such as quarries and borrow pits), unless the Engineer is satisfied that appropriate measures are in place to address environmental, social, health and safety risks and impacts. At a minimum, the Contractor shall apply the Management Strategies and Implementation Plans and Code of Conduct, submitted as part of the Bid and agreed as part of the Contract. The Contractor shall submit, on a continuing basis, for the Engineer's prior approval, such supplementary Management Strategies and Implementation Plans as are necessary to manage the ESHS risks and impacts of ongoing works. These Management Strategies and Implementation Plans collectively comprise the Contractor's Environmental and Social Management Plan (C-ESMP). The C-ESMP shall be approved prior to the commencement of construction activities (e.g. excavation, earth works, bridge and structure works, stream and road diversions, quarrying or extraction of materials, concrete batching and asphalt manufacture). The approved C-ESMP shall be reviewed, periodically (but not less than every six (6) months), and updated in a timely manner, as required, by the Contractor to ensure that it contains measures appropriate to the Works activities to be undertaken. The updated C-ESMP shall be subject to prior approval by the Engineer.	
(*) 4.2	Amount of Performance Security	**7%** of the Initial Contract Price, in the currencies and proportions in which the Contract Price is payable. The acceptable form is…….. **Performance Security shall only be an unconditional guarantee issued by a bank recognized by the Central Bank of Sri Lanka in accordance with the format given** **3%** of the Initial Contract Price …… The ESHS Performance Security will be in the form of a "*demand guarantee"* in the amount(s) of *3%* percent of the Accepted Contract Amount and in the same currency(ies) of the Accepted Contract Amount.

4.2 **Performance Security**	Add the following The Contractor shall obtain (at his cost) an Environmental, Social, Safety and Health (ESHS) Performance Security for compliance with the Contractor's ESHS obligations, for LKR …….. . The Contractor shall deliver ESHS Performance Security to the Employer within 14 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The ESHS Performance Security shall be issued by a reputable bank selected by the Contractor, and shall be in the form annexed to the Particular Conditions, as stipulated by the Employer in the Contract Data, or in another form approved by the Employer. The Contractor shall ensure that the ESHS Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the ESHS Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate (which, if applicable, includes satisfactory performance of the ESHS obligations), by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the ESHS Performance Security until the Works have been completed and any defects have been remedied. The Employer shall return the ESHS Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate.
4.14 **Progress Reports**	Sub-Clause 4.21 (g) is replaced by the following: **"4.14 (g)** the Environmental, Social, Health and Safety (ESHS) metrics set out in Appendix B" At the end of, and as part of Sub-Clause 4.14 add a new paragraph as follows: "The Contractor shall provide immediate notification to the Engineer of incidents in the following categories. Full details of such incidents shall be provided to the Engineer within the timeframe agreed with the Engineer. (a) confirmed or likely violation of any law or international agreement; (b) any fatality or serious (lost time) injury; (c) significant adverse effects or damage to private property (e.g. vehicle accident, damage from fly rock, working beyond the boundary) (d) major pollution of drinking water aquifer or damage or destruction of rare or endangered habitat (including protected areas) or species; or any allegation of gender based violence (GBV), sexual exploitation or abuse, sexual harassment or sexual misbehavior, rape, sexual assault, child abuse, or defilement, or other violations involving children.

6.8 Contractor's Personnel	**Key Personnel** Sub-Clauses 6.8 (d) is amended by inserting "or" at the end: **"6.9 (d)**……; or" Sub-Clauses 6.8 (e) is inserted as follows: **"6.9 (e)** undertakes behavior which breaches the Code of Conduct (ESHS) (e.g. spreading communicable diseases, sexual harassment, gender based violence, (GBV), sexual exploitation or abuse, illicit activity or crime)." After the sentence: "*If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.*" the following is added as a new paragraph: "The Contractor's Personnel includes Key Personnel. If the Contractor intends to replace a Key Personnel, the Contractor shall, not less than 30 days before the intended date of replacement, give notice to the Engineer, the name, address, academic qualifications and relevant experience of the intended replacement Key Personnel. The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Key Personnel or appoint a replacement."	
(*) 8.7	Liquidated damages for the Works	**0.05 %** of the Initial Contract Price per Day
(*) 8.7	Maximum amount of liquidated damages	**10 %** of the Initial Contract Price
12.2 (b)	Method of Measurement	The Method of Measurement shall be SLS 573
13.3 **Variation procedure**	Sub-Clause 13.3. (a) is replaced with the following: "(a) a description of the proposed work to be performed, a programme for its execution and sufficient ESHS information to enable an evaluation of ESHS risks and impacts;"	
(*) 13.4(b)I	Percentage for adjustment of Provisional Sums	***10%***
(*) 13.4(b)II	Overhead and Profit Factor	***20%***

<table>
<tr><td>13.7
Adjustment for changes in Cost</td><td colspan="2">Last paragraph “The weightings for each of the inputs of cost ……” shall be substituted by the following:

“The weightings for each of the inputs of cost given in this Clause shall be adjusted only if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.”</td></tr>
<tr><td>13.7</td><td>Weightings of Inputs</td><td>
<table>
<tr><th>Indices No</th><th>Indices Name</th><th>Input percentage</th></tr>
<tr><td>L1</td><td>Skilled Labour</td><td>1.24</td></tr>
<tr><td>L3</td><td>Unskilled Labour</td><td>1.22</td></tr>
<tr><td>M30B</td><td>Bitumen 60/70</td><td>84.38</td></tr>
<tr><td>M48</td><td>ABC</td><td>1.55</td></tr>
<tr><td>P2</td><td>Heavy Equipment</td><td>1.61</td></tr>
<tr><td></td><td></td><td>90.00</td></tr>
</table>
Nonadjustable element shall be:
• All Preliminary items
• All provisional sum & Lump sum Items
</td></tr>
<tr><td>(*) 14.2</td><td>Total Advance Payment</td><td>20 % of the Initial Contract Price excluding provisional sums and contingencies</td></tr>
<tr><td>(*) 14.3(c)</td><td>Percentage of Retention</td><td>10%</td></tr>
<tr><td>(*) 14.3(c)</td><td>Limit of Retention Money</td><td>5 % of the Initial Contract Price</td></tr>
<tr><td>(*) 14.5</td><td>Minimum amount of Interim Payment Certificates</td><td>5,000,000.00 Rupees</td></tr>
</table>

14.5 Issue of Interim Payment Certificate	The following is added to the third paragraph as (c): i. if the Contractor was, or is, failing to perform any ESHS obligations or work under the Contract, the value of this work or obligation, as determined by the Engineer, may be withheld until the work or obligation has been performed, and/or the cost of rectification or replacement, as determined by the Engineer, may be withheld until rectification or replacement has been completed. Failure to perform includes, but is not limited to the following: a) failure to comply with any ESHS obligations or work described in the Works' Requirements which may include: working outside site boundaries, excessive dust, failure to keep public roads in a safe usable condition, damage to offsite vegetation, pollution of water courses from oils or sedimentation, contamination of land e.g. from oils, human waste, damage to archeology or cultural heritage features, air pollution as a result of unauthorized and/or inefficient combustion; b) failure to regularly review C-ESMP and/or update it in a timely manner to address emerging ESHS issues, or anticipated risks or impacts; c) failure to implement the C-ESMP e.g. failure to provide required training or sensitization; d) failing to have appropriate consents/permits prior to undertaking Works or related activities; e) failure to submit ESHS report/s (as described in Appendix B), or failure to submit such reports in a timely manner; f) failure to implement remediation as instructed by the Engineer within the specified timeframe (e.g. remediation addressing non-compliance/s).

(*)14.8	Alternative method for Payment of Retention	On reaching the limit of retention, stated in the Contract Data under Sub-Clause 14.3, the Contractor may substitute full retention money with an unconditional guarantee acceptable to the Employer to a value equal to the full retention money, and valid up to 28 Days beyond the end of Defect Notification Period. On receipt of such guarantee the Employer shall repay the full retention money. The guarantee will be released to the Contractor upon the certification of the Engineer that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
(*) 18.2	Third Party Insurance	This Amount of insurance per occurrence is: **Rupees 500,000.00**
	<u>Clause 19.0 Claims, Disputes and Arbitration</u> ***Delete existing sub-clause 19.2 (Dispute Resolution),*** ***Delete existing sub-clause 19.3 (Procedure for Adjudication),*** ***Delete existing sub-clause 19.4 (Replacement of Adjudicator),*** ***Delete existing sub-clause 19.5 (Arbitration), and insert the following new sub-clauses;*** *19.2 Appointment of the Dispute Adjudication Board* *19.3 Failure to Agree on the Composition of the Dispute Adjudication Board* *19.4 Obtaining Dispute Adjudication Board's Decision* *19.5 Failure to Comply with Dispute Adjudication Board's Decision* *19.6 Expiry of Dispute Adjudication Board's Appointment* *19.7 Arbitration*	

19.2	Appointment of the Dispute Adjudication Board	Any dispute of whatever nature arising out of or in relation to this agreement shall in the first instance be referred to a Dispute Adjudication Board (DAB) for decision in accordance with Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision]. The Parties shall appoint a DAB within 28 Days from the Commencement Date. The DAB shall comprise, three suitably qualified persons ("the members"), who shall be professionals experienced in the type of construction involved in the Works and with the interpretation of contractual documents, one of whom shall serve as chairman. Within 28 Days from the Commencement Date each of the Parties shall appoint one member to serve on the Dispute Adjudication Board (DAB). The Parties shall consult both these members and shall agree upon the third member, who shall be appointed to act as the chairman. The agreement between the Parties and each of the three members shall incorporate by reference the General Conditions of Dispute Adjudication Agreement contained in the Appendix to these Contract Data, with such amendments as are agreed between them. The terms of the remuneration of the three members, including the remuneration of any expert whom the DAB consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment of the member or such expert (as the case may be). Each Party shall be responsible for paying one-half of this remuneration.

19.3	Failure to Agree on the Composition of the Dispute Adjudication Board	If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause. The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DAB (including each member) shall expire when the discharge referred to in Sub-Clause 14.11 [Discharge] shall have become effective. If any of the following conditions apply, namely: (a) either Party fails to nominate a member of a DAB by such date, (b) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DAB by such date, or (c) the Parties fail to agree upon the appointment of a replacement person within 42 Days after the date on which the one of the three members declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, Then Institute for Construction Training and Development (ICTAD) shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DAB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the expenses / disbursements incurred by ICTAD.
19.4	Obtaining Dispute Adjudication Board's Decision	If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, either Party may refer the dispute in writing to the DAB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause.

		The DAB shall be deemed to have received such reference on the date when it is received by the chairman of the DAB. Both Parties shall promptly make available to the DAB all such additional information, further access to the Site, and appropriate facilities, as the DAB may require for the purposes of making a decision on such dispute. The DAB shall be deemed to be not acting as arbitrator(s). Within 84 Days after receiving such reference, or within such other period as may be proposed by the DAB and approved by both Parties, the DAB shall give its decision, which shall be reasoned and shall state that it is given under this Sub-Clause. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the Works in accordance with the Contract. If either Party is dissatisfied with the DAB's decision, then either Party may, within 28 Days after receiving the decision, give notice to the other Party of its dissatisfaction and intention to commence arbitration. If the DAB fails to give its decision within the period of 84 Days (or as otherwise approved) after receiving such reference, then either Party may, within 28 Days after this period has expired, give notice to the other Party of its dissatisfaction and intention to commence arbitration. In either event, this notice of dissatisfaction shall state that it is given under this Sub-Clause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in Sub-Clause 19.5 [Failure to Comply with Dispute Adjudication Board's Decision] and Sub-Clause 19.6 [Expiry of Dispute Adjudication Board's Appointment], neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Sub-Clause. If the DAB has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 Days after it received the DAB's decision, then the decision shall become final and binding upon both Parties.

19.5	Failure to Comply with Dispute Adjudication Board's Decision	In the event that a Party fails to comply with a DAB decision which has become final and binding, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under Sub-Clause 19.7 [Arbitration]. Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision] shall not apply to this reference.
19.6	Expiry of Dispute Adjudication Board's Appointment	If a dispute arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works and there is no DAB in place, whether by reason of the expiry of the DAB's appointment or otherwise: (a) Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision] shall not apply, and (b) the dispute may be referred directly to arbitration under Sub-Clause 19.7 [Arbitration].
19.7	Arbitration	(a) Any dispute of whatever nature arising from, out of or in connection with this agreement, on the interpretation thereof, or the rights, duties, obligations or liabilities of any Party, or the operation, breach, termination, abandonment, foreclosure or invalidity thereof, shall be referred to by either Party to arbitration for final settlement, in accordance with the Arbitration Act No. 11 of 1995, or any amendment thereof, (b) Pending the award in any arbitration proceedings hereunder, (i) this Contract and the rights and obligations of the Parties shall remain in full force and effect and (ii) each of the Parties shall continue to perform their respective obligations under this Contract. The termination of this Contract shall not result in the termination of any arbitration proceedings pending at the time of such termination nor otherwise affect the rights and obligations of the Parties under or with respect to such pending arbitration. (c) Any award rendered by the arbitral tribunal shall determine the extent to which the cost of arbitration is to be borne by each Party. The arbitration centre charges and the compensation to the arbitrator shall be equally shared by the Parties initially.

		Composition of the Arbitral Tribunal : The arbitral tribunal shall consist of a sole arbitrator who shall be appointed in the manner provided in the Selection Procedure as given below. **Selection Procedure :** The Party desiring arbitration shall nominate three arbitrators out of which one to be selected by the other Party within 21 Days of the receipt of such nomination. If the other Party does not select one to serve as Arbitrator within the stipulated period then the Arbitrator shall be appointed in accordance with the Arbitration Act No. 11 of 1995, or any amendments thereof. **Venue & Language:** The venue of arbitration shall be in Sri Lanka. Unless otherwise agreed to by the Parties the proceedings shall be conducted and the award shall be rendered in the English language.
	In the following sub-clauses, the term "Performance Security" is replaced with: "Performance Security and, if applicable, an Environmental, Social, Health and Safety (ESHS) Performance Security": 2.1- Right of Access to the Site 14.2- Advance Payment 14.5- Issue of Interim Payment Certificate 14.11- Discharge 15.5- Employer's Entitlement to Termination for Convenience 16.4(a)- Payment on termination"	

Appendix to contract data

APPENDIX A

A General Conditions of Dispute Adjudication Agreement

1. Definitions

Each "Dispute Adjudication Agreement" is a tripartite agreement by and between:

(a) the "Employer";

(b) the "Contractor"; and

(c) the "Member" who is defined in the Dispute Adjudication Agreement as being one of the three persons who are jointly called the "DAB" (or "Dispute Adjudication Board") and, where this is the case, the other two persons are called the "Other Members."

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Adjudication Agreement, which incorporates this Appendix. In the Dispute Adjudication Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2. General Provisions

Unless otherwise stated in the Dispute Adjudication Agreement, it shall take effect on the latest of the following dates:

(a) the Commencement Date defined in the Contract,

(b) when the Employer, the Contractor and the Member have each signed the Dispute Adjudication Agreement, or

(c) when the Employer, the Contractor and each of the Other Members have respectively each signed a Dispute Adjudication Agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 Days notice of resignation to the Employer and to the Contractor, and the Dispute Agreement shall terminate upon the expiry of this period.

3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members, any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied

upon the Member's representations that he/she is:

(a) experienced in the work which the Contractor is to carry out under the Contract,

(b) experienced in the interpretation of contract documentation, and

(c) Fluent in the language for communications defined in the Contract.

4. General Obligations of the Member

The Member shall:

(a) have no interest financial or otherwise in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Adjudication Agreement;

(b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Adjudication Agreement;

(c) have disclosed in writing to the Employer, the Contractor and the Other Members, before entering into the Dispute Adjudication Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;

(d) not, for the duration of the Dispute Adjudication Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members;

(e) comply with the annexed procedural rules and with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract;

(f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;

(g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Adjudication Agreement;

(h) ensure his/her availability for all site visits and hearings as are necessary;

(i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received which shall be maintained in a current working file;

(j) treat the details of the Contract and all the DAB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members; and

(k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members.

5. General Obligations of the Employer and the Contractor

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DAB's activities under the Contract and the Dispute Adjudication Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members:

(a) be appointed as an arbitrator in any arbitration under the Contract;

(b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or

(c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the DAB under Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6. Payment The Member shall be paid as follows:

(a) a retainer fee per calendar month, which shall be considered as payment in full for:

(i) being available on 28 Days notice for all site visits and hearings;

(ii) becoming and remaining conversant with all project developments and maintaining relevant files;

(iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and

(iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Adjudication Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by 50%. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Adjudication Agreement is otherwise terminated.

(b) a daily fee which shall be considered as payment in full for:

(i) each day or part of a day up to a maximum of two Days travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members;

(ii) each working day on Site visits, hearings or preparing decisions; and

(iii) each day spent reading submissions in preparation for a hearing.

(c) all reasonable expenses including necessary travel expenses (hotel and subsistence and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, and faxes: a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (b) of this Clause.

The retainer and daily fees shall be as specified in the Dispute Adjudication Agreement. Unless it specifies otherwise, these fees shall remain fixed for the entire duration of the Contract.

The Member shall submit invoices for payment of the monthly retainer quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Adjudication Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DAB; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-Clause 14.7 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7. Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Adjudication Agreement by giving 42 Days notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Adjudication Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Adjudication Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a) - (d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members, for proceedings or decisions of the DAB which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the non-compliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions of the DAB which are rendered void or ineffective by the said failure to comply.

9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Adjudication Agreement, or the breach, termination or invalidity thereof, shall be finally settled in accordance with Arbitration Act No 11, 1995 of Sri Lanka with a sole Arbitrator..

PROCEDURAL RULES

1. Unless otherwise agreed by the Employer and the Contractor, the DAB shall visit the site at intervals of not more than 70 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor and the DAB, the period between consecutive visits shall not be less than 35 days, except as required to convene a hearing as described below.

2. The timing of and agenda for each site visit shall be as agreed jointly by the DAB, the Employer and the Contractor, or in the absence of agreement, shall be decided by the DAB. The purpose of site visits is to enable the DAB to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavour to prevent potential problems or claims from becoming disputes.

3. Site visits shall be attended by the Employer, the Contractor and the Engineer and shall be co-ordinated by the Employer in co-operation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the DAB shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.

4. The Employer and the Contractor shall furnish copy each to the members of the DAB all documents which the DAB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract. All communications between the DAB and the Employer or the Contractor shall be copied to the other Party.

5. If any dispute is referred to the DAB in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract, the DAB shall proceed in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the DAB shall:

   (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and

   (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

6. The DAB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

7. Except as otherwise agreed in writing by the Employer and the Contractor, the DAB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DAB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

8. The Employer and the Contractor empower the DAB, among other things, to:

   (a) establish the procedure to be applied in deciding a dispute,

   (b) decide upon the DAB's own jurisdiction, and as to the scope of any dispute referred to it,

   (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines,

   (d) take the initiative in ascertaining the facts and matters required for a decision,

   (e) make use of its own specialist knowledge, if any,

   (f) decide upon the payment of financing charges in accordance with the Contract,

   (g) decide upon any provisional relief such as interim or conservatory measures, and

   (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

9. The DAB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DAB shall make and give its decision in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision), or as otherwise agreed by the Employer and the Contractor in writing. The DAB:

   (a) shall convene in private after a hearing, in order to have discussions and prepare its decision;

   (b) shall endeavor to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and

   (c) Member fails to attend a meeting or hearing, or to fulfill any required function, the other two Members may nevertheless proceed to make a decision, unless:

      (i) either the Employer or the Contractor does not agree that they do so, or

      (ii) the absent Member is the chairman and he/she instructs the other Members to not make a decision.

DISPUTE ADJUDICATION AGREEMENT

[for each member of a three - person DAB]

Name and details of Contract

Name and address of Employer

Name and address of Contractor

Name and address of Member

Whereas the Employer and the Contractor have entered into the Contract and desire jointly to appoint the Member to act as one of the three persons who are jointly called the Dispute Adjudication Board (DAB) *[and desire the Member to act as chairman of the* DAB*]*

The Employer, Contractor and Member jointly agree as follows:

1. The conditions of this Dispute Adjudication Agreement comprise the "General Conditions of Dispute Adjudication Agreement" which is appended to the General Conditions of the "Standard Bidding Document, Procurement of Works, Major Contracts - Second Edition, January 2007" and the following provisions. In these provisions, which include amendments and additions to the General Conditions of Dispute Adjudication Agreement, words and expressions shall have the same meanings as are assigned to them in the General Conditions of Dispute Adjudication Agreement.

2. *[Details of amendments to the General Conditions of Dispute Adjudication Agreement, if any*

   For example:

   In the procedural rules annexed to the General Conditions of Dispute Adjudication Agreement, *Rule_____ is deleted and replaced by*: "……."*]*

3 In accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement the Member shall be paid as follows:

   A retainer fee of _____ per calendar month,

   plus a daily fee of _____ per day.

4 In consideration of these fees and other payments to be made by the Employer and the Contractor in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement, the Member undertakes to serve, as described in this Dispute Adjudication Agreement, as one of the three persons who are jointly to act as the DAB.

5 The Employer and the Contractor jointly and severally undertake to pay the Member, in consideration of the carrying out of these services, in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement.

6 This Dispute Adjudication Agreement shall be governed by the law of _____

SIGNED by:_____	SIGNED by:_____	SIGNED by:_____
for and on behalf of the employer	for and on behalf of the Contractor	the Member
in the presence of	in the presence of	in the presence of
Witness:_____	Witness: _____	Witness : _____
Name: _____	Name: _____	Name : _____
Address:_____	Address: _____	Address : _____
Date: _____	Date: _____	Date: _____

APPENDIX B

Environmental, Social, Health and Safety (ESHS)

Metrics for Progress Reports

[Note to Employer: the following metrics may be amended to reflect the Employer's environmental, social, health and safety policies and/or the ESHS requirements of the project. The metrics that are required should be determined by the ESHS risks of the Works and not necessarily by the scale of the Works]

Metrics for regular reporting:

a. *environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;*

b. *health and safety incidents, accidents, injuries and all fatalities that require treatment;*

c. *interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);*

d. *status of all permits and agreements:*

   i. work permits: number required, number received, actions taken for those not received;

   ii. status of permits and consents:

   - *List areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
   - *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
   - *identify major activities undertaken in each area in the reporting period and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
   - *for quarries: status of relocation and compensation (completed, or details of activities and current status in the reporting period).*

e. *health and safety supervision:*

   i. safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;

   ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);

f. worker accommodations:

i. number of expats housed in accommodations, number of locals;

ii. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;

iii. actions taken to recommend/require improved conditions, or to improve conditions.

g. HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);

h. gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);

i. training:

i. number of new workers, number receiving induction training, dates of induction training;

ii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;

iii. number and dates of HIV/AIDS sensitization and/or training, no. workers receiving training (in the reporting period and in the past); same questions for gender sensitization, flag person training.

iv. number and date of GBV /SEA sensitization and/or training, number of workers receiving training on code of conduct (in the reporting period and in the past), etc.

j. environmental and social supervision:

i. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;

ii. sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and

iii. Community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

k. Grievances: list new grievances (e.g. allegations of GBV / SEA) received in the reporting period and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):

i. Worker grievances;

ii. Community grievances

l. Traffic and vehicles/equipment:

i. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;

ii. accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;

iii. overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).

m. Environmental mitigations and issues (what has been done):

i. dust: number of working bowsers, number of watering /day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/spoil lorries with covers, actions taken for uncovered vehicles;

ii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;

iii. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken in the reporting period at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;

iv. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);

v. spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination;

vi. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;

vii. details of tree plantings and other mitigations required undertaken in the reporting period;

viii. details of water and swamp protection mitigations required undertaken in the reporting period.

n. compliance:

i. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;

ii. compliance status of C-ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

iii. compliance status of GBV/SEA prevention and response action plan: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

iv. compliance status of Health and Safety Management Plan re: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

v. other unresolved issues from previous reporting periods related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

Section - 5

Standard Forms (Contract)

- Letter of Acceptance
- Agreement
- Performance Security
- ESHS Performance Security
- Advance Payment Security
- Retention Money Guarantee
- ESHS Declaration

Notes on Form of Letter of Acceptance

The Letter of Acceptance will be the basis for formation of the Contract as described in Clause 34 of the Instructions to Bidders. This Form of Letter of Acceptance should be filled in and sent to the successful bidder only after evaluation of Bids and after obtaining approval from the relevant authority.

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 **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c''**

LK-MoMDE-465708-CW-RFB 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.

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

The Commencement Date shall be: …… *(fill the date as per Clause 8.1 of Conditions of Contract).*

The amount of Performance Security is *:* …… *(fill the amount as per Clause 4.2 of Conditions of Contract).*

The Performance Security shall be submitted on or before ……... *(fill the date as per*

Clause 4.2 of Conditions of Contract).

Authorized Signature : ……

Name and title of Signatory : …….

FORM OF AGREEMENT

This Agreement made the ……. *[day]* of …… *[month]* 200….. *[year],* between …….. *[name and address of Employer]* (hereinafter called and referred to as "the Employer"), of the one part, and …….. *[name and address of Contractor*] (hereinafter called and referred to as "the Contractor"), of the other part:

Whereas the Employer desires that the Contractor execute **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c'', LK-MoMDE-465708-CW-**RFB *[name and identification no of Contract](hereinafter called and referred to as "the Works")* and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and remedying of any defects therein.

The Employer and the Contractor agree as follows::

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract.

2. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, 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 execute and complete the Works and remedy any defects therein, 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 hereto have caused this Agreement to be executed the day and year aforementioned in accordance with laws of Sri Lanka.

……..	……..
Authorised signature of Contractor	**Authorised 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: ---------- *[Name and Address of* Employer*]*

Date: ----------

PERFORMANCE GUARANTEE No.: ----------

We have been informed that ---------- *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No **LK-MoMDE-465708-CW-RFB** dated ---------- with you, for the **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c''**

(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 Time for Completion]* and any demand for payment under it must be received by us at this office on or before that date.

_____

[signature(s)]

Environmental, Social, Health and safety (ESHS) Performance Security

ESHS Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of* Employer*]*

Date: _ *[Insert date of issue]*

ESHS PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ (hereinafter called "the Applicant") has entered into Contract No. _____ dated _____ with the Beneficiary, for the execution of _____ (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 Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____),[1] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its Environmental and/or Social and/or Health and/or Safety (ESHS) obligation(s) under the Contract, without the Beneficiary 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 ……, 2… [2], and any demand for payment under it must be received by us at this office indicated above on or before that date.

---

1 *The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency (cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.*

2 *Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*

FORM OF ADVANCE PAYMENT SECURITY

---------- *[Name and address of Agency, and Address of Issuing Branch or Office]* ------

Beneficiary: ---------- *[Name and Address of* Employer*]*

Date: ----------

ADVANCE PAYMENT GUARANTEE No.: ----------

We have been informed that ---------- *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. **LK-MoMDE-465708-CW-RFB** dated ---------- with you, for the **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c''**

(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]* is 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 the date, 28 days beyond the Time of Completion]*

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

_____
[signature(s)]

FORM OF RETENTION MONEY GUARANTEE

---------- *[Issuing Agency's Name, and Address of Issuing Branch or Office]* ----------

Beneficiary: ---------- *[Name and Address of* Employer*]* ----------

Date: ----------

RETENTION MONEY GUARANTEE No.: ----------

We have been informed that ----------*[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. **LK-MoMDE-465708-CW-RFB** dated ---------- with you, for the execution of **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c''**

(hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the works have being taken over and the first half of the Retention Money has been certified for payment, payment of the second half of the Retention Money may be made against a Retention Money guarantee.

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 under the Contract because the Contractor has not attended to the defects in accordance with the Contract..

This guarantee shall expire, at the latest, ---------- [*insert 28 Days after the end of the Defects Liability Period*]. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

_____

[signature(s)]

Form of ESHS Declaration

Date: _____

Bid No.: _____

To: _____

We, the undersigned, declare that civil work contracts *have/ have not been* suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social, (including sexual exploitation and abuse (SEA) and gender based violence (GBV)), or health or safety requirements or safeguard in the past five years.

(Note: If suspended, terminated or Performance Security is called give details)

Year	**Suspended or terminated portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and US$ equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s) e.g. for GBV/ SEA breaches]*	*[insert amount]*
...	...	*[list all applicable contracts]*	...
Performance Security called by an employer(s) for reasons related to ESHS performance			
Year		Contract Identification	Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]		Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for calling of performance security: *[indicate main reason(s) e.g. for GBV/ SEA breaches]*	*[insert amount]*

Signed: _____
In the capacity of _____

Name: _____

Duly authorized to sign the bid for and on behalf of: _____

Dated on _____ day of _____, _____
_____

Corporate Seal (where appropriate)

Section 6

Specifications

SPECIFICATIONS FOR CIVIL WORKS

GENERAL TECHNICAL SPECIFICATIONS

The contractor shall comply with the standards specified in "Standard Specification for Construction and Maintenance of Roads and Bridges, ICTAD Publication No. SCA/5, 2nd Edition June 2009 for road and bridge works. Where ever reference is made in the contract to specific standards to be met by materials to be purchased and work performed, the provisions of the latest current edition or revision of the relevant standards and codes shall apply.

The specification documents given here under can be purchased from Institute of Construction Training & Development.

Address: Institute of Construction Training & Development

"Savsiripaya" No. 123, Wijerama Mawatha, Colombo 07

Particular Specifications

The Particular Specifications are an amplification of the Standard Specifications and contain provisions in respect of items of work not covered by or at variance with the Standard Specifications.

Where there is any ambiguity or discrepancy between the Particular Specifications and the Standard Specifications, the requirements of Particular Specifications shall prevail.

Where BS tests are stipulated in the Specifications the equivalent ASTM or AASHTO test method may be substituted with the approval of the Engineer.

Clause numbers herein correspond with the numbers of related articles, if any, in the Standard Specifications. The numbering of new clauses is continuous with related clauses in the Standard Specifications.

The abbreviations AASHTO, ASTM, BS and SLS shall be considered to have the following meaning:

AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society of Testing and Materials
BS	British Standard
SLS	Sri Lanka Standard

Particular Specifications

PART A – PRELIMINARY & GENERAL

102 DEFINITIONS

Construction Boundary (*add new definition)*

Available width of the right of way.

Utility Services *(Delete the definition and substitute the following)*

Overhead or underground services such as electric and telecommunication poles, cables and appurtenances, water pipe lines, sewage lines etc which are mostly maintained by different agencies.

103 MANAGEMENT, SAFETY AND CONTROL AND TEMPORARY DIVERSION OF TRAFFIC

103.1 General *(Delete the para 2 & 3 and substitute the following)*

Material and equipment temporarily stored on, or adjacent to, the existing roadway shall be so placed, and the work at all times, shall be so conducted as to cause minimum disruption to the traveling public. Warning signs and barricades will be required to separate the Contractor's material and equipment from the public.

The Contractor will not be permitted to have excavations open on both sides of the road at a particular chainage such that there is a step adjacent to public traffic which may create a danger to traffic, i.e. the excavation and backfilling with sub-base or base shall be flush with the existing road level on one side before excavation can proceed on the other side of the road.

The maximum length of one-way working controlled by stop/go boards for flagmen shall be 500 metres. This length may be further reduced if visibility is reduced at bends on increased where appropriate at the Engineer's discretion.

Safety and Traffic Management plan at all the Road Works areas shall be complied with RDA "Manual on Traffic Control Devices Part II – Road Works Areas", latest edition available at the bid closing date and shall be approved by the Engineer.

103.2 Using part of the road *(Add the following sub section)*

Culvert and Bridge works

When undertaking culvert / bridge widening or reconstruction, the Contractor at all times ensure that the traffic on the road section is uninterrupted. (If the widening or reconstruction is on the existing alignment of the road, the new construction may require the provision of temporary by-passes for traffic. In the event of the requirement for temporary by-passes, the Contractor shall be responsible to provide design which have to approved by the relevant local authorities and the Engineer)

The Contractor will not be permitted to open all the culverts or bridges for widening or reconstruction at once.

AC resurfacing on bridge deck to be approved by RDA Bridge Design Division. The finish levels to be matched with the levels of the expansion and construction joints provided for the bridge, where appropriate.

103.3 Temporary Diversions *(Delete the sub section and substitute the following)*

The Contractor shall construct temporary diversion ways wherever construction of the Works will interrupt existing public or private roads or rights-of-ways. Further, temporary diversion ways shall be provided for the wherever the construction works interrupt existing traffic due to lane closures Diversions must be constructed in advance of any interference with the existing rights-of-way, and the subsequent traffic management, safety and control shall be in accordance with the paragraphs of this Clause 103 and / or as directed by the Engineer.

Where traffic management schemes are shown in the Contract Drawings they are for guidance and bidding purposes only. It is solely the responsibility of the Contractor to plan and design the necessary traffic diversions in the most efficient way possible in order to enable him to complete the Works within the Contract Period, with the minimum disruption of normal traffic flow, and absolute minimum impact on the Works, third parties, and environment.

The standard of construction and lighting of diversions shall be suitable in all respects for the volume, size and speed of traffic using the existing way. The level of lighting shall be as indicated on the Drawings or as directed by the Engineer, and must satisfy the requirements of the concerned local authorities prior to being approved by the Engineer. The width and number of lanes shall be sufficient to maintain an acceptable traffic flow commensurate with existing conditions. In any case the minimum width of traffic lane shall be 3.5 meters. It is the responsibility of the Contractor to obtain prior permission of the relevant Local Authority to open detours and the use of local authority roads.

Permanent roads used as temporary detour roads shall be signed and marked in compliance with detour road requirements whilst under detour road status. Should this road marking and signing be of a temporary nature the Contractor shall ensure that its removal will not impair the quality of the permanent Works.

Under no circumstances will the Contractor be allowed to open any new carriageway for detour traffic with permanent road markings which are not in compliance with the accepted detour markings.

The minimum pavement construction of any diversion road, unless otherwise specified, shall not be less than 40mm of bituminous paving course on 150mm of primed granular road base, constructed in accordance with the requirements of Section 400 and 500 of standard Specifications. Paving may be laid directly on primed subgrade only with the Engineer's prior approval.

The Contractor will remain responsible for the maintenance of the pavement in a satisfactory condition for as long as the diversion is required.

In urban areas, the traffic diversions shall be illuminated to a suitable lighting. In rural or other areas, where no street lighting exists, all signings shall be reflectorized and all changes in direction shall be floodlit at night to an intensity approved by the Engineer.

103.4 Traffic Safety and Control *(Add the following sub section)*

The Contractor shall, after consultation with the Engineer, all the concerned Local Authorities and Police prepare a scheme of traffic management for carrying out the Works. Such proposals shall be submitted to the Engineer for his approval, together with written approval / no objection certificates from the concerned authorities, not less than 30 days before the planned implementation of each proposal.

The Contractor shall not commence any works affecting any public highway until all approved traffic safety measures conforming to the Engineer's prior approval have been fully implemented to the satisfaction of the Engineer.

The Contractor shall take necessary measures for the safety of traffic and third parties by providing, erecting and maintaining all signs with a retro-reflective background and lamps, retro-reflective safety cones and barriers, traffic control signals, road markings, etc. in a clean and legible condition, and shall position, re-position, cover or remove them as required by the progress of the Works. All the barriers shall be adequately strong and shall have a firm base to support. Red lanterns or warning lights to the satisfaction of Engineer shall be mounted on the barriers at nights and shall be kept lit till sunrise.

The Contractor shall responsible to maintain the safety of the road during the construction period.

If the Contractor fails to comply with adequate safety requirements, the Engineer shall temporary suspend the work until such time proper remedial measures are implemented to a level acceptable to the Engineer. The remedial measures shall be in accordance with RDA "Manual for Traffic Control Devices Part II" Latest Edition available at the Bid Closing Date and methodology proposed by the Bidder.

Any additional cost or time incurred due to above shall be at contractors' expense and shall not be subjected to extension of time or claim for extra cost.

103.5 Measurement and Payment *(Delete the sub section and substitute the following)*

a. Measurement

Arrangement for traffic during construction shall be assessed weekly and accumulate per month and the quantity of work for payment during the month shall be assessed by the Engineer on the Contractor's intrim Payment certificate.

b. Payment

Payments shall be determined by the Engineer on the works during a month in accordance with the Clause 103. Or Payment will be made for at the Contract unit rate priced by the Contractor for the successful components and shall include full compensation for providing all materials, transporting, application, labour, equipment and incidentals to completely adopt Traffic safety measures.

Pay Item	Description	Pay Unit
103 (1)	Management, Safety & Control & Temporary Diversion of Traffic, including provision of a general traffic management plan due to lane closure	PS

106 GENERAL RULES FOR MEASUREMENT AND PAYMENT

106.1 Lead for Materials *(Delete the sub section entirely and substitute the following)*

No transport distances shall be measured for payment. The cost of transport, loading, unloading and piling of materials are deemed to be included in the bid rates for items of work in the Bill of Quantities, which involves supply of materials.

108 MOBILIZATION, MAINTENANCE AND DE-MOBILIZATION OF CONTRACTOR'S FACILITIES AND PLANT/EQUIPMENT *(Delete "Not Used" and substitute this section)*

Description

The Contractor shall make provision for erection, operation and removal at the completion of works, of his temporary installation and facilities, including offices, site laboratory, accommodation, workshops, quarries, borrow pits, batching and blending plants and restoring of temporary land for borrow pits and quarries, etc. He shall provide and maintain at his own cost sanitary facilities on site, first aid firefighting equipment, drinking water facilities, electricity and telephone for the duration of the Contract.

The Contractor shall be responsible for the security of the Site and safety of public and adjoining property and shall be liable for any claims arising from loss or damage suffered. He shall employ watchmen for this purpose.

All temporary accommodation shall be kept well maintained during the contract period and shall be available for inspection by the Engineer and/or Government Medical Officer of Health. The Contractor must comply immediately with any instruction given by the Engineer and/or Medical Officer for cleaning, disinfesting and maintenance of any building to return it to a hygienic and sanitary condition.

The Contractor shall confine his apparatus, the storage of materials and the operations of his workmen to the limits indicated by law, ordinance, permits, or direction of the Engineer. The Contractor shall erect temporary fences as required by the Engineer. The Site boundary lines shall be to the approval of the Engineer.

Description of major item

The Contractor will be paid for the mobilization of major items of Plant/Equipment. Major items of Plant/Equipment are defined as those that cost more than 1% of the Contract Price with an overall maximum of 5% of the Contract Price.

a. Payment

Payment for temporary installation and facilities, including offices, site laboratory, accommodation, workshops, quarries, borrow pits, batching and blending plants, etc. shall be made upon their satisfactory completion Including the arrangements of Lease agreements and if any maintenance.

50% of the item will be paid on arrival and erection on the site of the specified items of Plant/Equipment. The remainder will be paid on confirmation by the Engineer that the output of the Plant/Equipment complies with the requirements of the specification.

Pay Item	Description	Pay Unit
108. (1)	Mobilization of Contractor's Facilities and Plant/Equipment	LS
108. (2)	De-mobilization of Contractor's Facilities & Plant/Equipment	LS

109 WORKMANSHIP AND QUALITY CONTROL *(Delete the section entirely and substitute the following)*

109.1 General

The Contractor is responsible for producing work which conforms in quality and accuracy of detail to the requirements of the Contract. He shall institute a Quality Assurance System and provide experienced engineers, foremen, leading hands, surveyors, materials technicians and other technical staff, together with all transport, instruments and equipment, to ensure adequate supervision and quality of the Works are maintained at all times.

The cost of all supervision and quality of the work, including testing, carried out by the Contractor shall be deemed to be included in the rates and prices tendered for the related items of work, except where otherwise specifically provided for in the Contract.

The Contractor's attention is drawn to the provisions of the various sections of the Specification regarding the minimum frequency of testing that will be required for the Quality Assurance system. The Contractor shall, at his own initiative, increase this frequency where necessary to ensure adequate control.

On completion of every part of the Works and submission to the Engineer for examination, the Contractor shall submit to the Engineer the results of all relevant tests and survey checks that he has carried out indicating compliance with the Specification.
For cement, bitumen, mild steel bars, high tensile steel bars, pre-stressing materials, bridge bearings, road marking paints, reflective paints, road studs, guard rails and such materials, the Contractor shall furnish to the Engineer the manufacturer's test certificates of the actual material to be incorporated in the Works. When required by the Engineer to carry out essential testing at a manufacturer's plants or at laboratories other than the Site laboratory, all costs involved shall be borne by the Contractor.

The methods of sampling and testing of materials shall be as stipulated in the Specification or as approved by the Engineer.

The Contractor shall be required to demonstrate the adequacy of the equipment for each operation to establish their capacity to achieve the requirements to the Specification to the satisfaction of the Engineer before commencement of the Work.

All equipment provided shall be of proven efficiency and purpose made for its required operation and shall be operated by skilled operators and maintained at all times to perform its proper function in a safe and efficient manner acceptable to the Engineer.

The Contractor shall provide his own laboratory for his own quality control purposes, and trial mix testing etc. The testing of the Works by the Engineer in no way absolves the Contractor from his responsibilities to carry out his own on-site quality control testing of the materials and/or workmanship he has performed in completed work items.

The Contractor must make due allowance for the time required for any testing of materials or workmanship etc., within his programme for the Works.

109.2 Measurement and Payment *(Delete the sub section and substitute the following)*

a. Measurement

Special tests ordered by the Engineer shall be measured for payment. Routing tests shall not be payment.

b. Payment

It is necessary to include all expences for the provision of Quality Assurance System in contractor's rates and no separate payment will be made.

Pay Item	Description	Pay Unit
109 (1)	Special tests ordered by the Engineer	PS

112 SERVICES *(Delete the sub section entirely and substitute the following)*

In the execution of Works by the Contractor, if any services, public or private that are damaged by the Contractor, shall be rectified by the Contractor through reinstatement or repair.

112.1 Existing Services

The Contractor may be ordered to carry out certain works for and on behalf of various statutory service authorities and he shall also provide, with the prior approval of the Engineer, such assistance to the various bodies as, may be authorized by the Engineer.

No removal of or alterations to any public utility shall be carried out unless ordered by the Engineer.

The Contractor shall take all reasonable precautions to protect - by locating the existing services by means of detecting and / or making trail pits etc…, and shall provide temporary support to, existing services during construction and during reinstatement or repair of damaged services.

Whenever reinstatement or repair is encountered that interferes with the execution of the works and requires moving or relocation, the Contractor shall advise the Engineer who will determine the extent of the work involved.

Any pipe, cable, conduit or other known service of any nature whatsoever, which has been damaged as a result of the Contractor's operations shall be repaired and reinstated forthwith by the Contractor or by the authority concerned, at the expense of the Contractor or the authority and to the satisfaction of the Engineer.

The Employer will not be held liable or responsible for any delay in completion of the Works under this Contract which may occur due to any damage occurring to such services in consequence of the Contractor's operations.

112.2 Measurement and Payment

The work of detecting, temporary supporting and protecting public utility services during execution of the Works shall be deemed to be included in the Contractor's rates and prices and no extra payment shall be made for the same.

113 MAINTENANCE OF EXISTING ROADS OUTSIDE THE CONTRACT *(Delete "Not Used" and substitute this section)*

113.1 General Obligations

The Contractor shall take all reasonable steps to minimize nuisance during the construction of the works (see Clause 4.18 of General Conditions of Contract).

All existing highway and roads used by vehicles of the Contractor or any of his sub-Contractors or suppliers of materials or plant, and similarly any new roads which are part of the Works and which are being used by traffic, shall be kept clean and clear of all dust / mud / extraneous materials dropped by the said vehicles or their tyres. Similarly, all dust / mud / extraneous materials from the Works spreading on these highways shall be immediately cleared by the Contractor.

Clearance shall be affected immediately by manual sweeping and removal of debris, or, if directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed entirely from the road surface. Additionally, if so directed by the Engineer, the road surface shall be hosed or watered using suitable equipment. The road surface shall be maintained in a better or similar condition at all times.

Any structural damage caused to the existing roads by the Contractor's constructional plant or equipment shall be made good at Contractor's expense.

a. Payment

All these activities shall be deemed to be included in the Contractor's rates and prices and no separate payment will be made thereof.

117 SETTING OUT AND CROSS SECTION SURVEY AND DRAWINGS

(Delete the sub section entirely and substitute the following)

Description of Survey Requirement

The Contractor shall carry out a survey of the existing road and produce the required information as indicated in the following paragraphs. The Contractor will be provided the design profile and design cross section at 20 m interval according to the design. Survey plan and details for the structures shall be submitted by Contractor to the Engineer.

The existing ground levels indicated on the design cross sections shall not be used as exact ground levels nor as a basis for the measurements, and shall be used only for guidance and for verification purposes. Before commencing work on any section of the works contractor shall survey and level the existing ground and shall prepare existing ground cross sections not greater than 20m intervals and in special cases such as a sharp curve, or as otherwise directed by the Engineer, the cross-sections interval shall be reduced to 10 meters and shall submit to the Engineer for his approval. These shall when finally agreed, be signed by the Engineer and the Contractor as truly representing the existing ground and shall be the basis for measurements and payments. After the ground, cross sections are agreed the Contractor shall prepare detail cross sections incorporating the design including all the details and submit to the Engineers approval. The vertical and horizontal scales of the cross-section drawings shall be 1:20 and 1:50 respectively or as otherwise instructed by the Engineer

The Contractor shall be the sole responsible party for safeguarding all survey monuments, bench marks, beacons, etc…

The Contractor shall establish working bench marks tied with the Sri Lanka Survey Department bench marks established already at site, if any, in the area soon after taking possession of the site. The Traverse Stations and GPS points established for the design will be given to the contractor but additional point shall be established by the contractor as the work may require. TS points and GPS points already established during the detail design may have dislocated and the contractor shall locate and carry out own checks to ascertain the accuracy of the available points prior to use any point. The working bench marks shall be at the rate of four per km and also at or near all structures. The working bench marks/levels should be approved from the Engineer. Checks shall be made on these bench marks once every month and adjustments. If any, shall be agreed with the Engineer and recorded. An up-to-date record of all benchmarks including approved adjustments, if any shall be maintained by the Contractor and also a copy supplied to the Engineer for his record.

The lines and levels formation, side slopes, drainage, carriageways and shoulder shall be carefully set out and frequently checked. Care being taken to ensure that correct gradients and cross sections are obtained everywhere.

The contractor shall prepare all setting out data required for the works and shall be approved by the Engineer prior to commencement of any work.

In order to facilitate the setting out of the works the existing centre line of the carriageway must be accurately established by the Contractor and approved by the Engineer. It must then be accurately referenced. A schedule of reference dimensions shall be prepared and supplied by the Contractor to the Engineer. These marks shall be maintained until the works reach finished formation level and are accepted by the Engineer.

On reaching formation level stage of construction, the centre line shall again be set out by the Contractor and when approved by the Engineer shall be accurately referenced in a manner satisfactorily to the Engineer, to marked pegs set at the outer limits of the formation.

No reference peg or marker shall be moved or withdrawn without the approval of the Engineer and no earthworks or concrete or structural work shall commence until the centre line has been referenced.

The Contractor shall employ surveyor on the works qualified with at least 10 years' experience in works specified herein. The Surveyor shall be fully equipped with modern survey equipment and instruments, which must be approved by the Engineer. Competent chainmen shall be employed to assist the surveyor. The Contractor shall assist and supply the services of the Surveyor and his team to the Engineer whenever required by the Engineer or his staff in staff in checking and measuring the works.

Contractor shall maintain chainages at 100m intervals which could be easily identified at site, throughout contract period.

Payment *(Delete the sub section entirely and substitute the following)*

No separate payment shall be made for compliance under this section. Payment shall be deemed to be included in Contractor's rates and prices.

However, for additional surveying works instructed by the Engineer shall be paid to the Contractor.

Pay Item	Description	Pay Unit
117(2)	Additional surveying work directed by the Engineer	km
117(3)	Provide Survey Assistance	Month
117(4)	Provide Lab Technicians	Month
117(5)	Provide Semiskilled labour	Month

118 PROJECT SIGNBOARDS AND PLAQUES

118.1 Description *(Delete the Subsection entirely and substitute the following)*

The contractor shall provide and erect in the locations shown on the drawings and/or approved by the Engineer, the number of project sign boards as described in the contract.

The sign boards shall be made to the following requirements. Face plate size not less than 2.5 meters by 2.0 meters having double post supports with concrete foundations containing colour messages and logos to include project name, name of the Employer, name of the Contractor, name of the Engineer, name of the funding agency and anticipated completion date in all three languages (Sinhala, Tamil and English).

The board shall be galvanised steel of gauge 18 or 25mm thick marine plywood. The board shall be erected with the bottom of the board at a minimum of 2.3m above the adjacent ground and clear of motor traffic and should not obstruct any pedestrian movement or access to adjoining property or a road.

The project sign board shall be erected within 2 weeks of the commencement of the works.

The project sign boards shall be maintained during the contract period and at the end of the Contract all such sign boards shall be removed and ground reinstated to the approval of the Engineer.

The Contractor shall provide and install plaques made of brass or granite or other material with messages and logos approved by the Engineer at sites decided by the Engineer.

118.2 Measurement *(Delete the sub section entirely and substitute the following)*

Project Signboards shall be measured as the number of signboards satisfactorily provided, installed, maintained throughout the Contract period and removed after completion of works.

Project plaques shall be measured as the number of plaques satisfactorily provided, installed, maintained throughout the Contract period.

118.3 Payment *(Delete the sub section entirely and substitute the following)*

Payment shall be made at the stated unit rate per signboard/plaque. The price shall be full compensation for all materials and labour required to perform the work described.

Pay items shall be:-

Pay Item	Description	Pay Unit
118 (1)	Provide and Maintain Project Sign Boards	LS
118 (2)	Provide and Maintain Project Plaques	LS

120 MONITORING, CONTROLLING ENVIRONMENT HAZARDOUS ACTIVITIES AND TAKING REMEDIAL MEASURES.

120.1 General

The Contractor shall provide adequate measures to avoid any environmental pollution during the construction period due construction activities or any other related activities. The Contractor shall implement the Environment Management Plan (**EMP**) attached with the Bidding Documents with the support of an appointed dedicated/ qualified Environmental Officer. The remedial actions shall comply and be acceptable to Central Environment Authority (CEA) and other Environment Monitoring Agencies.

All construction activities, use of burrow pits, quarries, dumping sites, plants and machinery, access road to burrow pits and quarries, blasting operation, etc. are some of the identified vulnerable activities. The Contractor shall submit methodology and frequency of remedial activities for the approval of Engineer, as per the sub-section 120.3. All key environmental parameters such as Vibration and Noise shall not exceed the limitation imposed by the CEA.

Based on the findings of the Environmental Assessment (**EA**), which will be made available for the Contractor on request, the Contractor shall be provided with potential sites for material sourcing and siting of burrow sites, dump sites, quarries and sites for stock piling, storage, crusher plants, asphalt plants, etc. with information in reference to the ownership and status of the existing permits. Use of this information by the contractor shall be based on the contractor's discretion and by no means provides a guarantee that Engineer shall be in agreement or shall provide clearance for sourcing of material and siting based on the EA findings. Contractor has the sole responsibility to ensure final sites selected by the contractor for sourcing of material and siting are acceptable to the Engineer.

120.2 Applicable Laws, Regulations and Policies covering the proposed project

Following national laws and regulations will be applicable for this project.

- National Environmental Act (NEA) No 47 of 1980, and its' amendment Act No. 56 of 1988 and Act No. 53 of 2000
- Agrarian Services Act No 58 of 1979
- Control of pesticide Act No 33 of 1980
- Crown Land Ordinance (chapter 454)
- Explosive Act No. 36 of 1976
- Felling of Trees Control Act No. 9 of 1951 as amended through Act No. 30 of 1953
- Flora and Fauna Protection Ordinance (FFPO) amended by Act No 38 of 1949
- Forest Ordinance (FO) No. 34 of 1951
- Geological Survey and Mines Bureau (GSMB) Act No 33 of 1992
- Irrigation Act No. 1 of 1951
- Land Acquisition Act No 9 of 1950
- National Water Supply and Drainage Board Act No 2 of 1974
- Pradeshiya Saba Act No 15 of 1987
- State Land (Recovery of Possession) Act No 7 of 1979
- Urban Development Authority (UDA) Act, No. 41 of 1978
- Coast Conservation and Coastal Resource Management Act, No.57 of 1981

In addition to national laws and regulations, the project should comply with World Bank Operational Policies, which are the policies of the International Donor Agency (IDA) of this project. Specifically, World Bank projects shall not finance the extraction of resources from or use of sites within protected areas defined under FFPO or declared forest reserves under the FO (as per OP 4.04-Natural Habitats Compliance requirements) *regardless* of approvals obtained from the respective GOSL agencies.

120.3 Preparation of the Environmental Management Action Plan (EMAP)/ Environmental Methods Statement (EMS)

A draft Environmental Management Action Plan **(EMAP)/** Environmental Method Statement (**EMS**) based on the requirements of the EMP and in line with the construction plan should be prepared within 28 days from the date of commencement and final EMAP/ EMS should be submitted within 02 months and approval should be obtained from the Engineer. The EMAP/ EMS shall be amended during the construction period if needed in agreement with Engineer and Employer. EMAP/ EMS shall include, but not limited to:

- Environmental mitigation measures as per the EMAP and processes associated with relevant construction site(s), including staging and timing of proposed mitigation measures.
- Address the following, but not limited to:
  (a) Construction material extracting sites and disposal sites and related approvals from authorities and/or time-based plan to obtain the approvals;
  (b) Measures to avoid and/or control the occurrence of environmental impacts;

(c) Measures to provide positive environmental offsets to unavoidable environmental impacts;
(d) Measures to implement environmental enhancements as specified in the EMP;
(e) Initial plans for environmental redevelopment of material extracting and disposal sites;
(f) Site specific environmental management techniques and processes for all construction activities which are important for the quality of the environment in respect to permanent and/or temporary works including specific measures on safety;
(g) Site specific monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the construction works, including performance criteria, test and protocols (including frequency and location if not specified in the EMP);
(h) Locational details of important elements such as temporary dust and noise barriers, portable amnesties, truck, plant and material storage, access locations, provision of site hoarding, etc.; and
(i) Identification of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the EMAP/ EMS

120.4 Controlling environmental impacts

The Contractor shall be responsible to maintain and monitor the impacts to the environment to ensure the construction and related works are harmless to the environment. In order maintain the activities in accordance with EMAP, the Contractor shall be asked to quote the required rate in the Bill of Quantity.

If the Contractor fails to keep the environment free of impacts or mitigated the impacts to a level acceptable to the Engineer as per the EMAP and agreed with the approved EMS the Engineer shall be temporary suspend the work until such time proper mitigation measures are implemented.

If any of the defects are not remedied by the Contractor within the time given by the Engineer, the Engineer shall consider the contractor's work is non-compliance towards environmental safeguards and necessary remedial action shall be undertaken by the Engineer through a third party. Further the cost of the third party and 12% (twelve percent) for supervision charges shall be deducted from the Contractors Interim Payment that has non-compliance towards environmental safeguards**.**

Any additional cost or time incurred due to above shall be at contractors' expense and shall not be subjected to extension of time or claim.

120.5 Implementation of Environmental Monitoring Plan

It is mandatory that the Contractor through an agency approved by the Engineer to carry out monitoring of environmental parameters as required in the EMP in respective of Environmental Monitoring Plan (**EMoP**).

120.6 Measurement and Payment

The measurement will be based on weekly assessment of all activities given in 120.1 and 120.3 and categories given in 120.4 and evaluated proportionately for the particular month.

The contractor shall be responsible for cleaning up and disposing of all waste materials and rehabilitating (landscaping) all construction sites and work areas so that these can be returned as close as possible to their previous use. This includes the stabilization and landscaping of all of the construction sites. Any borrow pits that were operated by the contractor are to be reshaped and closed. Any contaminated soil must be removed from fuel and oil storage areas. All construction debris is to be removed. Payment will be withheld from the contractor until all of the sites are satisfactorily cleaned, all spoils removed and the sites satisfactorily rehabilitated. Supervision and monitoring of these issues will be overseen by the Environmental and Social Specialist of the PMU together with the Construction Supervision Consultants assisted by the Environmental officer. The final payment will be released only after confirmation by the Environmental and Social Specialist that the above mentioned tasks have been completed satisfactorily by the Contractor.

Pay Item	Description	Pay Unit
120(1)	Allow for environmental mitigation measure according to EMP.	LS
120(2)	Monitoring of environmental parameters (Baseline date) provided in EMP.	LS

121 OTHER EQUPMENT FOR THE ENGINEER

121.1 Description

The contractor shall provide the equipment detailed below, to the satisfaction of the Engineer, for the exclusive use of the Engineer. All the equipment shall be reputed brand product, purchased from authorised seller; in brand, new condition. This equipment shall be available in full working order to the satisfaction of the Engineer within the four (4) week period from receipt of the Letter of Acceptance. All the equipment shall be the property of the Employer upon completion of the project.

122 PROGRESS PHOTOGRAPHS

122.1 Description

The Contractor shall arrange to have monthly record photographs of the works taken. These photographs shall cover such extent of the works at location and days requested by the Engineer. The Contractor shall provide the Engineer with one set of the monthly progress photographs with dates imprinted on them. The set shall comprise the following;
The photographs shall be high resolution digital photographs having minimum of 5MP original unscaled resolution.

One colour print of each photograph for an anticipated average maximum of fifty exposures per month – these photos shall be laser printed on A4 papers in colour having maximum of two photos per page including short description of the works and shall be submitted by last day of the month.

Four sets of colour photographs each printed on heavy weight photo paper with matt finish. Each set shall have maximum of twenty photos as selected by the Engineer from above set, and photos shall be 294mm x 210mm and shall be marked with brief description including date of exposure, location and direction.

The prints are to be processed by an approved professional and each photograph shall be provided in and approved clear plastic cover for binding. The softcopy of all the photographs shall be provided to the Engineer on a CD. The copyright of all the photographs shall be vested in the Employer and the original softcopy and prints shall be delivered to the Engineer fifth day of the following month. The photographs shall not be used for any other purpose whatsoever without the Employer's approval.

122.2 Measurement and Payment

Progress photographs shall be measured by the no of photographs submitted to the Engineer printed on 294mm x 210mm size heavy weight, mat finish, photo papers. The rate shall be inclusive of: Taking the photographs, processing and printing, referencing, annotating and binding, preparation of CDs (including the price of CDs), and delivering hard copies and soft copy (in CD) to the Engineer.

Pay Item	Description	Pay Unit
122 (1)	Provide Progress Photographs	LS

Part B- ROAD WORKS

126 GUIDE SPECIFICATION FOR PRECAST PRODUCTS *(Insert this new subsection below subsection 125)*

126.1 Description

Unless otherwise specified, all precast products manufactured or purchased for the Project works shall be complied with the "Appendix E – Guide Specifications for Precast Concrete Products"

201 CLEARING AND GRUBBING

201.1 Description *(Delete the Subsection entirely and substitute the following)*

This work shall consist of clearing and grubbing necessary for the performance of the work within construction boundary covered by the Contract in accordance with the Specification or as directed by the Engineer.

The work shall consist of clearing and grubbing the designated areas within construction boundary of all trees (other than those designated for preservation), stumps, and roots, dead wood, vegetation, rubbish, and objectionable materials as broken kerbs, broken paving slabs, concrete debris etc… and disposing of the same. It shall not include the demolition, removal and disposal of structures which are covered under 202 that obtrude or encroach upon or obstruct the work.

Contractor shall only remove and dispose trees instructed by the Engineer at site. Tree removal and disposal method shall be subjected to the Engineers approval. Unless otherwise specified all cut sections of the trees shall be the property of the Employer.

201.3 Construction Method

a General *(Delete the text and substitute the following)*

Generally clearing and grubbing shall be performed on the areas designated by staking or detailed in the Contract. If no areas are so designated the areas shall in principle be carried out over the construction boundary unless otherwise instructed. The Engineer shall instruct to carry out beyond the construction boundary within Right of Way where necessary for filling etc.

201.6 Payment & Measurement

(a) Measurement *(Delete the text and substitute the following)*

Clearing and grubbing will be measured on plan area basis by the square metre, on the actual work done at site. The work of clearing and grubbing at disposal sites, material sites, and borrow pit sites shall not be paid for.

Any areas occupied by existing asphalt, concrete or sealed road or otherwise maintained area are excluded from the designated areas and shall not be included in measurement.

Removal of trees, including stumps and roots unless otherwise specified, of girth less than 600 mm and overhanging branches of girth less than 300 mm shall be considered as included in clearing and grubbing.

Removal of trees including stumps and roots, as well as stumps and roots of previously felled trees of girth greater than 600 mm, shall be measured in numbers and separately assessed according to the size categories given below: However the trees such as Gliricidia Spp., Musa Spp. (Banana), Macaranga Spp. (Kanda) shall not be considered for measurement and shall be considered part of clearing and grubbing.

(a) Girth greater than or equal to 600 mm and less than 1,200 mm

(b) Girth greater than or equal to 1,200 mm and less than 2,000 mm

(c) Girth greater than or equal to 2,000 mm

Girth shall be measured at a level of 1.0 m above average ground level, or in case of stumps shorter than 1.0 m, at the highest level of the stumps.

Overhanging branches of trees of girth greater than 300 mm shall be measured as directed by the Engineer. The girth shall be the girth of cut.

(b) Payment *(Delete the sub section entirely and substitute the following)*

Pay Item	Description	Pay Unit
201(1)	Allow for clearing and grubbing within the construction boundary including removal and disposal of trees, stumps, roots, vegetation and other obstructions as directed.	Sq.m
201(3)	Removal and disposal of trees: girth greater than or equal to 600mm and less than 1200mm	Nos
201(4)	Removal and disposal of trees: girth greater than or equal to 1200mm and less than 2000mm	Nos
201(5)	Removal and disposal of trees: girth greater than than 2000mm	Nos
201(10)	Removal and disposal overhanging branches of girth greater than 300mm	Nos

202 REMOVAL AND / OR REINSTATEMENT OF EXISTING STRUCTURES

202.1 Description *(Delete first para and substitute the following)*

This work shall consist of dismantling and removing existing bridges, culverts, masonry and brickwork structures, walkways, property accesses, medians, kerbs and other structures such as guard rails, manholes, catch basins, inlets and the like which are in place, but interfere with the Works and are not suitable to remain in place within construction boundary, and salvaging and disposing of the resulting materials. It shall include the demolition, removal and disposal of buildings or parts thereof necessary to widen the existing right of way where such has not been undertaken or completed by the Employer or the building owners. All the materials obtained from dismantling shall be the property of the Employer unless otherwise specified by the Engineer.

202.3 Salvaged Materials *(Add at the end of this sub section)*

The Contractor shall comply with the laws, ordinances, building regulations, etc. as prevailing in Sri Lanka. Unless otherwise permitted by the Engineer, the Contractor shall furnish, erect and maintain suitable barricades to prevent personal injury or damage to property.

202.5A Rebuilding the demolished properties *(Add this sub section)*

The Contractor shall re-construct or relocate the demolished or removed properties of the third parties. The structures, parapet walls, property accesses, gates, extended roof and claddings, huts etc shall be reconstructed to the condition prevailed including foundation if any, and any salvage material obtained from the same location shall be used to rebuild.

202.7 Measurement and Payment

a. Measurement *(Add at the end of this sub section)*

The required and accepted work of dismantling and removing structures which are cannot measured in Cu.m shall be paid as a Provisional Sum amount.

Rebuilding of affected structures shall be paid as Provisional Sum amount.

b. Payment *(Delete the sub section entirely and substitute the following)*

Payment of the lump sum for dismantling and removal of structures shall be made in the proportion to the actual length of highway cleared compared to the total length of highway included in the Contract and as directed by the Engineer. OR, the payment for demolition and removal shall be made under a Provisional Sum and shall be based on agreeable rate for such work.

Payment shall include full compensation for carrying out the operations described including but not limited to excavation, backfilling of excavations using approved materials, preparing and shaping, handling, sorting out, salvaging, stockpiling and disposing of material.

Payment for reconstruction of demolished property shall include all incidentals required to establish the stability of the structure.

Pay Item	Description	Pay Unit
202(1)	Dismantling and Removal of brick masonry structures	Cu.m

202(1) a	Dismantling and Removal of random rubble structures	Cu.m
202(2)	Dismantling and Removal of concrete structures	Cu.m
202(6)	Allow for demolishing existing Structures, including bridges, culverts, parapet wall, fence etc. and removal of obstructions and objectionable materials within construction boundary.	PS
202(7)	Rebuilding of parapet walls, fence, gates, Property Accesses or any part of permanent building to the prevailed condition	PS

203 UTILITIES RELOCATION

(Delete the section entirely and substitute the following)

203.1 Description

The positions of all public and privately-owned utilities listed on the Drawings must be regarded as approximate. The Contractor must verify this information and satisfy itself as to the exact nature and position of all such apparatus. The Engineer does not guarantee the accuracy of the information given on the Drawings and no warranty is given or implied.

It is the intention of the Employer that all the utilities interfering with the Work are shifted by the respective agencies. The Contractor shall coordinate with the utility agency in shifing of them. However, it is the responsibility of the Contractor to initiate the process of getting any of the utilities at site shifted during construction in accordance with this Specification.

The Contractor shall take into account the current laws regarding the safety of utility lines, together with any amendment or additions thereto. The utility authority shall include in his cost estimate for anything in these laws considered to have monetary value / implication. The Contractor shall take any and all measures reasonably required by any public or concerned authority for the support and full protection of all mains, pipes, cables and other apparatus during the progress of the work, and shall construct and provide to the satisfaction

of the Engineer, all works necessary for the prevention of damage to utilities or interruption of services.

If any underground utility line is encountered unexpectedly, excavation shall cease, and the Engineer shall be notified immediately. Emergency work, as necessary, shall be put in hand without delay and without prejudice to the indemnity of the Employer.

If in the execution of the works, by reason of any subsidence caused by any act of neglect, or default of the Contractor, any damage to any apparatus, or any interruption of, or delay to the provision of any service is caused, the Contractor shall report it to the Engineer immediately.

The Contractor shall familiarize himself and all his Employees, and train the employees as necessary with the dangers of working or near live sewers and at sewage treatment works, in particular to the risks of physical injury from the explosion of dangerous gases and / or bacterial infection from contact with sewage and of exposure to poisonous gases, which may be given off by the sewage. Hydrogen sulphide and methane are prevalent in the sewers and can exist in excavations where septic sewage from collection tanks is allowed to seep into groundwater. In the context of this clause, the term sewer includes irrigation mains and drains carrying ground water and / or storm water.

The Contractor shall at all times during the progress of the Works, afford facilities to properly accredited utility agencies to access all or any of their apparatus situated in or under the Site, as may be necessary for inspecting, reporting, repair, maintaining, removing renewing or altering such apparatus in connection with the construction of the Works or any other purpose whatsoever.

The Contractor will be fully responsible for ensuring observance of the above regulations by his sub-Contractors, if any.

Where any utility or service works are to be constructed under a separate contract by the Employer within the Site, concurrent with the execution of the Works, the Contractor shall cooperate with the other Contractor and be responsible to fully coordinate construction operations so as to avoid interference with either Contractor’s operations.

Any public or private service for water, electricity, drainage, sewer, telecommunication etc affected by the Works shall not be interrupted without the written permission of the Engineer. Such permission will be withheld until suitable approved permanent or temporary alternative services have been provided by the owner of the utility or his agents. Live Sewer lines shall

not be interpreted at all-time unless otherwise permanent or temporary alternative service or diversion is provided

Due allowance shall be given by the Contractor, when preparing the Program of Works, to compliance with this Clause

203.2 Measurement and Payment

Payment shall be based on the cost of utility agency for the completed works to the satisfaction of the Engineer, which shall include full compensation for providing all materials, labour, tools, equipment and incidentals necessary to carry out the works as specified above through the utility agency. A mark up will be paid separately for the expenditure of the contractor in attending for the works.

Pay Item	Description	Pay Unit
203(1a)	Diversion, Protection or Removal of Electrical services	PS
203(1b)	Diversion, Protection or Removal of Water services	PS
203(1c)	Diversion, Protection or Removal of Telecommunication Services	PS
203(3d)	Shifting of existing Sewer line	Lm
203(3e)	Raising of existing Sewerage Manholes	No
203(2a)	Mark up on above item 203(1a)	20%
203(2b)	Mark up on above item 203(1b)	20%
203(2c)	Mark up on above item 203(1c)	20%

204 PROPERTY CONDITION SURVEY

204.1 Description

Surveying the road right of way and locating and identifying all properties within or adjacent to the right of way that do not require demolition but may be damaged by the Contractor's operations should be carried out as a comprehensive property condition survey. Location shall include position and dimension in relation to the right of way. Identification shall include the nature of the property, the type of construction, the owner and, if different, the occupant, and shall include a photograph or photographs of the property sufficient to define its type, physical and structural condition. Such survey shall carried out prior to the commencement of the work of the section.

Such surveys may be conducted, at both before, and after the works have passed any given property. The findings of such surveys shall be used in evaluating representations, if any, from property owners or occupants regarding allegations of damage to their property arising from the Contractor's operations.

204.2 Measurement and Payment

Measurement

Measurement shall be by the Kilometre of road fully surveyed to the Engineer's satisfaction, as measured along the centre line. Fully surveyed shall mean that all the houses along both sides of the road have been surveyed.

Payment

Separate payment will be made for surveys conducted before, during and after the works have passed the point of survey with the submission of report of the survey. The contract unit rate specified for the work concerned shall be for full compensation for furnishing all labour, materials, tools, equipment and incidentials necessary to complete all the work required by the Contract and as directed by the Engineer.

Pay Item	Description	Pay Unit
204(1)	Allow for Property condition survey of houses and structure prior to the commencement and after the completion of construction work covering 50 m of either side of road	km

301 ROADWAY EXCAVATION AND PREPARATION OF SUBGRADE IN CUT AREAS

301.1 Description *(Delete first para and substitute the following)*

Roadway excavation shall consist of all the required excavation within the limits of construction boundary except excavation otherwise classified. The work shall include the removal, stockpiling, multiple handling, hauling and proper utilization in the Works or disposal to spoil tips located by the Contractor and approved by the Engineer of all excavation materials, and shaping of excavation and preparation of exposed surfaces of excavation on the entire length of the roadway and approaches, in accordance with the Specification and the lines, grades, dimensions and cross-sections shown on the Drawings and as required by the Engineer.

301.5 Measurement and Payment

b. Payment *(Delete entire sub section and substitute the following)*

The quantities of roadway excavation measured as specified above will be paid for at the Contract unit rates per cubic metre for the various types as detailed below. Such rates shall include excavating, removal, stockpiling, multiple handling, haulage to embankment areas for re-use and satisfactory disposal of all roadway excavation, to designated spoil tips or to spoil tips located by the Contractor and approved by the Engineer, for shaping, dressing and completion of all surfaces and for furnishing all labour, materials, tools, equipment and incidentals necessary to complete the work. The rate for topsoil shall include stockpiling or disposal as instructed. The rates for excavation of unsuitable materials exclude backfill, which shall be measured and paid for as embankment Type I, embankment Type II, sub base or base course as the case may be.

The Contract unit rate specified for the work concerned shall be full compensation for furnishing all labour, materials, tools, equipment and incidentals necessary to complete the work, including compaction and trimming to specified tolerances of the top of sub grade as instructed by the Engineer.

Pay Item	Description	Pay Unit
301(1)	Roadway excavation, soil suitable for fill	Cu.m
301(2)	Roadway excavation, soft rock	Cu.m
301(3)	Roadway excavation, hard rock	Cu.m
301(4)	Roadway excavation, boulders	Cu.m
301(5)	Roadway excavation, unsuitable soil	Cu.m
301(6)	Roadway excavation-, sub grade replacement	Cu.m
301(7)	Road pavement excavation in reconstruction area	Cu.m
301 (8)	Prepare sub grade in reconstruction area	Sq.m

302 EXCAVATION AND BACKFILL OF STRUCTURES

302.5 Measurement and Payment

a. Measurement *(Delete the sub section and substitute the following)*

All excavation shall be according to dimensions as given in the Drawings prepared for the purpose of construction and as directed by the Engineer, in Cu. m for each class of material encountered. Working space or excessive excavation beyond the line of foundation shall not be measured for payment. Any excavation in excess of above other than what had been allowed by the Engineer shall be considered as carried out for the convenience of the Contractor in exceeding the work and shall not be measured for payment.

For lined drain, excavation shall be measured as lined drain excavation and shall be measured to the dimensions of the drain as shown on the Drawings.

Backfilling shall not be measured for payments.

b. Payment *(Delete the sub section excluding pay items and substitute the following)*

The quantities of excavation for structures as measured above will be paid for at the Contract unit rate per Cu m for each class of material encountered. Such rates shall include full compensation for all labour, materials, tools, equipment, safety measures and incidental necessary to carry out the work to this Specification. This work shall include;

i) Setting out
ii) Removal of all logs, stumps and other deleterious mater and obstructions for placing the foundation
iii) Backfilling with approved soil and compacting in accordance with section 304 of Standard Specification
iv) Clearing the Site and disposal of all surplus material

For structures and line drains, no separate or extra payment shall be made for backfilling which shall be deemed to be included in the Contractor's rate. No extra or separate payment shall be made for over excavation and there shall be no allowance for bulking or shrinkage.

The payment for the following items shall be made under provisional Sum and payment shall be made in pro rata basis within the quoted amount.

i) Preparation of base for foundation
ii) Construction of necessary cofferdams, crib sheeting, shoring and bracing and subsequent removal
iii) Dewatering

Payment for clearing of Site shall be made under Pay Item 201(1) at Section 201.

(Add following pay items and pay units)

Pay Item	Description	Pay Unit
302(14)	Excavation in wet soil including dewatering, diverting streams,	

	Cofferdams and shoring, Backfilling.	Cu.m
302(15)	Excavation in unclassified soil and backfill with approved soil. Including shoring and dewatering	Cu.m

304 EMBANKMENT CONSTRUCTION

304.3 Construction Requirements

d. Placing and Compaction of Embankment Material

(iii) Compaction procedure *(Add at the end of this sub section)*

Compaction shall be carried out as a continuous operation covering the full width of the layer concerned and the length of any section of a layer being compacted shall, wherever possible, be not less than 150 metre no more than can be properly compacted with the available equipment before drying out.

Fill shall be placed in successive layers whose planes are parallel to the final road surface, wherever this is practicable, and the construction of tapered layers shall be restricted to the bottom layers of fill where it may be unavoidable due to cross fall, tapering out of fills or super elevation of the final road surface.

The Contractor shall ensure that oversize material be disposed of or utilized elsewhere in the construction of the Works. The Contractor shall exercise all reasonable care to avoid bringing onto the road material which cannot be broken down to the required size by processing on the road. This shall be avoided by proper selection in excavation in cut or in borrow. In cut such material shall be taken directly to spoil or shall be utilized as instructed by the Engineer.

305 TRENCH EXCAVATION FOR UTILITY SERVICES

305.3 Construction Requirements

b. Reinstatement of Trenches *(Delete first para and substitute the following)*

The surround for the pipe or ducts as appropriate shall be constructed according to the Specification and Drawings provided for the purpose. The thickness of layer which used for reinstatement shall be in accordance with the Drawings.

305.5 Measurement and Payment

a. Measurement *(Delete last two para of this sub section and substitute the following)*

Trenching and reinstatement will be considered together for Duct crossing and the plan area of trench will be measured in Cubic Meter on acceptance of work in accordance with Drawings and as specified above. The cost of duct or pipe will be considered separately.

b. Payment *(Insert following text after the second para of this sub section)*

The price for duct crossing will include excavation and reinstatement of trench with specified material in addition to the other requirements specified therein.

(Add the following additional Pay Item)

Pay Item	Description	Pay Unit
305(7)	Trench excavation and reinstatement	Cu. M

401 SUB BASE - UPPER & LOWER (CAPPING LAYER) AND SELECTED SUBGRADE

401.4 Construction Requirements

a. Preliminaries *(Add at the end of this sub section)*

Where a sub base is to be laid over an existing pavement, the existing pavement shall be fully scarified to enable the existing bituminous layer and aggregate greater than 100 mm in size to be removed. In removing the bituminous layer the Contractor shall ensure that as much of the adhering existing aggregate as possible is dislodged and left remaining to be mixed with the sub base to be added.

Where instructed by the Engineer, existing material considered of poor quality shall be removed and disposed of. Extra sub base material shall then be added to the existing pavement material and thoroughly mixed either in place or alongside the area to be strengthened or by removing of the existing subbase material and providing of Geo textile as specified by Engineer at sub grade level prior to replacing the improved sub base material. Compaction and surface finish shall be carried out as specified in Section 401 herein. Payment for Geo textile at subgrade level will be measured in Sq.m shall be made under standard specification section 307 and pay item 307(5).

405 DENSE GRADED AGGREGATE BASES

405.3 Construction Requirements

a. Preparation of Existing Surface *(Delete second para and substitute the following)*

Where the base course is laid over an existing bituminous pavement, the surface shall be lightly scarified or punctured to permit drainage through the surface where, in the opinion of the Engineer, the surface shape is not adequately crowned, and cleaned of any scarified material before laying the base course. During this operation the Contractor shall not damage the underlying pavement layer. Any damage to the existing underlying layer which results due to careless scarification shall be rectified forthwith by the Contractor to the approval of the Engineer at the Contractor's own cost.

b. Spreading and Rolling *(Delete the first para of this sub section and substitute the following)*

The aggregate shall be spread uniformly using an asphalt concrete paver and without segregation over the prepared surface of an underlying layer which complies with the specified requirements for the layer concerned, or on an existing Pavement, and in quantities sufficient to ensure that after compaction the completed layer will comply with all requirements of layer thickness, levels, cross section and density.

411. MILLING OF ASPHALTIC CONCRETE PAVEMENT

(Add this new sub section below sub section 410)

411.1 Description

411.1.1 This work shall consist of removal of asphalt concrete pavement by cold milling in accordance with these specifications and in reasonably close conformity with the lines, grades and cross sections shown on the drawings or as designated by the Engineer.

411.1.2 The sequence of the locations to be milled will be determined by the Engineer.

411.2 Equipment

411.2.1 The equipment for removing the pavement surface shall be a cold milling machine specifically designed for automatically controlled profiling.

411.2.2 The automatic controls shall provide for accurately establishing profile grades at each edge of the machine by referencing from the existing pavement or an independent grade reference, where required, or be capable of automatically maintaining a designated cross slope and longitudinal / transverse tapers where required from a single reference.

411.2.3 The machine shall have sufficient power, traction and stability to maintain an accurate depth of cut.

411.2.4 The machine will be equipped with means to effectively control dust generated by the cutting operation.

411.2.5 Hauling equipment shall be available to receive milled material directly from the milling machine or loaded from a windrow of milled material when approved by the Engineer, and haul it directly to the stockpile Pre-nominated.

411.2.6 Equipment for removing any loose material during the sweeping operation shall have the capability to pick the material up off the milled and/or adjacent roadway and be able to be unloaded onto the hauling equipment.

411.3 Construction

411.3.1 The pavement surface shall be removed by milling to the specified depth, width, grade, and cross section shown on the plans or as directed by the Engineer.

411.3.2 The number of passes required to achieve the specified width and depth shall be determined by the Contractor.

411.3.3 The surface deviation should not exceed *20*mm of the design level to be milled in 10 m in preparation for overlay.

411.3.4 The milling is to expose frames of all manholes, water valves, survey monuments, power and telephone poles and water valves expansion joints in the bridges to the required depth of milling without damaging or disrupting to the integrity of such item or service.

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411.3.5 Dust produced shall be controlled to a level acceptable to the Engineer. Reference to be made to the Section 120 of Particular specification

411.3.6 When pavement removal is to be completed across the entire roadway width, it shall be completed to a uniform termination point in any given working day. For divided roadway, the interpretation of "entire roadway width" shall be that portion of the roadway facility associated with the movement of traffic in one direction. At the point of daily termination of removal operations, abrupt changes in the roadway surface profile shall be avoided. The longitudinal transition shall be a maximum of 25 mm vertically per metre.

411.3.7 In the event the entire roadway of pavement along a section has not been milled by the end of the working period, resulting in a vertical longitudinal face, the maximum deviation between the two surfaces should not exceed 40 mm.

411.3.8 Vertical cuts along a lip of gutter will be allowed at the end of the working period. Should the depth of cut be 75 mm or greater, proving hazardous to traffic, suitable signing and/or warning devices shall be provided by the Contractor in accordance with the section 103 of the standard specification.

411.3.9 Asphaltic concrete that cannot be removed by the milling equipment because of physical or geometrical restraints should be removed by Jack Hammering or other methods suitable to the Engineer.

411.3.10 All milled material shall be loaded directly to trucks from the milling machine or from the windrow if approved by the Engineer, and hauled to the designated stockpile site.

411.3.11 The milling equipment shall be operated and maintained in such a manner that tearing and breaking out of the underlying and adjacent material is minimized.

411.3.12 The resultant milled roadway surface shall be swept clean immediately after the removal of the milled material, and in no case should the sweeping operation be more than 100 metres behind the milling operation.

411.3.13 Any distress of the newly milled surface caused by the milling which may constitute a driving or cycling hazard, shall be promptly repaired to the satisfaction of the Engineer.

411.3.14 The Contractor shall at all times minimize contamination of the milled material with granular or deleterious material.

411.3.15 The contractor shall on his own expense, promptly repair any localized areas of distress in the milled surface that may present a hazard to traffic.

411.3.16 In the event of rain or other inclement weather, the Contractor shall suspend cold milling operations. The Contractor shall make necessary allowances for drainage of water that may pond in areas where the milled sections have not been paved.

411.3.17The Contractor shall not use cold milling machines to correct the shape, level or ride quality of the surface of Concrete Structures unless specified or directed by the Engineer. In the event that the cutting teeth contact the cement concrete, the Contractor shall immediately

- Halt forward progress of the cold milling machine.
- Notify the Engineer of the incident, providing details of the cause and the proposed course of action.
- Repair any fault in the machine and readjust settings and controls.

411.4 Stockpiling Site

411.4.1 The location of the stockpile within the site shall be selected to assure that positive surface drainage exists away from the stockpile. Erosion and sedimentation control devices to be provided as per the environmental legislative requirements.

411.4.2 The area upon which the stockpile is to be constructed shall be stripped of all clay loam, organic material and other soil as directed by the Engineer.

411.4.3 A stockpile shall be constructed on a firm base after the removals and disposal of the vegetation and topsoil The stockpile base layer shall be of such dimensions as to accommodate the maximum quantity of Milling Waste (asphaltic pavement) which will exist in the stockpile.

411.4.4 All milled material shall be stockpiled in such a manner that no equipment is allowed to operate on the stockpile itself. The milled material shall not be compacted after placement into the stockpile. The contractor shall be responsible for providing machinery that will maintain an efficient stockpile.

411.4.5 The maximum permissible height to which the milled material may be stockpiled is 3 metres, and stockpiling equipment shall operate so as to create as small a total area as possible. When mechanical equipment is used to facilitate the construction of an efficient stockpile such as a front end loader, the free fall distance shall not exceed two (2) metres.

411.4.5 The material produced as a result of cold milling shall be defined as Milling Waste (asphaltic pavement) The RDA will retain the ownership of the Milling Waste (asphaltic pavement) and the contractor shall haul the material to the designated location.

411.5 Sampling and Testing

411.5.1 General

Sampling and testing will only be required if Milling Waste is to be used for the production of asphalt concrete pavement or stockpiled for the RDA.

The Consultant shall have access to the Work at all times for taking samples. The Contractor shall provide, at his own expense, sampling stands, sampling devices and other facilities which the Consultant may require to safely obtain representative samples of the item being produced.

411.5.2 Test Methods

tem	Description of the test	Test methods
01	Extraction, Milling Waste	ASTM D 2172
02	Sieve Analysis , Milling Waste	ASTM D 2172

411.5.3 Quality Control Testing Requirements

Description of testing	Test methods	Minimum frequency
Sampling Mixes	ASTM D 3665	One per 1000 tonnes
Milling Waste Sieve Analysis	ASTM C 136	One per 1000 tonnes
Milling Waste Asphalt Content (Extraction)	ASTM D 2172	One per 1000 tonnes
Extraction Sieve Analysis	ASTM D 2172	One per extraction test

411.6 Measurement and Payment

a. Measurement

411.6.1 Work shall be measured by the square metre of surface area milled to a specified depth.

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Reformat the clause numbers below

1.6.2 Asphalt milling shall be paid for at the tendered unit price which shall be full compensation for all labour, tools, materials and equipment necessary to complete the work, including all other work necessary or incidental thereto for which separate payment is not provided elsewhere.

1.6.3 Payment by the square meter will be for an average cut of 25 mm, 26 -50 mm and above 51.mm shall be full compensation as listed in 1.5.1.

1.6.4 Surcharge for the removal of asphalt concrete in the vicinity of objects by other means without damaging to the object will be paid in square meters of the area of asphalt *removed.*

b. Payment

Pay Item	Description	Pay Unit
411(1)	Surface area milled to 25mm depth	Sq.m
411(2)	Surface area milled to 26-50 mm depth	Sq.m
411(3)	Surface area milled above to 51 mm depth	Sq.m
411(4)	Surcharge for the removal of asphalt concrete other than milling in the vicinity of the objects	Sq.m

501 PRIME COAT

501.2 Materials

d. Aftercare *(Delete the first para and substitute the following)*

Following the prime coat application, the primed, unblinded surface shall be allowed to cure for a minimum of 24 hours without being disturbed so as to allow the prime coat to penetrate the surface fully, unless full penetration and curing has taken place in the opinion of the Engineer in a shorter period. If after 24 hours the prime coat has not sufficiently cured to permit trafficking without being picked up, and the Contractor wishes to open the section to traffic, the Engineer shall either instruct that the area be left for a further period until the prime coat has fully penetrated and aired to allow traffic to pass or permit the Contractor to

place mineral aggregate for blinding applied at a rate of 250 square metre per one cubic metre of mineral aggregate and in the places instructed to blot up the excess bitumen.

e. Quality Assurance *(Detete the sub section and substitute the following)*

Samples of the bituminous material that the Contractor proposes to use, together with a statement as to its source and character shall be submitted and approved before use of such material. The Contractor shall require the manufacturer or producer of the material to furnish material subject to this and all other pertinent requirements. Only satisfactory materials, so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish vendor's certified test reports for each consignment of bituminous material supplied. The reports shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's reports shall not be interpreted as basis for final acceptance. All such test reports shall be subject to verification by testing samples of materials received.

Control of the quality of materials and work shall be exercised in accordance with Section 1602 herein.

501.4 Measurement and Payment *(Delete the entire sub section and substitute the following)*

a. Measurement

The surface application shall be measured in Sq m of work completed and accepted. Surface measurement shall be based on the width and length of the surface area as approved by the Engineer.

In case of extra application of emulsified bitumen as directed by Engineer, the additional quantity due to increased rate of application shall be measured.

b. Payment

Payment will be made for at the Contract unit rate priced by the Contractor and shall include full compensation for providing all materials, mixing where required, transporting, application, labour, equipment and incidentals to complete the prime coat as specified.

Only additional quantity of binder will be considered for payment where the rate of application is varied

Pay Item	Description	Pay Unit

501(2) Bituminous prime coat using MC-30 over DGAB surface

At 1 litre/sq.m litre

506 ASPHALTIC CONCRETE SURFACING

506.1 Description *(Delete second para and substitute the following)*

The Asphalt concrete surfacing shall consist of Binder course and Wearing course or wearing course only to the specified individual thicknesses of each layer.

506.2 Materials *(Add the following text at the end of last para of sub section (b))*

If significant changes occur to the aggregate grading during crushing and screening this will immediately effect the grading of the asphaltic concrete mix produced by the asphalt plant rendering it out of compliance with the approved job mix formula. Therefore the Contractor shall take immediate steps to rectify the irregularity in aggregate production and, if such occurs, submit a new job mix formula based on the changed aggregate grading for the approval of the Engineer.

506.3 Mix Requirements

a. Combined Grading of Aggregate and Binder Content *(Delete sub section and substitute the following)*

The grading requirements for the combined aggregate and the binder content shall be as given in Table 506.1 for Binder Course and Wearing Course. The selection of the optimum mix shall be subjected to the approval of the Engineer.

The sieve sizes used herein are of ASTM designation. However equivalent BS sizes as given in Table 107-1 of Section 107 may be used with the prior approval of the Engineer.

Mix Classification	Percentage passing sieve size	
	Binder Course	Wearing course

Compacted thickness in mm Max / Min	75 / 35	75 / 40
Sieve Size (mm)		
25.0	100	100
19.0	88 – 100	93 – 100
12.5	-	-
9.5	54 – 80	59 – 94
4.75	34 – 56	38 – 69
2.36	21 – 38	25 – 48
1.18	15 – 33	20 - 40
0.60	10 – 26	15 - 32
0.30	06 – 20	10 – 23
0.15	03 – 13	4 - 15
0.075	01 – 17	3 – 12
Percentage binder content by total weight of mix	3.5 – 5.0	4.5 – 6.0

***Table 506.1*: Aggregate Grading, Binder Content and Thickness Requirements for Binder Course and Wearing Course**

506.4 Job Mix Formula

Table 506 – 3 – Permissible Variations from Job Mix Formula.
Delete the statement "Binder content percent by weight of total mix ±0.3%" and substitute by "Binder content percent by weight of total mix +0.3%".

506.5 Construction Requirements *(Delete the bullet (i) of this sub section and substitute the following)*

i. **Surface Regularity**

Surface regularity shall be in accordance with Table 1601.1 herein.
i. Temporary Ramps and accessesTemporary ramps that are constructed for the safe trafficking of the work, must be constructed by placement of asphalt complying with this Specification as appropriate for the application, or by milling of existing or new asphalt. The length and grade of temporary ramps must be equivalent to those specified for treatment at edges and structures described in Section 411.

ii **Tie-ins to existing pavement**

Construct permanent tie-ins to existing pavement by placement of asphalt complying with this Specification.

iii. Goefabric / Geotextile

The Geotextile / Geofabric to be used over the existing pavement where exhibits block cracking or as specified elsewhere in the Specifications or as shown on the drawing or as instructed by the Engineer, shall be non –woven, polypropylene/ polyester/ polyethylene fibers thermally bounded type. The material shall be such that it has adequate tensile strength and sliding resistance to prevent reflecting of block cracks through the proposed asphalt overlay. The characteristic of the fabric in accordance with the relevant testing procedure shall be as follows:

Table 506-6 Geofabric General Properties

Property	Range	Value	Test
Unit weight	Not less than	245 gm/m2	ASTMD 3776
Thickness	Minimum	2.3mm	ASTMD 1777
Tensile Strength	Not less than	14.9kN/m	ASTMD 4595
Puncture	Not less than	600N	ASTMD 4833

Additional properties as a Paving fabric (Reinforcement)

Melting Point	Not less than	150^{o} C	ASTMD 276

The Contractor shall verify the suitability of the material to meet te specified requirements and forward the manufacturer's / supplier's certificate of conformity to the Engineer for approval prior to the provision of the material incorporation into the Works.

506.6 Measurement and Payment *(Delete the sub section and substitute followings)*

a. Measurement

Asphalt Concrete in wearing course / Binder course:

Shall be measured by square metres of mix furnished, spread, compacted, completed, tied-in and accepted. Measurement of the asphalt laid and compacted shall be of the area and thickness as shown on the Drawings, described in the Specifications or instructed by the Engineer.

Thickness of asphalt concrete wearing course shall be determined by average calliper

measurement of cores, rounded upwards to the nearest mm.

Paved sections to be measured separately shall consist of each 300-metre section in each traffic lane. The last section in each traffic lane shall be 300 metre plus the fractional part of 300 metres remaining. Other areas such as intersections, entrances, crossovers, ramps, etc. shall be measured as one section and the thickness of each shall be determined separately. Small irregular unit areas may be included as part of another section.

One core shall be taken from each section by the Contractor at approved locations and in the presence of the Engineer. The measurement of the core from any paved section shall not be less than the thickness from the specified thickness, the core will be deemed to be of the specified thickness as shown on the Drawings.

The Contractor shall construct all at his own expense, a wearing course overlay, if practicable in the judgment of the Engineer, when there is any discrepancy. Overlay shall be a minimum of 40 mm compacted thickness and to the specified standard of the course it is overlaying.

Asphalt Concrete in Binder / Correction Course:

Measurement of the asphalt laid and compacted shall be within the tolerances specified in Section 1601 herein and based upon the lines, levels, thicknesses and areas shown on the Drawings or as instructed by the Engineer.

Crack and Joint Sealing

Measurement of the sealing of Longitudinal and transverse cracks and joints include cleaning. labour, machinery and traffic, safety and environmental control measures as required in the specification.

Laying of Geofabric

Measurement of the fabric supply and laid shall be measured in plan area of the surface to be covered with the fabric. The work shall be inclusive of over lapping as per the manufactures specification or minimum of 500mm which is greater. Bituminous tack coat (CRS1) at the rate of 0.8 L/Sq.m is required to be applied over the existing surface, then lay the Geofabric and leave it to dry prior to the application of binder course. Necessary precautions to be taken to avoid picking off the fabric by the wheels of paving machine or by the reversing trucks.

b. Payment

Payment for asphalt surfacing will be made at the Contract unit rate for the item as measured above. The price shall be full compensation for furnishing all materials, for mixing and placing of the mixed material and for providing all plant, machinery, equipment, tools, labour and incidentals necessary to complete the work to the Specification.

Unit rate for the payment of joint and crack sealing shall be in Linear meters of the length of

the crack / joint sealed.

Unit rate for the geofabric shall be in Square Meters to be paid for the net covered area. Application of tack coat shall be paid under the pay item 502 (1)

Pay Item	Description	Pay Unit
506(1a)	Asphalt Concrete in Wearing Course compacted thickness of 40mm	Sq.m
506(1b)	Asphalt Concrete in Wearing Course compacted thickness of 60mm	Sq.m
506(1c)	Asphalt Concrete in Binder Course compacted thickness of 60mm	Sq.m
506(2)	Asphalt Concrete surfacing for regulating (correction) course	MT
506(3)	Supply and laying of Geofabric (SAMI)	Sq.m

506A POLYMER MODIFIED ASPHALTIC CONCRETE SURFACING **(INSERT THIS NEW SECTION AFTER SECTION 506)**

506A.1 Description

This work shall consist of furnishing materials, mixing at a central mixing plant, and spreading and compacting asphalt concrete Surfacing on an approved Base course as shown on the Drawings and as instructed by the Engineer.

The polymer modified asphalt concrete Surfacing shall consist of the wearing course only.

This work shall be carried out in accordance with these Specifications and with the lines, levels, grades, dimensions and Cross-sections as shown on the Drawings and as directed by the Engineer.

506A.2 Materials

Materials used shall conform to the requirements of the following, unless otherwise specified: -

(a) The bitumen binder shall be **plastomer modified bitumen binder type P40-60 and shall confirm to the table given below.**

Table-a Requirements of plastomer modified Bitumen

Binder Type	**P40/60**	**Test method**
penetration	**40-60**	**ASTM D5**
Softening Point(R&B)0C (min)	**65**	**ASTM D 36**
Flash Point 0C(min)	**230**	**ASTM D 92**
Dynamic Viscosity@150'C (Pa.S)(max)	**0.9**	**ASTM D 2171**
Seperation tendency Difference in Softening Point(R&B)	**4**	**ASTM D 7173**
Polymer content	**Report**	**ASTM D 5546**

Each consignment of bitumen delivered to site must be accompanied by a certificate of testing, as per test method given in table above from the supplier. Any extra test instructed by the Engineer whose result proves that the material is out of specification will be carried out at no extra cost.

(b) Aggregate - coarse aggregate

The coarse aggregate shall be of nominal maximum size 20 mm and fine aggregate shall conform to the general requirements of Sub section 1701.3(a)

When the coarse and fine aggregate is combined, along with filler where required, the combined grading requirements shall be as given in Sub section 506.3 for Binder course & wearing Course Type 3.

The Contractor shall control the production of coarse aggregate, fine aggregate and filler for asphalt concrete at the crushing and screening plant such that the grading of aggregates in stockpiles shall be uniform and consistent throughout the period of asphalt production and paving operations. Regular sampling of stockpiles by the Contractor shall be carried out to demonstrate the

uniformity and consistency of grading of the aggregate production to the satisfaction of the Engineer.

(d) Filler, where separately used in the mix, shall be chemically active cement and hydrated lime and chemically inert limestone dust and crusher fines or other non-plastic inert materials to section 1706.

506A.3 Mix Requirements

(a) Combined Grading of Aggregate and Binder Content

The grading requirements for the combined aggregate and the binder content shall be as given in Table 506A-1 for the Binder course & wearing courses type 3.

Table 506A-1 - Aggregate grading, binder content and thickness requirements for Binder course and wearing courses

Mix classification	**Wearing Course Type-3**
Compacted Thickness mm - Max. Min.	**75** **40**
Sieve Size mm/μm	
28	**100**
20	**93 – 100**
14	**-**
10	**59 – 94**
5	**38 – 69**
2.36	**25 – 48**
1.18	**20 – 40**
600	**15 – 32**
300	**10 – 23**
150	**4 – 15**
75	**3 – 12**

Percentage binder content by total weight of mix	**5.0 – 6.5 with tolerance of 0.3%**

(b) Mix Characteristics

The mix characteristics as determined by the Marshall Mix Designs procedure shall be as given in Table 506A-2(a) and 506A-2(b) for Binder courses and for wearing courses respectively for low, medium or high traffic depending on whether the cumulative number of standard axles, for the design life of the Surfacing, is less than 10,000 or between 10,000 and 1,000,000 or greater than 1,000,000 respectively.

In the determination of the above, laboratory samples shall be prepared and tested as specified in Sub section 1802.4(a).

The wearing course & Binder course mix shall be determined by using Table 506A-2(b) and 506A-2(a) - High Traffic category, under otherwise stated in the Contract Documents or according to the Traffic category.

Table 506A-2(a) – Binder Courses

No	Description	Low Traffic	Medium Traffic	High Traffic
1.	Marshall stability in kN	Not less than 3.33	Not less than 5.34	Not less than **12.0**
2.	Marshall flow (0.25mm)	8 to 20	8 to 18	8 to 16
3.	Air voids in mix percent	3 to 7	3 to 7	3 to 7
4.	Voids in mineral aggregate VMA (%)			
	(i) for design VIM of 4%	Not less than 13	Not less than 13	Not less than 13
	(ii) for design VIM of 5%	Not less than 14	Not less than 14	Not less than 14

Table 506A-2 (b) – Wearing Courses

No	Description	Low Traffic	Medium Traffic	High Traffic
1.	Marshall stability in kN	Not less than 3.33	Not less than 5.34	Not less than **12.0**
2.	Marshall flow (0.25mm)	8 to 20	8 to 18	8 to 16
3.	Air voids in total mix (VIM)	3 to 5	3 to 5	3 to 5
4.	(percent) Voids in mineral aggregate VMA (Percent) For design VIM of 4%	**Not less than 14**	**Not less than 14**	**Not less than 14**

The asphalt contents on the "Wet" or right-hand increasing side of the VMA curve shall be avoided

The air voids in total mix at refusal density as per TRL UK Overseas Road Notes 19 & 31 for High Traffic and severe sites (slow moving heavy traffic) shall not be less than 2.5 and 3% respectively.

506A.4 Job Mix Formula

The Contractor shall submit to the Engineer in writing at least two weeks before the start of the work, the job mix formula proposed to be used by him for the work based on trial mix designs carried out in accordance with "Mix Design Methods for Asphalt Concrete (MS - 2)" published by the American Asphalt Institute or similar approved method which shall give the following details: -

(i) A single percentage of aggregate passing each specified test sieve.

(ii) A single percentage of binder content by total weight of total mix.

(iii) A single temperature at which the mix is emptied from the mixer which shall not be less than 145 degrees C.

(iv) A single temperature at which the mix is to be delivered to the paver on the road which shall not be less than 135 degrees C.

In addition, the Contractor shall give the sources, locations of all materials and the details of the mix design based on requirements given in Table 506-2(a) and (b).

The Engineer shall check the proposed Job Mix Formula for compliance with the Specification and shall approve the same when compliance is achieved.

All mixes produced shall conform to the job mix formula approved by the Engineer within the ranges of tolerances given in Table 506-4.

Table 506A-3 - Job Mix Tolerance for Single Test

Aggregate Passing 14 mm and larger	± 8%
Aggregate Passing 10 mm and 5 mm sieves	± 7%
Aggregate Passing 2.36 mm and 1.18 mm sieves	± 6%
Aggregate Passing 600 μm and 300 μm sieves	± 5%
Aggregate Passing 150 μm sieves	± 4%
Aggregate Passing 75 μm sieves	± 3%
Binder content percent by weight of total mix	**+0.3%/-0.1%**
Temperature of mixture when emptied from mixer	± 10 ^{0}C
Temperature of mixture when delivered on road	± 10 ^{0}C

If a change in the materials or source of materials is proposed, or a change in the grading of the coarse and fine aggregate or filler occurs a new job mix formula shall be submitted and approved before the mix containing the new material is delivered to site.

When unsatisfactory results or changed conditions make it necessary, the Contractor, if required, shall submit a new job mix formula to the Engineer for approval.

506A.5 Construction Requirements

(a) Preparation of Existing Surface

(i) Where asphalt concrete Surfacing is laid over newly constructed aggregate Bases with total asphalt concrete thickness is more than 100mm, asphalt can be laid directly over the un-primed surface of the aggregate Base course. Prior to laying of the asphalt concrete surfacing, the surface shall be cleaned of extraneous matter and dust as per paragraph 1 of Sub section 501.3(b) and shall be free of moisture and shall not be opened for traffic.

If the total thickness of asphalt concrete is less than 100mm, the newly constructed aggregate Base surfaces shall be cleaned of extraneous matter and dust and shall be primed as per Section 501.

(ii) Where asphalt concrete Surfacing are laid on existing bituminous Pavements, the surfaces of such Pavements shall be corrected to the required width and profile as directed by the Engineer.

On the corrected surfaces, a tack shall be applied as per Section 502.

(iii) Where the mix is laid over cement concrete Pavements or bridge decks, joints and cracks shall be cleaned and filled with bituminous material as approved, and any unevenness of the surface shall be corrected as required. A tack coat as per Section 502 shall then be applied to the surface.

(b) Weather Limitations

The bituminous mix shall not be laid during rainy weather or when the surface on which it is laid is damp or wet.

(c) Limitations due to Lack of Equipment Etc.

No work shall be carried out when there is insufficient equipment for hauling, spreading, compaction and finishing or insufficient labour to ensure progress at a rate compatible with the output of the mixing plant to ensure a continuous paving operation.

(d) Thickness of Compacted Mix

The maximum and minimum thickness of any compacted layer shall be as given in Table 506-1.

Tolerances for the wearing coarse thickness shall be in accordance with Section 1601.

(e) Mixing Plant and the Preparation of Mix

An approved mixing plant of the automatic batch type shall be used for the preparation of the mix, which shall have the capacity sufficient to supply the paver continuously. The asphalt mixing plant shall generally comply with and be operated in accordance with the "Asphalt Plant Manual (MS-3) "published by the American Asphalt Institute.

The mixer shall be capable of accurately batching the aggregates, filler and binder and mixing the same thoroughly so that the mixed material on discharge from the mixer is uniform in composition and that all aggregate particles are completely coated.

Batch type plants, shall be equipped with suitable means for accurately weighing of each bin size of aggregate and the filler. The scales of such weighing mechanisms shall be calibrated at least once a month or at the frequencies as instructed by the Engineer using standard weights. The Contractor shall always have at hand sufficient weights for such calibration.

The mixing plant shall be capable of heating the aggregate and the binder separately to the appropriate temperatures.

The binder and mineral aggregate shall be heated separately to temperatures between 140 and 170 degrees C, and 150 and 170 degrees C respectively. The materials shall be mixed at temperatures within absolute limits of 145 and 170 degrees C, even allowing for tolerances.

The plant shall, if situated in urban areas or required by the relevant authorities be equipped with an approved dust collector so constructed as to waste or return uniformly to the elevator all or any part of the material collected.

The mixing plant shall be capable of loading the mix into transport vehicles in such a manner that segregation does not occur.

In addition, the plant shall be provided with the following: -

(i) Covered protected ladders or stairways with secure hand rails in adequate number which shall be placed at all points required for accessibility to all operations.

(ii) Covering devices for pulleys, belts and drive mechanisms and other moving parts.

(iii) Ample and unobstructed space on the mixing platform.

(iv) A clear and unobstructed passage at all times in and around the tipper loading space which shall be kept free from drippings from the mixing platform.

(v) Insulated flexible pipe connections to carry hot bitumen from the heated storage tanks to the mixer.

(f) Transport of Mix

The mix shall be transported from the mixing plant to the point of use in suitable purpose made tipping trucks.

The trucks shall be in good mechanical condition at all times. They shall have clean and smooth metal beds, that have been sprayed with water or lime solution or any other detergent solution approved by the Engineer, to prevent the mix from adhering to the beds. The amount of sprayed fluid shall however be kept to a practical minimum. All precautions shall be taken to avoid segregation of mixed materials and to ensure that they do not become contaminated with dust or foreign matter.

Any truck causing excessive segregation of bituminous material by its spring suspension or other contributing factors, or that shows oil leaks in detrimental amounts or that causes undue delays shall be removed from the Works until such conditions are corrected.

Each load shall be covered with a properly fastened canvas or other suitable material of such size as to protect the mix from the weather or dust. In order that the mix shall be delivered to the Site within the specified temperature range, during cold weather or during long hauls, properly fastened insulating covers shall be used.

Loading and transporting shall be coordinated such that spreading, compacting and finishing shall be completed during daylight hours. Working during darkness will not be permitted, unless adequate illumination, as approved by the Engineer is provided by the Contractor.

The mix shall not be delivered to the paver at the site at a temperature below 135 degrees Centigrade.

(g) Paving Plant and Laying of the Mix

The mix shall be laid at temperatures not below 135^0C by means of approved mechanical self-powered pavers. They shall be capable of spreading, finishing and providing initial compaction to the mix so that, the Surfacing can be finished to the required lines, grades, levels, dimensions and Cross-sections intended, either over the entire width or over such other partial widths as may be practicable.

The pavers shall be equipped with receiving hoppers and spreading screws of the reversing type to place the mix evenly in front of adjustable steering devices and shall have reverse as well as forward travelling speeds. They shall also be furnished with a vibrating screed (levelling) unit equipped with suitable burners or heaters and tamping bars or vibration attachments all operating in accordance with the manufactures instructions. A supporting shuttle attachment shall be provided for unloading Asphalt Concrete from trucks as well as for smooth feeding of Asphalt Concrete to the receiving hoppers.

The pavers shall be able to confine the edges of the Pavement to true lines without the use of stationary side forms. The equipment shall include blending or joint levelling devices for smoothing and adjusting longitudinal joints between lanes. The assembly shall be adjustable to achieve the Cross-sectional shape and level tolerances prescribed and shall be so designed and operated as to place the required thickness and weight per Sq.m of material.

A fully trained and experienced operator shall be in direct charge of the paver at all times. The pavers shall be operated so as to avoid dragging of the material.

If the asphalt is to be laid on a Bitumen Base surface which is 7 days old after laying and is not used by any form of traffic, no tack coat is required to be applied before laying asphalt if not otherwise instructed by the Engineer. If the Bitumen Bound Base surface is older than the time specified above and/or was opened for traffic, a tack coat shall be evenly applied, as specified in

Section 502, at a rate of 0.25 to 0.50 l/m^2 or at a rate determined by the Engineer. Payment for the tack coat shall be made under the pay items in Section 502.

The bituminous mix, after spreading, finishing and initial compaction by the paver, shall have a smooth surface free of irregularities caused by dragging, tearing or gouging.

During construction, if it is seen that the paver in operation leaves on the Surfacing tracks or indented areas or other objectionable irregularities or segregation of mix that cannot be satisfactorily corrected by normal operations, the use of such a paver shall be discontinued forthwith and another satisfactory paver shall be provided by the Contractor.

In narrow widths and in restricted areas where the paver cannot operate, the mix may be manually laid, in which case, care shall be taken to avoid segregation. Manually laid strips shall be rolled at the same time as the paver laid work and allowance shall be made for extra compaction of these strips using appropriate approved purpose made compaction equipment. Any defects in the laid surface shall immediately be rectified before rolling commences and there shall be no unnecessary scattering back by hand of material on paver laid work.

(h) Compaction Procedure

Immediately after the mix has been spread and struck off, the surface shall be checked and any irregularities adjusted. Rolling shall commence as soon as the material will support the roller without undue displacement or cracking. The mix shall then be thoroughly and uniformly compacted by rolling, according to the sequence of rolling as given below: -

i. Transverse joints

ii. Longitudinal joints, where applicable

iii. Outside edge

iv. Initial or breakdown rolling

v. Second or intermediate rolling

vi. Finish or final rolling

Normally the first rolling of all joints and edges and the initial or breakdown rolling, shall all be done with static weight tandem or vibratory steel wheeled tandem rollers and the second or intermediate rolling with pneumatic tired rollers. Use of any other rollers for the above purposes shall be with the prior approval of the Engineer.

During initial or breakdown rolling, the direction of travel of the roller shall be such that the powered or driving wheel passes over the un-compacted mix first, before the driven wheel. The second intermediate rolling shall follow the initial or breakdown rolling as closely as possible while the bituminous mix is still plastic and at a temperature that will result in maximum density. The final rolling shall be accomplished with static weight tandems or vibratory tandems (without vibration) while the material is still warm enough for removal of roller marks.

In general, the type of roller or roller combination to be used shall be proposed by the Contractor for the approval of the Engineer prior to the commencement of work and the rollers shall satisfy the requirements given in 506.5(i).

The speed of the rollers shall not exceed the limits given in table 506-5 and shall be at all times be slow enough to avoid displacement of the hot mix.

Table 506A-5 – Number of roller passes and the speed of the roller

Type of roller	Speed (km/hr)		
	Breakdown	Intermediate	Finish
Steel Wheeled Rollers	3	5	5
Pneumatic Tired Rollers	-	5	8
Vibratory Rollers	5	5	-

During stages of initial, intermediate and final rolling, rolling shall commence at the lower side of the spread and progress towards the higher side parallel to the centre line of the Pavement.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by either removing or by adding fresh material. The rolling shall be continued till the entire surface has been compacted adequately and the roller marks have been eliminated. Each pass of the roller shall uniformly overlap not less than one half of the proceeding pass. The roller wheels shall be kept damp if required to avoid the material sticking to the wheels and being picked up. However, the quantity of water used for this purpose shall be the minimum required and shall not form puddles on the area under compaction.

When using a vibratory roller for the compaction of a Surfacing the vibration shall be turned off before the roller stops when reversing direction, and turned on after it starts in the new direction.

Vibratory rollers shall not be used for Surfacing of thickness less than 50mm, unless otherwise approved by the Engineer.

The breakdown and the intermediate rolling shall be carried out at temperatures not less than 135 degrees C and **120** degrees C respectively.

The final rolling shall be completed before the temperature of the mix falls below **100**degrees C.

Rollers shall not be allowed to stand on newly laid material until 6 hours has elapsed after completion of the compaction of the Surfacing.

When the bituminous mix is spread in areas that are inaccessible to rollers such as places near kerbs and manholes etc., compaction shall be achieved by hand tampers, mechanical tampers, or small vibrating plate compactors to the approval of the Engineer. In such locations spreading and compacting shall be carried out without any delay before the mix cools below a minimum of **125**-degree C.

The density of all samples taken from the compacted surface course shall not be less than 97% of the Marshall Density at the point appropriate to the locations**.** The sample densities shall be determined as given in Sub section 1802.4(c) by cutting cores of minimum diameter 100mm.

Transfer of refusal density mix design to compaction trials

Placement Trial

Prior to commencing work, the plant and personnel proposed for use on the work must be subjected to a placement trial.

Each nominated mix must be subjected to a separate placement trial. Each placement trial must be located remote from the work, unless otherwise approved by the Engineer. The size of the placement trial must be limited to one production shift. Design the trial to implement all the conditions and demonstrate conformity to the Specification in respect of:

Homogeneity, insitu air voids, course thickness, course position, joint quality and surface regularity.

In the event of a nonconformity in the placement trial, or when the Engineer determines that a previous trial is not representative of the materials, asphalt mix proportions, temperature, plant, rate of output and/or method of placement, a new trial must be implemented.

A minimum of three trial lengths shall be constructed with bitumen contents at the laboratory optimum for refusal density and at 0.5% above and at 0.5% below the optimum.

A minimum of 93% and a mean value of 95% of the standard Percentage Refusal Density shall be taken as the density on completion of compaction of the layer.

If the mix is laid to refusal density the compacted layer thickness shall be 2.5 to 4 times the maximum aggregate particle size to obtain satisfactory workability.

(j) Requirements of Compacting Equipment

(i) General

Generally, with each paver, a minimum of 3 rollers shall be provided by the Contractor. On small projects involving a total of less than 5000 tonnes of material the minimum requirements shall be two tandem rollers.

All rollers shall be self-propelled, capable of being reversed without backlash and equipped with power steering, dual controls allowing operation from either the right or left side. They shall have water tanks with sprinkler systems to ensure even wetting of wheels or tires.

The rolling surface of the wheels of a steel wheel roller shall be checked for wear. If grooves or pits have been formed on the rolling surface, the roller shall not be used on the work area.

Each roller shall have a calibration chart showing the relationship between depth of ballast and weight and giving the tare weight of the roller. Each roller shall be in a good condition and shall be operated by a competent and experienced driver.

(ii) Steel Wheeled Rollers

Steel wheeled rollers (tandem) shall weigh not less than 8 metric tonnes. The minimum rolling pressure of the rear wheels of each three wheeled roller or at least one roll of each tandem roller shall be 35 kN/m of roller width.

(iii) Pneumatic Tired Rollers

Pneumatic tired rollers shall have not less than seven wheels (3 wheels on the front axle and four on the rear) fitted with smooth tread compactor tires, of equal size and construction, capable of operating at inflated pressures up to 850 kN/square meters. The wheels shall be able to move up and down independently of one another. Wheels shall be equally spaced along both axle lines and arranged so that tires on one axle line tract falls midway between those on the other with an overlap. The tires shall be kept inflated to the manufacturers specified operating pressures with variation not exceeding 36 KN/square meters. Means shall be provided for checking and adjusting the tire pressures on the job at all times. For each size and type of tire used, each roller shall have charts or tabulations showing the relationship between wheel load, inflation pressure and tire contact pressure, width and area. Each roller shall be equipped with means of adjusting its total weight by ballasting so that the load per wheel can be varied from 1,500 to 2,500 kilograms. In operation the tire inflation pressure and the wheel load shall be adjusted, as required by the Engineer, to meet the requirements of each particular application in general the compaction of any course with a pneumatic tired roller shall be accomplished with contact pressures as high as the material will support.

(iv) Vibratory Rollers

Generally Vibratory rollers shall be equipped with automatic vibration control which cuts out the vibratory system before the machine comes to a halt.

The minimum operating weight of the roller shall be 6 tonnes and minimum drum width 0.9 m, the minimum linear drum applied force 44 KN/m and the minimum frequency of vibration 33 Hz (2000 cycles/min).

(k) Joints

Both longitudinal and transverse joints in successive courses shall be staggered so as not to be one above the other. As far as practicable, longitudinal joints shall be arranged so that the joints in the top course shall be at the location of the line dividing the traffic lanes, and the transverse joints shall be staggered at a minimum of 250 mm and be straight.

Longitudinal and transverse joints shall be made in a careful manner so that well bonded sealed joints are provided for the full depth of the course. No mixture shall be placed against previously rolled material unless the edge is trimmed vertically to line and the vertical edge applied with a thin coating of binder just before additional mix is placed against the previously compacted material.

Paving shall be as nearly continuous as possible and rollers shall pass over the unprotected end of freshly laid mix only when authorised by the Engineer. In all such cases provision shall be made for a properly bonded and sealed joint with the new surface for the full depth of the course as specified above. Before placing mix against them, all contact surfaces of kerbs, gutters, manholes, etc., shall be given a thin uniform coating of hot bitumen and the joints between these structures and the surface mix shall be effectively sealed by the subsequent spreading, finishing and compaction operations.

(l) Miscellaneous Requirements

The Contractor shall provide suitable means for keeping all tools clean and free from accumulations of bituminous material. He shall provide and have ready for use at all times enough tarpaulins or covers, as may be directed by the Engineer, for use in any emergency such as rain, chilling wind, excessive dust or unavoidable delay, for the purpose of covering or protecting any material that may have been dumped and not spread. Generally, the hot mix shall be discharged directly from the asphalt delivery trucks into paver receiving hopper unless the Engineer approves dumping and spreading by hand in difficult areas not accessible by paver.

(m) Aftercare

Sections of the newly finished work shall be protected from traffic of any kind until the mix has sufficiently hardened. Also, traffic shall normally, not be permitted over newly laid surfaces at least for twelve hours after laying or the temperature of the newly laid Surfacing has achieved the ambient temperature.

In the event any Binder course is constructed initially the surface so formed shall be maintained in its finished condition until the surface course is placed thereon, and any damage caused shall be made good by the Contractor. If the damage could be attributed to the negligence of the Contractor, it shall be corrected at his own expense.

(n) Surface Finish and Quality Control

The Asphalt Concrete Surfacing shall be finished to the requirements given within this Section and in conformance with Section 1601.

The Control of the quality of materials and works shall be exercised in accordance with Section 1602.

(o) Surface Test of the Pavement

Within 14 days after completion of paving works for the wearing course, the roughness of the surface after final rolling shall be measured. For this purpose the contractor shall provide Multi-Purpose profile System (including all the necessary devices, hardware, software etc..) for the calculation of International Roughness Index (IRI) in accordance with – AASHTO PP37 or ASTM E950.Defective area on 0.1kilometer segments with IRI value greater than 2.4 m/km shall not be accepted and shall be rectified by the Contractor at his own cost. No separate payment will be made for compliance to this part of the Specification.

506A.6 Measurement and Payment

(a) Measurement

Asphalt Concrete Surfacing shall be measured by sq.m of mix furnished, spread, compacted, completed and accepted. Measurements shall be of the areas and thickness as shown on the Drawings, described in the Specification or instructed by the Engineer.

Deficiencies in thickness of the wearing course shall, unless an overlay is constructed at the Contractor's expense, result in a proportion only of the wearing course area being measured for payment. Proportions shall be determined in accordance with the thickness deficiencies and area proportions described below.

Thickness of asphalt concrete wearing course shall be determined by average calliper measurement of cores, rounded upwards to the nearest mm.

Paved sections to be measured separately shall consist of each 100 lin.m section in each traffic lane. The last section in each traffic lane shall be 100 m plus the fractional part of 100 m remaining. Other areas such as intersections, entrances, crossovers, ramps, etc. shall be measured a one section and the thickness of each shall be determined separately. Small irregular unit areas may be included as part of another section.

One core shall be taken from each section by the Contractor at approved locations and in the presence of the Engineer. When the measurement of the core from any paved section is not deficient by more than 5 mm from the specified thickness, the core will be deemed to be of the specified thickness as shown on the Drawings.

(b) Payment

Payment for asphalt concrete Surfacing and placement trials as nominated by the Engineer will be made at the Contract unit rate for the item as measured above. The price shall be full compensation for furnishing all materials, for mixing and placing of the mixed material and for providing all plant, machinery, equipment, tools, labour and incidentals necessary to complete the work to these Specifications.

The Pay Item and Pay Unit will be as follows:-

Pay Item	Description	Pay Unit
506A (1)	Polymer Modified Asphalt Concrete in Wearing Course compacted thickness of 50mm	Sq.m

701 ROADSIDE AND LEAD AWAY SURFACE DRAINS

701.1 Description *(Delete this sub-section and substitute the following)*

This work shall consist of:

(i) The construction of roadside and lead-away surface drains lined, and covered where required, to dimensions, grades and in positions shown on the Drawings or instructed by the Engineer.

(ii) Provision of built-up access to premises as shown on the Drawings or as directed by the Engineer.

The construction of built-up access to premises shall be done within the least possible time without causing much inconvenience to the owners of premises and the road users. Contractor should inform the owners of the premises well in advance that his intention to cut open the entrances or demolish the existing structure to replace with a new entrance structure. The Contractor shall provide temporary crossings over the cut open drains or demolition of existing structures as a temporary measure for the use of owners of premises and their vehicles.

701.4 Measurement and Payment

a. Measurement *(Delete first & fourth paras of this sub-section and substitute the following)*

The excavation for lined drains shall be measured and paid as provided in Section 302.

Precast reinforced concrete cover slabs shall be measured in Numbers which includes concreting, reinforcement, form work and any platform preparation. Also it includes

b. Payment *(Add this para at the end of this sub-section)*

Payment for Concrete cover slab shall be at the Contract unit rate and shall include full compensation for all labour, material, tools and incidentals necessary for casting, stacking, transporting, placing and incidentals necessary for completion of the work according to this Specification

(Delete the Pay Item 701(6) and substitute the following)

Pay Item	Description	Pay Unit
701(6)	Precast reinforced concrete cover slabs (State thickness, class and grade of concrete)	Sq.m
701(7)	Construction of leadaways as directed by the Engineer	PS

703 MANHOLES, CATCHPITS AND INLETS

703.5 Measurement and Payment

b. Payment

(Add following Pay items and pay unit)

Pay Item	Description	Pay Unit
703(6)	Supplying and fixing of strainers approximately sizes (600mm x 150mm) as per the drawings	No
703(7)	Supplying and laying 160mm, Diameter and type 600, PVC Pipe for Connecting Gully inlet to main manhole. as instructed by Engineer	Lm

707 PIPE CULVERTS

707.3 Construction Requirements

a. Excavation *(Add the following at the end of this sub-section)*

Where rock or other unyielding material is encountered it shall be removed below the foundation level for a depth of 300 mm, or 40 mm for each metre of fill over the top of the pipe whichever is greater, but not to exceed 0.75 of the inside diameter of the pipe.

Where the soil encountered at the designed grade is unstable, soft or spongy, such material under the pipe and for a width of 500 mm on each side of the pipe shall be removed to a depth instructed by the Engineer, and replaced by sand or other selected material as instructed by the Engineer to provide an adequate support for the pipe. When instructed by the Engineer, the Contractor shall construct a blinding layer of concrete to provide a suitable working floor.

b. Bedding of Pipes *(Delete the sub section and substitute the following)*

Construction of culverts shall begin at one end, the position of which shall be fixed as shown on the Drawings or as instructed by the Engineer. The end of the last whole unit, the top of which breaks through the fill slope, shall normally determine the position of the other end of the culvert. However, in the case of skew culverts or culverts with a cover less than 500 mm at the shoulder, the Engineer may instruct that the end unit be cut to the length and skew required.

Any units which deform or crack, or which are not constructed to the required lines, levels and grades, or which become displaced in the process of work or during the Defects Liability Period, shall be removed and replaced by the Contractor at his own expense.

Precast units shall be lifted and handled by means of approved lifting devices only. Lifting eyes shall be caulked with a suitable mortar after the units have been installed.

The Contractor shall exercise due care not to damage, overstress or displace any prefabricated culvert with his own traffic or compaction equipment and shall provide additional cover over the culverts to ensure that the culvert is adequately protected from construction equipment.

Where culverts are constructed on gradients exceeding 1:4 particular care shall be taken to protect excavations against storm water damage and the trenches shall be excavated to firm ground. The trenches shall be backfilled with selected gravel or concrete if it is necessary to over-excavate in order to obtain a firm floor.

After first completing the outlet structure, the culvert units shall be laid in the normal manner, starting from the lower end' and placing successive units firmly against each other to prevent subsequent movement. The lowest unit shall be securely cast into the outlet structure and thrust and anchor blocks shall be constructed as required according to the Drawings.

Backfilling of trenches or around the pipes shall begin at the lower end and be carried out in horizontal layers.

(i) Concrete Bedding *(Delete first para of this sub-section and substitute the following)*

The pipes shall be bedded in a continuous cradle of class C concrete having a minimum thickness of 0.25 times the external diameter of the pipe or 200 mm, whichever is greater. The screed shall be of Concrete Class C to a thickness of 50 mm. The concrete shall extend up to the sides of the pipes to a height of at least 10% the external diameter or 200 mm whichever is the greater. The minimum width of the cradle shall be the external diameter of the pipe plus 0.25 times the external diameter on either side and shall be constructed monolithically without horizontal construction joints. The cradle shall be such that the pipe can be seated fully in it and the pipe shall be laid on the concrete bedding the concrete has set.

707.8 Measurement & Payment

a. Measurement *(Delete this sub-section and substitute the following)*

The Pipes shall be measured as supplied, laid and jointed in metre length of single

row. No separate measurements shall be taken for ancillary works required in laying and jointing of concrete pipes. The trench excavation and backfill, concrete bedding, concrete around joints/connection to existing pipes, formwork, and steel reinforcement shall be measured separately. Measurement for excavation and backfill and construction of headwalls, wing walls, etc. shall be taken for payment under specified respective sections.

b Payment (Delete para (ii), Pay items & pay units and substitute the following

Pay Item	Description	Pay Unit
707(7) a	Supply and placing reinforced concrete Hume pipes 1200mm dia	Lm
707(7) b	Supply and placing reinforced concrete Hume pipes 900mm dia	Lm
707(7) c	Supply and placing reinforced concrete Hume pipes 600mm dia	Lm

803 PLANTING TREES, SHRUBS VINES ETC

803.1 Description *(Add followings at the end)*

Beautification work in centre median and shoulders shall be done as directed by the Engineer.

803.4 Measurement & payment

a. Measurement *(add following at the end)*

Beautification work shall be measured as Provisional Sum

b. **Payment** *(add following Pay Item and Pay unit)*

Pay Item	Description	Pay Unit
803(3)	Allow for beautification work as directed by the Engineer	PS

805 GABION WALLS AND METTRESS USING WIRE BASKETS

805.1 Description *(Delete the sub section entirely and substitute the following)*

This work shall consist of the construction of protection walls and mattreses to embankment slopes, canal banks and canal beds, using rock filled wire mesh baskets known as Gabions.

The gabion mattress shall be flexible, box/mattresses shape with galvanized steel wire mesh cages of rectangular sides, packed with rock and in constructing the walls/mattresses, as indicated in Drawings or as directed by the Engineer.

805.2 Materials *(Delete the sub section entirely and substitute the following)*

Materials used shall meet the requirements of the following unless otherwise specified.

a) Gabions shall be PVC coated galvanized steel wire woven into a not more than 82x122mm HEXAGONAL mesh, and strength should be not less than 47 KN/m or equivalent. Gabions longer than 1.5 m shall have partition panels at 1.0 m centers.
b) Broken rock for filling baskets shall be of sizes varying from about 100mm in minimum dimension to 150mm in maximum dimension, and they shall be hard and durable, free from weathered pieces and extraneous matter. The rock shall be reasonably well graded between the two limiting sizes.

805.3 Construction Requirements *(Delete the sub section entirely and substitute the following)*

The canal banks against which gabions are to be placed shall be suitable trimmed and the ground shall be leveled and compacted as required by the Engineer.

The baskets for the gabions shall be constructed to regular box shapes with rectangular sides of dimensions as shown on the drawings, and assembled and erected strictly in accordance with the manufacturer's instructions.

The baskets shall be constructed out of 2.7 mm or more dia. wire to BS 1052/1980 having a tensile strength not less than 380 N/mm^2, and not exceeding 500 N/mm^2 or equivalent, and shall be heavily (at least 275 gm/sq.m) hot dip galvanized to B.S. 443/1982 or equivalent. The wire shall be coated with 0.5 mm thick UV stabilized PVC which shall be extruded onto the wire to limit air moisture, contaminants, and the lime coming in contract with the steel in the event the PVC is penetrated by damage. After coating, the wire shall be woven with one and a half twists and edges shall be reinforced with heavier coated wire not less than 3.4 mm dia. Core diameter, 4.4 mm overall diameter (selvedge wire). Assembly shall be securely tied with PVC coated tie wire 2.2/3.2 mm, 5% of Gabion weight of the same specification as the mesh wire. All tolerances limit to be as per specified in BS 1052/1980. The product should be ISO 9002 certified or equivalent.

A certificate from a recognized independent testing authority confirming the offered Gabions possesses the above values. The report should separately show the values of each and every detail stated above.

The filling of baskets shall be carried out in-situ, unless otherwise directed. This requires that the empty baskets, open at the top, be positioned on the base or on top of the gabions, and in filled with the rock pieces in such a manner as to completely fill up the baskets leaving only

the minimum of voids prior to closing and securely tying the lid using wire of approved gauge. In building the walls, the gabions shall be placed with scattered joints, and they shall be tied together using strands of wire. In the event of this not being as the manufacturer's requirements, the manufacturer's requirements shall apply.

The space just behind the gabion walls shall be protected by a geotextile filter in accordance with given below. All work to be done in accordance with the drawings and directions of the Engineer.

805.3a Geotextile Filter Material *(Insert following sub section after 805.3 sub section)*

a) General
   The level of the water table reference to structure under construction such as roads, retaining walls, embankment etc., has to be limited to protect their stability.

   Drainage water will filter through the geotextile filter into the gabion box, and finally escape into the canal.
b) Materials

The geotextile filter cloth shall be of approved filter fabric composed of polyester, polypropylene, polyethylene, polyamide non-woven type or a combination of the above.

The Geotextile should be resistant to ultraviolet degradation and to biological and chemical environment normally found in soil.

Further, the offer Geotextile should conform to the property values listed below.

TABLE 805-1

Property	Test Method	Unit	Typical Roll Values

Physical	ASTM D5261	g/m^2	280
Mass per Unit Area	ISO 9864		
	AS 3706-1		
	ASTM D5 199	mm	2.5
	AS 3706-1		
Mechanical			
Grab Tensile Strength	ASTM D4632	N	1090
	AS2001.2.3 method		
(Elongation @ Break)		%	60
Wide Width Tensile Strength		KN/m	17.5
(Elongation @ Break)	ASTM D4595	%	50
Trapezoidal Tear	BS6906-1	N	445
Mullen Burst	ASTM D4533		
	AS 3706-3	Kpa	3030
	ASTM D3786		
Puncture Strength	AS2001.2.4	N	620
CBR Burst	Method B	N	3780
	ASTM D4833		
	GRI-GSI		
	BS 6906-4		
Cone Drop	AS 3706-4		16
	DIN 54307	mm	2450
	BS 6906-6		
Hydraulic	AS 3706-5	mm	0.15
Pore Size (O95)		cm/s	0.48
Permeability	ASTM D4751		0.41
	(Dry)	S^{-1}	1.8
Permittivity	ASTM D4491		4885
Water flow rate	BS 9606-3	1/min/	9370
	ASTM D4491	m^2	
Endurance	ASTM D4491	%	70
UV Resistance (% retained & 500 hours)	BS 9606-3		
	ASTM D4355		

The product should be ISO 9002 certified or equivalent. The certificate from a recognized independent testing authority confirming the offered Geotextile possess the above stated values. The report should separately show the values of each and every detail stated above.

805.3b Backfill behind Gabions *(Insert following sub section after 805.3 sub section)*

After placing the geotextile filter, the backfilling behind gabions shall be carried out with approved sandy-gravel material as directed by the Engineer.

805.3c Anchoring Gabion Mesh *(Insert following sub section after 805.3 sub section)*

Anchoring Gabion Mesh shall be of PVC coated galvanized steel wire woven into a not more than 82x122mm HEXAGONAL mesh, and strength should be not less than 47 KN/m or equivalent, securely tied to Gabion box with PVC coated tie wire 2.2/3.2 mm, 5% of Gabion weight of the same specification as the mesh wire.

805.3d Reno Mattress *(Insert following sub section after 805.3 sub section)*

The Reno mattress is a gabion where the depth is small in proportion to its length and width. It is divided into several cells by transverse diaphragms and is fabricated from woven hexagonal steel wire netting. The netting used shall have the same specifications as for the gabions. The base, sides and ends are formed from one single panel of netting on which the diaphragms are fixed at 1m centres. Lid is supplied as a separate panel of mesh. Typical unit would be 6mx2mx300mm divided into 6 cells.

After joining together of the units, the Reno mattress is filled up with stones which are hard, durable and 75 – 100mm min in size, and of specific gravity not less than 2.0. The sequence of operations in the assembly, and fitting of the Reno mattress is summarized as follows:

(a) Assembly of mattress unit
(b) Place geotextile filter behind the mattress
(c) Placing in position and lacing together of units
(d) Filling with stone and fitting the lids
(e) Filling of the boxes shall be done as described in Sub-section 805.3.

805.3e Weep-Holes *(Insert following sub section after 805.3 sub section)*

Weep-holes shall consist of specified filter arrangements placed behind opening provided in the protection works in the location, and of the dimensions as shown in the drawings or as directed.

The filter arrangement at weep-holes shall consist of graded rock and sand commencing with the largest rock sizes against the structure and finishing with sand. The filter arrangement shall cover the area of opening in the structure fully, and extend beyond at least to the least dimension of the opening. The length of the filter arrangement shall be at least thrice the least dimension of the opening. Separate payment shall not be made for weep holes provided for protection works, and shall be included in the unit price per cubic meter/meter square of the particular unit rate item of protection works.

805.4 Measurement and Payment

a. Measurement

The gabion walls shall be measured in Cu.m, completed and accepted

The filter fabric & mattresses shall be measured in Sq.m

Concrete base shall be measured as given in Section 1001

The granular backfill shall be measured in Cu.m

b. Payment

the quantities determined for gabion walls and granular backfill material as provided above shall be paid for at the Contract unit rate which price shall be full compensation for all labour materials tolls and incidentals necessary for completion of the work including cutting and shaping the slopes and forming the ground on which the wall is built.

The Pay Items and Pay Unit will be as follows;

Pay Item	Description	Pay Unit
805(1)	Gabions	Cu.m
805(2)	Filter fabric	Sq.m
805(3)	Mattresses (state thickness)	Sq.m
805(4)	Granular backfill material	Cu.m

806 PAVED SIDE WALKS

806.1 Description *(Add item (e) at the end)*

(f) Precast concrete interlocking block laid on a prepared bed.

806. 2 Material *(Add following at the end)*

Concrete interlocking paving blocks shall be complied with SLS 1425 part 1 and 2. Contractor shall provide the product compliance test certificates from the manufactures, and shall be provided product samples, upon request by the Engineer and shall be subjected to the Engineers approval. No payment shall be made for the product sample and rejected samples shall be returned to the Contractor.

806. 3 Construction Requirement *((Add following at the end)*

(e) Precast concrete interlocking block paving construction.

The precast concrete interlocking blocks shall be laid to line and level on a prepared bed course material as indicated on the drawings. The bed course material shall be spread and uniformly compacted on an approved solid foundation to a thickness indicated on the drawing. The blocks shall be laid to the pattern indicated on the drawings, or shall be instructed by the Engineer. Jointing sand shall be used as instructed by the Engineer in order to seal the joints. Cement shall not be added to the jointing sand as this will lead to cracking and subsequent water ingress.

806.4 Measurement and Payment

(a) Measurement *(Delete first para of this sub-section and substitute the following)*

The quantity of paving to be measured shall be the number of square metres of finished surface irrespective of the type of paving. The above measurement, in the case of precast interlocking block slab paving, unless otherwise specified, will include excavations, preparation of the bed surface, 50 mm thick sand bed fill, approved type precast interlocking blokes, jointing sand for joint sealing, jointing with edge curbs with approved type cement sand mortar or concrete.

(b) Payment *(Add the following pay items)*

Pay Item	Description	Pay Unit
806(6)	Supplying and installation of 300mmx300mm detectable tactile warning tiles as per the drawings.	Sq.m
806(7)	Supply, Laying and Compacting of 40mm thick Asphalt Concrete for pedestrian footwalks approved by the Engineer.	Sq.m
806(8)	Suppling, Laying and Compacting of Precast Concrete Interlocking Blocks	Sq.m

807 PRECAST CONCRETE KERBS AND CHANNELS

807.1 Description (*Delete this sub-section and substitute the following)*

This work shall consist of the construction or resetting of kerbs such as Standard kerb, Edge kerb, Drop kerb, or combination of such kerbs to lines and grades shown on Drawing or as directed by the Engineer

807.4 Measurement and Payment

b. Payment (Delete the Pay items and pay units and substitute the following)
Pay items and pay units will be as follows:

Pay Item	Description	Pay Unit
807(1)	Standard kerb	Lm
807(2)	Flat/Edge kerb	Lm
807(3)	Drop kerb	Lm
807(4)	Dropper kerb	Lm
807(5)	Bridge kerb	Lm

808 GUARD RAILS AND WALLS, GUARD STONES, AND GUIDE POSTS

808.3 Construction Requirements

(a) Guard Rails *(Delete first para of this sub-section and substitute the following)*

The guard rail complete shall be erected true to line and level and the holes shall be backfilled with concrete Class C only after the Engineer has signified his approval. When the backfilling is complete and the bracing removed the posts must be rigid and vertical and the guard rail true to line and level and firmly fastened to the posts.

(c) Guide Posts and Guard Posts *(Delete the subsection (c) entirely and substitute with this section)*

The Guide posts and Guard posts at the end of the medians or islands shall be constructed with flexible and drivable type Guard posts and Guide posts as indicated on the drawings, that could be withstand multiple impact from any direction. The posts shall not be dislodged or damaged due to impact or over-run. All Guide posts and Guard Posts shall be weather resistance, including UV. Reflective surface or the posts shall not be discoloured or corroded during the usage. The contractor shall provide compliance test certificates from the manufactures, and shall be provided product samples, upon request by the Engineer and shall be subjected to the Engineers approval. No payment shall be made for the product sample and rejected samples shall be returned to the Contractor. The Pass this way sign may be incorporated to the Guard post and subjected to the Engineer's approval.

The posts shall be planted as per the manufacturers' specification and shall be vandal proof design.

The Contractor shall provide the Engineer with product samples and compliance test certificates from the manufacturers for the approval of Guide posts and Guard posts and the costs of providing these shall be included in the tendered rates. Only Guide posts and Guard posts approved by the Engineer shall be incorporated in the Works. Guide posts and Guard posts samples and trial installations which are not approved shall be removed from the site and no payment will be made for these.

808.4 Measurement & Payment.

(b) Payment *(Delete the subsection entirely and substitute with this section)*

Unless otherwise specified, guardrails shall be measured by the length in meters of each type, and a guide post with two guard posts and a pass this-way sign at the ends of the

median or islands shall be measured as one unit. The payment shall be fully compensation for all labor, casting, handling, transporting, furnishing all equipment and materials and all other incidentals required to complete the work.

(Delete Pay Item 808(6) and 808(7) and insert following Pay Item)

Pay Item	Description	Pay Unit
808(8)	Provision of Guard Posts, Guide Posts with Pass-this-way sign at ends of medians or islands as per the drawings	PS

810 ROAD MARKINGS

810.2 Materials

(c) Reflecting Road Studs *(Delete this entire sub-section and substitute the following)*

Reflective road studs shall confirm to BS EN 1463-1 and BS EN 1463-2 and shall be of an approved design self-cleansing (via rain and overrunning car tires) retro-reflective units from a reputable manufacturer.

The Contractor shall provide the Engineer with product samples and compliance test certificates from the manufacturers for the approval of the road studs and the costs of providing these shall be included in the tendered rates. Only road studs approved by the Engineer shall be incorporated in the Works. Road stud samples and trial installations which are not approved shall be removed from the site and no payment will be made for these.

The road studs shall be heavy duty spherical glass reflector type. Plastic or fiberglass type road studs shall not be used. Each stud shall be provided with either one retro-reflective lens for traffic in one direction (referred as uni-directional type) or two reflecting lenses for traffic in either direction (referred as bi-directional type) or omni-directional as shown on the drawings or instructed by the Engineer. The Road studs shall be Heavy duty, Embedded, Non-depressible type. The area of lens facing each direction of traffic shall be at least 300 square millimetres. The studs shall be capable of withstanding heavy wheel impacts and glass reflector shall not be cracked, crushed or removed from the mounting surface. The studs shall not project more than 20 mm above the level of the surrounding road surface and the lowest part of the lenses shall be more than 5 mm above the surrounding road surface. The studs may be either bonded to, or anchored within, the road surface. The design shall be such as to ensure ample key to the road pavement with adequate load distribution and such that it shall not be possible for heavy equipment such as road rollers and tracked vehicles travelling in the direction of the road axis to meet with any sharp edges whereby the removal of the stud might be facilitated.

The road studs shall be of a type to the approval of the Engineer and shall have reflecting amber, red and white colours.

811 TRAFFIC SIGNS

811.5 Measurement and Payment

b. Payment *(Add the following Pay Item and pay unit)*

Pay Item	Description	Pay Unit
811(4)	Single pole, multiple sign area up to 1.0 m^2	No

812 ROAD LIGHTING AND ELECTRICAL SYSTEM (*Delete the sub-section entirely and substitute with this sub section)*

812. 1 General

This Section covers the supply of road electrical facilities included, such as all equipment and lanterns, complete with concrete foundations, brackets, columns and other supporting devices, bases, cables, switch-gear and all necessary ancillary equipment together with the transportation, storage, assembly, erection, connection and testing of the same in order to supply a complete street lighting system in accordance with the details shown on the Drawings and as specified herein.

812.2 Applicable Codes and Standards

(a) British Standards Institution

BS 5489:..... 1992 Road Lighting.

Part 1. Guide to general principles.

Part 2. Code of practice for lighting for traffic routes

BS 7671:..... 2008 Regulation for Electrical Installations (IEE Wiring Regulations Seventeenth Edition).

BSEN 60598-2-3:..... 1994 Road Lighting Luminaires.

BS 5649:..... Lighting Columns.

BS 5467:..... 1997 Specifications for XLPE insulated Armoured Cables.

BSEN 60439-5:.....1996 Distribution Boards for outdoor locations.

BSEN 60529: .....1992 Degrees of protection provided by enclosures.

BSEN 60662: ....High Pressure Sodium Vapour Lamps. *(NOT APPLI.)*

BS 5972: ..... Photo-electric Control Units.

BSEN 60920/12/2/3:.....Ballasts.

BSEN 61048/9:.....Capacitors.

BSEN 60898 and BSEN 60947: Part 2:1992 Miniature Circuit Breakers.

BSEN 60947:.....Part 2:1992 Moulded Case Circuit Breakers.

BSEN 50262:.....1999 Cable Glands.

BS 7430:..... Code of practice for Earthing.

(b) Commission Internationale De L' Eclairage (International Commission on Illumination)

CIE 23:.....1973 International Recommendations for Motorway Lighting.
CIE 30.2:.....1982 Calculation and Measurement of Luminance and Illuminance in Road Lighting.
CIE 31:.....1976 Glare and uniformity in road lighting installations.
CIE 66:.....1981 Road surfaces and lighting.

812.3 Responsibility for Design and Materials

(a) All work shall be accomplished and all materials and equipment shall be made and tested strictly in accordance with

- The respective Standards and Codes specified above and stated specifically hereunder.
- The requirements of the Electrical Codes (SLS-703) of the Sri Lanka, where applicable. c) The requirements of the local Electricity Supply Authority- The Ceylon Electricity Board (CEB) as applicable.
- Materials, equipment and workmanship shall comply with BS 7671 Regulations for Electrical Installations (IEE Wiring Regulations) and the rules and regulations of the electricity supplier who provides the supply. Other reference regulations are NEMA, ASTM, AASHTO, CIE, JIS, IEC or equivalent, to the prior approval of the Engineer.
- Inspection and Testing of the completed installation shall be performed in accordance with BS 7671: 2008.

(b) As design of the road facilities has been carried out and the structures have been designed to accommodate wiring, equipment, lanterns and columns in the positions shown on the layout drawings, no change to this layout shall be attempted without the prior written approval of the Engineer.

(c) The equipment offered and the work done shall be suitable for continued trouble-free operation under adverse climatic conditions of heavy rain, high humidity and intense sunlight. The equipment shall be able to withstand over long periods ambient air temperature varying from a normal of 30°C to a maximum of 50°C.

812.4 Compliance with Manufacturer's Specifications

(a) The Contractor shall ensure that the equipment used shall be entirely suitable for the work to be performed and that they shall be manufactured to proper clearances and fits. He shall further ensure that the loading of equipment shall under all normal circumstances not exceed the maximum laid down limits or as otherwise agreed upon in writing with the Manufacturer.

(b) The Contractor shall be responsible for the inspection of all equipment before their incorporation in the works to ensure that they comply with the conditions of the Contract and that they are not defective in any way as regards materials or workmanship. The Contractor shall, at his expenses and to the Engineer's satisfaction, correct any default to the requirements or defect found during the inspection.

812.5 Spare Parts

The Contractor shall supply list of the numbers of spare parts required for the maintenance of the system for five years at the time of submission of "As built drawings"..

812.6 Working and Storage Areas

The working areas to be made available for purposes of storage, assembly and offices will comprise suitable areas along the road. The Contractor shall be responsible for providing all storage, offices and other facilities he requires, both on and off Site.

812.7 Electricity Supply

(a) The Engineer will assist the Contractor in the provision of an electricity supply at the positions shown on the Drawings by the Ceylon Electricity Board. The Contractor shall be responsible for arranging the date and time of the final connection at each position and maintaining an effective liaison with the Ceylon Electricity Board (CEB). The SCDP shall make payment to CEB for the connections.

(b) The Contractor shall ensure that the equipment supplied shall correctly function at the supply voltage and must allow for normal supply Voltage variations and surges.

812. 8 Excavation and Backfill for Facilities' Installation

812.8.1 Description

This work shall consist of excavation for the foundations, cable laying in open ground, pumping, dewatering and bailing, backfilling, and the disposal of excavated material. Reinstatement shall be such that the surface is restored to its original standard.

812.8.2 Excavation and Backfill for Conduit Laying

(a) The approximate location of the trench is shown on the Drawing but the Contractor shall obtain the approval of the Engineer for each final location before excavation commences. The trenches shall be cleanly excavated, reasonably straight and free from loose soil or water before the conduit is laid. The trenches change depth to accommodate access to conduits, or for similar reasons, the change in level shall be gradual and wherever possible the slope should not be more than 1:5.

(b) No conduit shall be laid in a flooded trench and the Contractor is responsible for dealing with any surface water and any pumping or bailing of the trenches. Where trenches are flooded after the conduits are laid and before backfilling by the Engineer the conduits shall then be removed prior to pumping or bailing.

(c) Conduits shall not be laid in the trench until the Engineer has inspected and approved the excavation. Backfilling shall not commence until Engineer has inspected and approved the placement of conduits and accessories in the trench.

(d) Trenching for conduit's laying shall proceed as follows:

- The trench shall be excavated to the required width and depth and disposed of all unusable material. Trench bottom shall be compacted to true level.
- After the approval of the Engineer, a 150mm thick layer of sand bedding and conduit spacers shall be laid. Conduits shall be laid at least 5 cm apart.
- After the approval of the Engineer, concrete shall be laid as specified in Section.
- The trench shall be backfilled with the selected material, ram and tamp in layers of not more than 150 mm compacted thickness. Allowance shall be made for subsequent settlement.

812.8.3 Installation of Buried Armourd Cable

(a) Where excavation for armoured cable laying in open ground is carried out the buried cable shall have a minimum cover of 600 mm.

The location of the trench is approximately shown on the Drawings but the Contractor shall obtain the approval of the Engineer for each final location before breaking the ground. The actual width of the trench shall be decided by the Contractor, with the approval of the Engineer, but the trenches shall be cleanly excavated, reasonably straight and free from loose soil or stones or water before the cable bed is laid. Trenches shall where necessary be adequately shored. Where trenches change depth to accommodate access to ducts or for similar reasons the change in level shall be gradual. A slope of not more than 1:5 shall be aimed for.

(b) No cable shall be laid in a flooded trench and the Contractor is responsible for dealing with any surface water and any pumping or bailing of the trenches. Trenches should be carefully bailed or pumped dry. If required by the Engineer the cables and

accessories in the trench should be removed from the trench to facilitate effective bailing or pumping.

(c) Cables shall not be laid in the trench until the Engineer has inspected and approved the excavation. Backfilling shall not commence until the Engineer has inspected and approved the laying of cables and accessories in the trench.

(d) Trenching shall proceed as follows:

- Excavate the trench to the required width, 800 mm deep and dispose of all unsuitable material, level and ram trench bottom.
- After the approval of the Engineer, lay a 150 mm thick bed of sifted river sand and lay cables on the bed. Cables shall be at least 50 mm apart.
- After approval of the Engineer, lay and compact a further 200 mm layer of sifted river sand and lay pre-cast concrete protective slabs of minimum thickness 50 mm along the length of the cable to the approval of the Engineer.
- Partially backfill and compact the trench with material in two layers, ramming and tamping at each layer and laying a marker tape along the length of and above the line of the cable, 150 mm below the intended finished ground level. The remainder of the trench can then be backfilled with further selected material, well compacted, leaving an allowance for subsequent settlement. The marker tape shall be yellow in colour with black legend stating 'Electric Cable.'
- Lay cable markers (concrete slabs) with an engraving 'Electric Cable' along the cable trench at 200mm below finished ground level at continuously. At all places the cables shall have a minimum cover of at least 450 mm.

812.8.4 Measurement

The quantity of work done under this item shall not be measured but it shall be included in each item of facilities requiring excavation or backfilling.

812.8.5 Payment

No payment shall be made for the work, materials, labour and equipment. It shall be considered incidental to work performed under other items.

812.9 Road Lighting

812.9.1 General

This section covers the supply of all lanterns, Main Distribution Boards, Lighting Distribution Boards, Over Ground Junction Boxes, lighting columns complete with brackets, pole, fuse, miniature circuit breaker and enclosure, and other necessary ancillary equipment together with the transportation, storage, assembly, erection, connection and testing of the same in order to supply a complete road or street lighting system in accordance with the

details shown on the Drawings and as specified herein.

812.9.2 Road Lighting

812.9.2.1 Quality of Road Lighting

Luminaries and lamps selected for the execution of the works shall ensure the achievement of the following photometric parameters.

- Maintained Average Luminance-L (cd/m2) Minimum 1.0
- Overall Uniformity Ratio-Uo Minimum 0.4
- Longitudinal Uniformity Ratio-UL Minimum 0.7
- Threshold Increment-TI (%) Maximum 15.0
- Surrounds Ratio-SR Minimum 0.5

812.9.2.2 Road Lighting Luminaire. (NOT APPLICABLE)

The luminaire shall comply with BSEN 60598-2-3, and shall employ High Pressure Sodium-vapour lamps of rating 250 W. The architectural shape of the luminature shall be as shown in the drawing.

It shall belong to the low threshold increment (LTI) class.

The optical compartment of the luminaire shall have a minimum ingress protection rating of IP 66 to BSEN 605209/ IEC 60529.

The gear compartment shall have a minimum ingress protection rating of IP 54 to BSEN 605209/ IEC 60529.

The body and canopy shall be made of pressure die-cast aluminium, painted in steel grey. The reflector shall be of highly polished anodized high-grade aluminium. The enclosure shall be a shallow toughened glass curved bowl.

All lanterns shall be supplied complete with control gear and other accessories fully wired and ready for erection.

The control gear shall incorporate power factor correction and radio interference suppression capacitors complying with BSEN 610492:1993/ IEC 610492:1991 and BS 613

respectively. A minimum power factor of 0.90 lag shall be achieved by the capacitors.

The luminaire shall be insect and vermin poof.

The luminaire shall have a side entry socket for fitting the luminaire to the lighting column arm spigot. Cable entry to the luminaire shall be through cable glands complying with BSEN 50262:1999. A grounding earth-ring may be provided where necessary for completion of the earthing circuit. Fixing screws shall be made of stainless steel. All wiring within the luminaire shall have an insulation resistance not less than 0.5 Mega Ohm.

All cabling inside the lighting column shall be of double insulated PVC/PVC/CU conductor cable of minimum cross section of 2.5sqmm for the connection between the lighting fitting and its individual protection 10A 2 pole circuit breaker and suitable sized earth continuity conductor.

Electrical cut out shall be provided in enclosure with non-Hygroscopic black A.B.S. moulding, hooded to prevent ingress of moisture and condensation. The Sealing chamber shall integral double entry chamber with detachable front, fitted with rubber cable bushes. The entire enclosure unit shall be to the prior approval of the Engineer.

Cables in and out of the junction box shall be through cable glands to BESN 50262:1999.

812.9.2.3 Road Lighting Lamps

High power LED shall be new and have a colour rendering more than 75. The rated average life of the lamp shall be 50,000 hours assuming 10 hours per start. The lamp shall have a minimum lanterns output of 13500 lm. The independent LED driver shall be 0.95 Power factor at the rated voltage (230V) and frequency (50 Hertz) and wattage of lantern shall be 150W. The majority of the lamp output shall be concentrated and fall within the visible spectrum.

812.9.2.4 Wire and Cable

1. Underground Cabling;

(a) Excavation

Underground cable installation shall, unless otherwise specified includes all necessary

clearing, excavating, disposal of spoils temporary supports, baling, pumping and the provision of bedding material, conduit laying, cable laying, protection, backfilling, marking and reinstatement of the cable route. Prior to the commencement of excavation the Contractor shall mark the locations of all existing services along the proposed cable route. Any existing facilities, which become damaged during the course of the work, shall be repaired and reinstated to the original condition to the Engineers satisfaction.

(b) Cable Laying

Cables shall be enclosed in 50mm, or 100mm diameter PVC conduit as appropriate when laid direct in ground or in 50mm or 100mm steel conduit when between manholes under road crossings.

Conduits enclosing cables shall be laid at the depths shown in the Drawings and to the requirements of the Electricity Regulations. Conduits enclosing cables shall be bedded in clean river sand with minimum depth of bedding of 100 mm below the conduit and minimum cover of sand above the conduit of 200 mm. The minimum depth of cable shall mean the perpendicular depth from final finished surface level to the top of the buried cables, which shall be 450 mm. Conduit enclosing directly buried cables, shall be further protected by approved cover slabs placed directly on the sand bedding. Conduits or ducts shall be provided to the required depth. Long radius sweeps or bends shall be used for all changes of direction. Sharp bends will not be accepted. Cable markers shall be placed during backfilling along the full-buried length of cables as stated under Section 802.3 on straights and at all changes in direction. Cable markers shall be painted. Other appropriate colours shall be employed for signal, data and telecommunications cables. Underground cable joints shall not be permissible. Where unavoidable, underground cable joints shall be permitted only with the specific prior approval by the Engineer. All exposed ends of underground cables shall be capped and sealed until properly terminated, to prevent the ingress of moisture. A loop or slack section of cable shall be left at each side of a road or traffic way to allow for settlement of the road without stretching the cable. Plaques shall be provided to identify the points at which buried cables enter the ground. These shall be securely fixed to the structures or external walls of buildings from which the cables enter the ground.

(c) Backfilling

Backfilling material shall be free of stones, debris, rubbish, etc., and shall be placed, and thoroughly compacted in 200 mm (loose) layers. Make good the surface to match the original adjacent. The trench shall not be backfilled until the Electrical Supply Authority and

the Engineer have reviewed installation. Where the trench is used for Electrical Supply Authority MV cables, liaise with that Authority for any installation of earthing within the trench prior to backfilling.

2. All wires and cables shall be copper, PVC/XLPE insulated, PVC sheathed and free of joint except at terminal blocks, and junction boxes. Direct burial cable enclosed in conduit shall be armoured. Wires conveying power supplies to lighting columns, over ground junction boxes, Lighting Distribution Boards etc. shall terminate in suitable sockets or terminal blocks enclosed in terminal boxes, cable entry being made through cable glands, which shall be covered and protected so that no live parts are exposed. Applicable Sri Lanka and International codes shall be used.

3. All wires and cables shall conform to the sizes and current ratings of BS 7671:2001.

4. All non-current carrying metallic parts shall form an electrically continuous system, which shall be grounded or separately grounded as specified in the latest IEE Regulations 17th Edition. All items below ground level shall be so designed and installed that they shall continue to operate without fault if immersed in ground water.

5. Where tees and joints are used, they shall be made in compound filled joint boxes and accessories specially manufactured for the cables. The compound shall be two-part resin-hardener, which will form a void-free quick-setting compound. Alternatively an equivalent insulating sealing compound to be applied and then wrapped with approved electrical insulating tape can be used.

6. The conductor connections within the joint shall be made using compression crimps or other means of positive mechanical clamping to ensure that the electrical continuity if the wire is maintained without significant increase in resistance as compared with that of straight cable runs.

7. The design of the joint box and the composition of the compound shall provide and effective seal to prevent moisture ingress to the circuit connections and clamps.

8. No joint shall be made in a cable without the specific approval of the Engineer in writing.

812.9.2.5 Road Lighting 12 m Column and Bracket

1. The lighting column shall be of Tubular flange-mounted type complying with BS5649/EN40 heavy duty type, constructed out of material complying with BS 4360

and shall be of longitudinally seam welded steel to BS 5135 and hot-dip galvanized to ISO 1461:1999 or BS 729. The Galvanised Lighting columns shall be painted with approved marine painting system prior to the installation.

The marine paint system shall be applied to the top of galvanised surface without damaging to the lighting column manufacturer's hot dipped galvanized coating. The total dry film thickness of marine paint coating shall not less than 220 microns.

The vertical column of the lighting pole and its detachable bracket (s) shall be made of ground single length (without joint) steel with yield point not less than 25 kg/mm2 and ultimate tensile strength of not less than 41 kg/mm2. The bracket is to be provided with spigot to suit the manufacturer's lantern. The outreach of the bracket shall be 1.50 m or as otherwise specified on the Drawings. Each column shall be provided with a base-plate for mounting the column onto a suitable foundation by means of anchor bolts or 'J' bolts. The column, arm (s), lanterns together with other accessories shall be designed to withstand a distributed wind load corresponding to the wind-speed 35 m/sec or wind pressure of 150 kg/m2. Each column shall be provided with weatherproof service door of minimum dimension 120mm x 400mm and drain holes at column toe.

2. A non-hygroscope mounting board composed of electrically insulating material shall be fixed in an easily accessible position behind the service door inside the column and shall be of suitable size to accommodate an enclosure with all necessary electrical equipment such as terminal strip, connectors, cut out with enclosure etc. Adjacent to this mounting board, there shall be provided on the inside of the column a grounding bus bar complete with two stainless steel bolts, lock nuts and washers, for use as grounding points.

3. All the columns shall be erected in a truly vertical position with the arms at right angle to the traffic flow. In the case of parapet-mounted columns, the column doors shall all face in the same direction along the Highway. The doors of the column erected at the sides of the road shall be positioned away from the approaching traffic. In each run of columns of five or more, every fifth column shall be checked for verticality by means of a theodolite. The columns between each checked column must be in line along the road and parallel to the checked columns. Shim washers may be used to achieve vertically where necessary. The Engineer prior to installation of the lanterns and wiring shall inspect each group columns. Each column must be grounded.

4. Lighting pole shall be marked with a numbering system that can identify the source of power supply from pillars by means of black luminous paint. Size of numbering shall be as approved by the Engineer but in no case smaller than 50mm in height.

812.9.2.6 Time Switches

At each supply pillar, a time switch is required to switch off part of the lighting circuit during the period of darkness when traffic volumes are low. The time switch shall be electrically wound motor driven from 230 volts; 50 hertz supply and have a spring driven clockwork reserve of not less than 12 hours. The contacts shall be inductively rated to accept an inrush current of the contractor coils and auxiliary relays.

812.9.2.7 Photo Electric Control

Photosensitive lighting controls shall be weatherproof enclosed, suitable for operation on 220-250 volts, 50Hz A.C. The controls shall function to energize artificial lighting when the natural lighting level fails to a preset, adjustable value, and to de-energize artificial lighting when natural lighting level rises to a present adjustable value. The operation shall be fail-safe, in that, in the event of failure of any components of the control unit the artificial lighting shall be continuously energized. Time delay devices shall be included to prevent switching of artificial lighting due to transient lighting changes. The control unit shall be completely unaffected by humidity. The switch mechanism shall be snap acting of sufficient capacity to adequately handle loads of inrush rating of contractor coils or auxiliary relays. Suitable mounting socket and bracket shall be provided.

812.9.2.8 Feeder Pillars

(a) The Contractor shall supply and erect the outdoor mounting self-standing type pillars enclosing the Distribution Boards and Over Ground Junction Boxes in accordance with the Drawings. The pillars shall be mounted on the plinths supporting the Distribution Boards and Over Ground Junction Boxes. The pillars shall be manufactured from steel or cast iron. The final appearance and finish of the surround shall be identical to that shown on the Drawings irrespective size to house the equipment shown on the Drawings and leave 10% spare usable space.

(b) The enclosure will be fabricated with 2.3mm thickness of Zinc coated steel sheet. After fabrication of the enclosure will be powder coated with powder coating of Zinc rich powder as an undercoat of 80 microns. Once the undercoating is over the enclosure is powder coated with epoxy polyester resins powder which suits for outdoor marine conditions. The door of enclosure will be provided with neoprene gaskets and provide protection against the ingress of moisture and dust to degree IP54 of IEC529.

(c) The enclosure will have 2 ventilation louvers for both sides. The colour of the enclosure will be beige (RL7032). Door will be locked with three prong lock with bar arrangement. The Door of enclosure is designed in a manner that opening of 1800 can be obtained. The mounting plate will be hot dip galvanized steel sheet

with 3 mm thickness. All incoming and outgoing cables will enter to the cabinet at the bottom. Cable Gland will be provided for all cable in the entry point.

(d) The supply pillars shall be fitted with a steel channel base. The door shall be lockable with either wedge type locks approved by the Engineer. The pillars must be self-ventilating and rainproof. The doors shall be hinged internally to prevent unauthorized access. All the supply pillars shall provide with the multiple lock and key. Six keys shall be marked with the numbering to identify the source of supply pillar and road number.

(c) The Contractor shall provide mount and wire the equipment as shown on the Drawings including a 12 mm thick backbite board and frame. The Contractor shall keep the space for installation of CEB's meter in the same enclosure. The equipment includes main safety switch, distribution fuse board, contactors, multi-terminal blocks, time switches etc. and some space must be left free for the possible future installation of addition equipment.

(d) In addition to the items shown on the Drawings, the following shall be provided and installed at each supply pillar:

- A multi ground terminal block shall be provided for the connection/bonding of all non-current carrying metallic parts, common grounding conductor and grounding electrode conductor. The size of the common grounding conductor shall be 25 mm2 insulated stranded copper.
- A circuit identification chart and circuit-wiring diagram sealed within a clear plastic envelope and fixed to the inside of the door.
- An approved sign fitted to the outside of the pillar to indicate that the pillar houses electrical equipment.
- Lighting and convenience outlet.
- All necessary internal wiring, which shall be of a size to match the rating of the protective fuse.
- Spare Mobs and McCabe, two of each size used.
- Supply pillar shall be provided with spare power plugs usable 20 watt tubular fluorescent lamp, voltmeter, ammeter. Circuiting procedure shall be as approved by the Engineer.

812.9.2.9 Grounding

Except where specifically indicated otherwise, all exposed non-current carrying

metallic parts of electrical equipment shall be grounded. Ground rods shall be driven so that the tops are approximately 0.30 m below the finished grade, the neutral conductor shall only be grounded at its origin or at the service entrance. Grounding electrodes shall be driven ground rods of the cone-pointed, copper-encased steel. Copper-encased steel ground-rods shall be tolled to a commercially round shape from a welded copper-encased billet and shall have a conductivity not less than 27 percent of that pure or pure copper with an equivalent cross-section. The rods shall have clean, smooth, continues copper surfaces and the proportion of copper shall be uniform throughout the length of the rod. Ground wires shall be secured to the upper ends of ground rods by exothermic process. Ground rods shall be of at least 3.0 m long unless otherwise specified, and shall have diameters sufficient to permit driving to the necessary depth without being damaged, but in no case shall they be less than 5/8 inch (16mm) diameter. If the maximum resistance cannot be obtained by one rod a sufficient number of additional rods shall be installed not closer than two (2) meters on centre and bonded to the main system.

Grounding system for all lighting columns on structure shall be accomplished by use of cable armour bonded to grounding terminals and grounding rods at lighting columns and supply pillars.

812.9.2.10 Testing of the Lighting System

(a) A functional test shall be made on completion of the work in order to demonstrate that every part of the equipment and installation functions as intended and specified. The test shall consist of not less than five night's continuous and satisfactory operation. It any defects or unsatisfactory operation is revealed, this condition shall be corrected and the test repeated until the required five successive nights of satisfactory operation has been achieved.

(b) The Contractor shall make available to the Engineer a photometer, and other related accessories, suitable calibrated by an authorized authority, for measuring the illumination on the road surface if desired.

(c) Prior to the functional test, the Contractor shall provide the testing equipment and accessories and shall carry out the following tests to the entire satisfaction of the Engineer:

- Each circuit shall be tested for continuity and polarity.
- Each circuit shall be tested for ground continuity and ground resistance, as specified in the relevant British Standards.
- Voltage drop in each circuit shall be determined.
- Power factor for each circuit shall be determined.

(d) On the completion of testing, the Contractor shall supply to the Engineer three copies of "as built" drawings of wiring and circuit diagrams, which shall clearly indicate any modifications which have been made to the original design.

812.10 Concrete Work

812.10.1 Description

All lighting column foundations shall be constructed as per contract documents and drawings by the approved Civil Contractor unless otherwise specified on the Drawings. Foundations will be complete except that the top 12-mm shall be placed after the lighting column, has been positioned by the Contractor.

The foundation for the supply pillars and other incidental items shall be erected by the Contractor using concrete Class B (Grade 20).

812.10.2 Concrete Constituents

The constituents of Class B (Grade 20) concrete are as follows:

Class	**Cement Content (kg/m3)**		**Range of Coarse Aggregate**	**Min. 28-day Cylinder Compressive strength (kg/cm2)**	
	Min.	**Max.**		**Preliminary**	**Site**
B (20)	315	380	20 mm	320	240

Concrete placed under water shall be 1.5 times of cement content specified above. Still water shall be maintained at the point of deposit and the forms under water shall be watertight.

The grading of the coarse and fine aggregates shall be within the limits required by AASHTO Standard Specification M 80 and M 6 respectively.

All aggregates shall be stored in such a way that they shall be kept free of all deleterious matter, and aggregates of different sizes shall be stored separately. Aggregate stockpiles shall be shaded and shall be water sprayed in order to obtain a concrete laying temperature of less than 38ºC.

The water/cement ratio for saturated surface dry aggregate shall not exceed 0.50 by weight.

812.10.3 Workability

The concrete shall be sufficiently workable for full compaction to be obtained.

812.10.3 Sampling of Concrete

The concrete mixes shall be sampled at the direction of the Engineer in order to check any of the foregoing stipulations.

Mixing: Unless otherwise agreed by the Engineer, the concrete shall be mixed in a power driven mixer, which has been approved by the Engineer.

Ready mixed concrete shall also be used with the approval of the Engineer.

812.10.4 Forms and Formwork

All concrete plinths, bases and foundations shall be constructed with the use of formwork. All formwork used shall be of such quality and strength as will ensure rigidity throughout the concreting operation. The Engineer shall inspect all formwork before concreting commences. An approved release agent shall be used on all formwork. No formwork shall be removed sooner than 24 hours after concreting.

All concrete shall be compacted to produce a dense homogeneous mass. Unless otherwise agreed with the Engineer, it shall be compacted by the use of vibrators.

The compacted concrete shall be cured for at least 7 days and shall be protected against the effects of rain, temperature changes and from drying out. The methods of protection shall be subject to the approval of the Engineer.

The foundation depths shown on the Drawings are approximate only and may be increased by the Engineer in order to obtain satisfactory foundations. Concrete for foundations underwater shall be placed in position by trim pipe, pipeline from the mixer or as approved by the Engineer.

812.11 MEASUREMENT

Measurement shall be made on the items detailed in the Bill of Quantities completed, accepted and measured in place. The units of measurement of each item shall be the unit of measurement shown in the Bill of Quantities.

The quantity of each item paid for under this clause will be system of individual system as detailed shown on the Drawings furnished and installed in accordance with this specification, the drawings and the instructions of the Engineer. The system will be paid for as a “system” for the work as provided hereunder.

812(4) Feeder Pillar Panel (LDB)

Furnishing, transportation, erection, installation and connection as per contract drawings and specifications to incoming and outgoing distribution cables of feeder pillars & Lighting panel Board manufactured as per contract drawings, all switchgear , external photocell switch and specifications and fixing on plinth and foundation with anchor bolts, nuts, washers, and providing and installing enclosure including foundation and all other incidental materials, field tests and data, relative civil and all other incidental work connected therewith the feeder pillar to be installed shall be the feeder pillar Board unit furnished, installed, testing and commissioning in place and accepted by the Engineer.

812(1) Pole mounted type street lamps 150 W, LED. Single Arm

Furnishing, transportation, erection, installation and connection as per contract drawings and specifications to incoming and outgoing distribution cables of Pole mounted LED type street lamps 150 W completed with marine painting system & 2Cx2.5sqmm PVC/PVC cable . Single Arm manufactured as per contract drawings and specifications complete with Luminaire, lamp and control-gear, lighting column terminal box with Miniature Circuit Breaker, and fixing on foundation with anchor or 'J' bolts, nuts, washers, ensuring verticality and all other incidental materials, field tests and data, relative civil and all other incidental work connected therewith the Pole mounted type street lamps 150 W. Single Arm to be installed shall be the Pole mounted type street lamps 150 W. Single Arm unit furnished, installed in place and accepted by the Engineer.

812(6)a 4core Cu/XLPE/SWA/PVC 25 sq. mm cables

Supply, lay and install with sockets and other accessories a) laid directly under ground and / or b) laid from manhole to manhole for road crossing and elsewhere if applicable, and / or c) laid over Bridges and / or d) under Bridges inside box girder as per contract requirements encase 4core Cu/XLPE/SWA/PVC 25 sq. mm cables inside laid PVC conduits, ducts on Bridges, including laying on trays under Bridges and fastening with cable ties at one meter intervals, as applicable terminate cable ends in specified manner as per contract drawings and specifications on Lighting column/ unit terminal boxes or Main Distribution Board or feeder pillar terminals as per contract drawings and specifications, ensuring proper cable grounding and termination with insulated compression lugs and ferrules shall be the 4core Cu/XLPE/SWA/PVC 25 sq. mm cables unit furnished, installed in place and accepted by the Engineer.

812(6)b 4core Cu/XLPE/SWA/PVC 16 sq. mm cables

Supply, lay and install with sockets and other accessories a) laid directly under ground and / or b) laid from manhole to manhole for road crossing and elsewhere if applicable, and /

or c) laid over Bridges and / or d) under Bridges inside box girder as per contract requirements encase 4core Cu/XLPE/SWA/PVC 16 sq. mm cables inside laid PVC conduits, ducts on Bridges, including laying on trays under Bridges and fastening with cable ties at one meter intervals, as applicable terminate cable ends in specified manner as per contract drawings and specifications on Lighting column/ unit terminal boxes or Main Distribution Board or feeder pillar Board terminals as per contract drawings and specifications, ensuring proper cable grounding and termination with insulated compression lugs and ferrules shall be the 4core Cu/XLPE/SWA/PVC 16 sq. mm cables unit furnished, installed in place and accepted by the Engineer.

812(6)c 4core Cu/XLPE/SWA/PVC 10 sq. mm cables

Supply, lay and install with sockets and other accessories a) laid directly under ground and / or b) laid from manhole to manhole for road crossing and elsewhere if applicable, and / or c) laid over Bridges and / or d) under Bridges inside box girder as per contract requirements encase 4core Cu/XLPE/SWA/PVC 10 sq. mm cables inside laid PVC conduits, ducts on Bridges, including laying on trays under Bridges and fastening with cable ties at one meter intervals, as applicable terminate cable ends in specified manner as per contract drawings and specifications on Lighting column/ unit terminal boxes or Main Distribution Board or feeder pillar terminals as per contract drawings and specifications, ensuring proper cable grounding and termination with insulated compression lugs and ferrules shall be the 4core Cu/XLPE/SWA/PVC 10 sq. mm cables unit furnished, installed in place and accepted by the Engineer.

Manholes for Power cables

Furnishing, transportation, erection of pre-cast, or cast in-situ with all required materials included, manholes completed with cast iron cover and incidental minor civil works at locations indicated in drawings or otherwise necessary for construction work to fulfill contract obligations shall be unit of each manhole furnished, installed in place and accepted by the Engineer. This work shall be paid under pay item 815(5)a.

Duct bank Type-A

Supply, lay and install 2x110mm diameter Medium Pressure Type 600-400 uPVC pipe complete with sockets and other accessories a) laid directly under ground and / or b) laid from manhole to manhole for road crossing and elsewhere if applicable, and as per contract requirements concrete encased as per contract drawings and specifications, ensuring proper installed in place and accepted by the Engineer. This work shall be paid under pay item 815(1)a.

Duct bank Type-B

Supply, lay and install 4x110mm diameter Medium Pressure Type 600-400 uPVC pipe complete with sockets and other accessories a) laid directly under ground and / or b) laid

from manhole to manhole for road crossing and elsewhere if applicable, and as per contract requirements concrete encased as per contract drawings and specifications, ensuring proper installed in place and accepted by the Engineer. This work shall be paid under pay item 815(2)a.

812.13 PAYMENT

The work measured shall be paid at the Contract Unit Price for each item, such price and payment constituting full compensation for all materials, labour, equipment, tools and incidental needed to complete the work. All materials and work necessary for satisfactory completion of the installation which is not specifically mentioned in the Bill of Quantities shall be deemed to be included in the items shown.

Pay Item	Description	Pay Unit
812 (1)	Lighting Column 12m high-Single arm including light fittings.	No
812 (2)	Lighting Column 12m high-Double arm including light fittings.	No
812 (3)	High mast lighting columns including light fittings (state height)	No
812 (4)	Feeder Pillar including all switch gear, control devices and photo cell	No
812 (5)	3 Core/2.5mm^2 Plain copper conductor pvc insulated.	Lm
812 (6)	4 Core/2.5mm^2 Plain copper conductor pvc insulated.	Lm
812 (6a)	4 Core/25mm^2 Plain copper conductor pvc insulated.	Lm
812 (6b)	4 Core/16mm^2 Plain copper conductor pvc insulated.	Lm
812 (6c)	4 Core/10mm^2 Plain copper conductor pvc insulated.	Lm
812 (7)	Replacement of existing road lantern with new 150W LED lanterns	No

818 PASSENGER SHELTERS *(Delete "Not Used" and Insert this new section)*

818.1 Description

Bus bay and shelter shall generally be provided at location close to where commuters can cross the road conveniently. Unless otherwise instructed by the Engineer, Bus Shelters shall be provided at all the bus Bays. Bus bay locations shown on the drawings shall only be considered as a guide and actual bus bay locations shall be confirmed by the Engineer at site.

Bus shelters shall be either single or double type depending on the requirement and shall be determined by the Engineer at site. The Contractor shall refer to the detail design drawings for placing and installation.

818.2 Material

It's expected that bus shelters to perform with minimum maintenance for longer period of time. All fabrications shall be constructed of vandal resistant material. The Main structure should able to support the load on, and strong enough and resistance to corrosion or another weather effect. Also, the surface is not harmful to lean on. Reference shall be made to the detail design drawings for full material and fabrication details.

818.3 Construction Requirement

Installation of bus shelter shall be complied with the followings;

- Shall Provide maximum protection from the weather and passing vehicles whilst ensuring that approaching buses are visible to waiting passengers who themselves are visible to the bus driver.
- Shelters shall be large enough to accommodate the average number of passengers at each stop allowing $0.4m^2$/passenger.
- Shelters shall be sited to cause minimum obstruction of the footway and create minimum visibility obstruction for road users.
- Any of the projecting part of the shelters shall not be closer than 500mm from the kerb face in order to avoid hitting of busses projecting mirrors or overhang of the buses (during entering and exiting)
- Hand railing may be provided at locations where frequent mobility of disable persons are expected such as at deaf and blind school, and shall be instructed by the Engineer.
- Bus Shelter shall provide a non-slip, solid, level and well-drained paved area around the shelter and connect to adjacent walkways.

818.4 Measurement and Payment

(a) Measurement

The quantities to be measured for payment shall be the actual No of completed Standard bus shelters constructed as per the drawings and accepted. Double type bus shelter may be considered as two times of the standard shelter.

(b) Payment

Pay Item	Description	Pay Unit
818(1)	Construction a standard bus shelters for passengers at bus bays, as per the drawing	No

819 KILOMETRE POSTS, BOUNDARY MARKERS AND BOLLARDS

819.4 Measurement and Payment

b. Payment *(Add the following Pay Item and pay unit)*

The work measured for removing existing km post includes transport and stack at the place as directed shall be paid under a Provisional Sum and shall be based on the agreeable rate for such work in force at the time.

Pay Item	Description	Pay Unit
819(5)	Provide install and paint new boundary marker	No
819(6)	Removing of existing kilometer post	PS

1106 CRACK SEALING

1106.1 Description (Add the following)

Longitudinal and transverse cracks greater than 3mm of wide and asphalt joints of existing and new surfaces are to be sealed with a band of rubberised bitumen compound of 75mm wide as directed by the Engineer. The sealant compound shall be compatible with the adhesion properties of overlaying asphalt product. The crack / joint and the area to be sealed shall be cleaned and ensure dust free and dry prior to the sealing operation by means of applying high pressured air or by other means.

Pay Item	Description	Pay Unit
1106(4)	**Cracks and Joint sealing**	**Lm**

1109 MAINTENANCE OF EXISTING ROAD *(delete the entire sub-section and substitute with the followings)*

1109.1 Description

The Contractor shall maintain to the satisfaction of the Engineer the carriageway of all roads and bridges sections in his possession forming part of the site, in a condition same as at the time the Contractor was given possession. Roads used as diversion routes for traffic due to the works, shall be considered as part of the site for the purpose of maintenance. All work shall be carried out as per Specification. The Contractor shall ensure the flow of traffic on all road sections and bridges and all culvert locations with reasonably ease during construction as determined by the Engineer.

1109.2 Measurement

Maintenance of roads shall be measured as the length of existing road which has been handed over to the Contractor until first operation of laying Asphalt whether binder course, Bitumen bound base, wearing course, Aggregate Base Course or scarifying the road surface. No measurement shall be made for maintenance of access roads by the Contractor for having materials, plant, etc.

If the contractor fails to maintain the roads to the satisfaction of the Engineer he shall order a third party to rectify the shortcomings and shall deduct the cost and 12% (twelve percent) for supervision charges from the Interim Payment.

Any additional cost or time incurred due to above shall be at contractors' expense and shall not be subjected to extension of time or claim.

1109.3 Payment

Payment for maintenance of roads shall be at the contract unit price and shall include for supply of all materials, labour and plant together with all necessary traffic safety and controls. The rate for Km week shall be the rate for providing maintenance as required on any one kilometer of road for a period of one week.

Pay Item	Description	Pay Unit
1109(3)	Maintenance of road	km week

1303 CLEARING, DESILTING AND REPAIRING OF CULVERTS

1303.4 Measurement and Payment *(Delete the sub-section and substitute the followings)*

a. Measurement

Unless otherwise specified measurement for cleaning and de-silting of culverts shall be in Nos for all type of culverts. The required and accepted repairing of culvert shall be paid as a Provisional Sum. Painting of culverts and bridges will be measured in square metre. Stenciling & Numbering for both parapets a structure measured in Nos of structure, irrelevant to the No of digits.

b. Payment

The rate for payment shall include full compensation for material, labour, equipment, transport needed to carry out the work and the disposal of debris and incidentals required for the work.

Payment under this sub-section will be made only once for each culvert. Thereafter, any further clearing, de silting or repair work necessary shall be deemed to be covered by the rates of various items of work in the Bill of Quantities.

The payment for repairing culverts shall be made under a Provisional Sum and shall be based on the agreeable rate for such work in force at the time.

Pay Item	**Description**	**Pay Unit**
1303(1)a	Clearing and de-silting of pipe culverts	No

1303(1)b	Clearing and repairing of box/slab culverts	No
1303(3)	Painting with enamel single coat to parapets of culverts & bridges and guard stones	Sq.m
1303(4)	Stencilling and Numbering on Parapets /guard walls	No

1403 PRESTRESSED CONCRETE AND REINFORCED CONCRETE BRIDGES *(NOT APPLICABLE)*

1403.1 Description *(Add the followings to the end of the sub section)*

The Contractor shall carry out repair works to the existing bridges as instructed by the Engineer.

1403.3 Work Requirements

(a) Wearing Course *(Delete the sub-section and substitute the followings)*

The asphalt wearing course of bridge decks shall be re-laid as instructed by the Engineer. The existing wearing course shall be removed by milling or any other method approved by the Engineer.

Further, AC resurfacing on bridge deck to be approved by RDA Bridge Design Division. The finish levels to be matched with the levels of the expansion and construction joints provided for the bridge, where appropriate.

1403.4 Measurement and Payment

(a) Measurement *(Delete the first paragraph of this sub-section and substitute the following)*

The wearing course shall be measured under Sub Section 506.6

(b) Payment *(Add the following Pay Item)*

Pay Item	Description	Pay Unit
1403(8)	Repair works to the existing Bridges as instructed by the Engineer	PS

1600 QUALITY CONTROL OF WORK

Add the following Sections:

The details testing regimes and standards for the quality control of workmanship and materials are given in each item.

The Contractor shall carry out the tests detailed in the items in accordance with its Quality Assurance Plan.

1600.1 Quality Assurance Plan

The Contractor shall prepare a Quality Assurance Plan which shall detail quality control procedures such as to demonstrate that the requirements of Clause 36 of the Conditions of Contract in respect of quality are met. The Quality Assurance Plan shall provide a formal framework for the approval of the Works by the Engineer.

In particular the Quality Assurance Plan shall include:

(a) Quality control procedures in respect of the selection and control of materials, distinguishing between approval testing and compliance testing;

(b) Quality control procedures in respect of construction operations, identifying procedures for production control and procedures for survey control;

(c) Procedures for the Contractor and Engineer to 'sign off' approved construction works.

In preparing the Quality Control Plan the Contractor shall take into consideration the requirements and obligations of the Engineer in respect of checking and inspection of the Works.

The Contractor shall appoint a Quality Control Manager who shall be responsible for ensuring that the quality control procedures set out in the Quality Control Plan are adhered to. The Quality Control Manager shall have independent control of all quality control activities.

1601 CONTROL OF ALIGNMENT, SURFACE REGULARITY AND PAVEMENT LAYER THICKNESS

1601.1 General

Add the following:

The Contractor shall allow for the time taken to. carry out testing of materials in his method and program of working, and no delays shall be considered relating to any materials testing.

As a guide, the Contractor should allow a period of at least 24 hours after the completion of a layer of fill, subgrade, sub base or base course for testing for compliance with the compaction requirements.

Any material, whether naturally occurring, placed, fabricated or manufactured by others which is intended for incorporation in the Works will be subject to quality control testing before approval is given for its use.

Any material or product which fails to receive approval shall be immediately removed, replaced or otherwise treated to the approval of the Engineer. Any unapproved material or product subsequently covered over or incorporated in the Works shall be removed at the Contractor's expense as instructed by the Engineer.

1601.2 Horizontal Alignment

(At the end of this sub-section add the following :)

The corresponding tolerances for the edges of the shoulders and the lower layers of the pavement shall be + 25 mm with no negative tolerance.

1601.3 Longitudinal Profile

(Delete the first paragraph and substitute the following :)

The level of sub grade and different pavement courses as constructed shall not vary from the design level calculated at any point with reference to longitudinal and cross-section profile of the road shown on the Drawings or as instructed by the Engineer beyond the tolerances mentioned below:

Sub grade : + 25 mm / -10 mm

Sub base : + 20 mm / -10 mm

Basecourse : + 15 mm only

Asphalt surfacing : + 10 mm only

1601.4 Surface Regularity of Subgrade and Pavement Layers

Delete Table *1601-1* and substitute the following:

***Table 1601-1* : Tolerance of Surface Regularity**

TYPE OF TRANSVERSE CONSTRUCTION	**LONGITUDINAL PROFILE WITH 3 m STRAIGHTEDGE**				**PROFILE**
	Maximum permitted undulation	Maximum No of undulations permitted in any 300-metre length exceeding:			Maximum permissible variation from specified profile under camber template
	mm	18 mm	12 mm	10 mm 5 mm	mm
Subgrade	24	30			15
Sub base	15		30		10
Basecourse	12			30	8
Asphalt Surfacing	5			30	5

Surface regularity requirements in respect of both the longitudinal and transverse profiles shall be simultaneously satisfied.

1601.5 Rectification *(Delete the sub section and substitute with followings)*

Where the surface regularity of subgrade and the different pavement courses falls outside the

specified tolerances, the Contractor shall rectify these in the manner described below and to the approval of the Engineer.

Subgrade

Where the surface is high, it shall be trimmed and suitably compacted to achieve the tolerances. Where the surface is low, the deficiency shall be corrected by scarifying the existing layer and adding fresh material. The degree of compaction and the type of material to be used shall conform to the requirements of Section 1708.1 herein.

Sub base

The same as for sub grade except that the degree of compaction and the type of material to be used shall conform to the requirements of Section 1708.2 herein.

Aggregate Base course

Where the surface is high or low, the top 75 mm shall be scarified, reshaped with added material as necessary, and re-compacted. The area of treatment at any place shall not be less than 5 metres long and 2 metres wide. The degree of compaction and the type of material to be used shall conform to the requirements of Section 405.2 herein.

Bituminous Wearing Course

For wearing courses, where the surface is high or low, the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications. The area of treatment shall not be less than 5 metres long and not less than one lane wide.

Surface Test of the Pavement

Within 14 days after completion of paving works for the wearing course, the roughness of the surface after final rolling shall be measured. For this purpose the contractor shall provide Multi-Purpose profile System (including all the necessary devices, hardware, software etc..) for the calculation of International Roughness Index (IRI)–in accordance with AASHTO PP37 or ASTM E950. Defective area on 0.1kilometer segments with IRI value greater than 2.4 m/km shall not be accepted and shall be rectified by the Contractor at his own cost. No separate payment will be made for compliance to this part of the Specification.

PARTICULAR TECHNICAL SPECIFICATIONS

1 INTRODUCTION

The following Particular Specifications are part of the requirements for the work related to the Civil Works which are to be provided according to the stipulations of the Contract. Hence, the instructions given herein form an integral part of, and are applicable to, all technical and Contract Documents issued for the Works. Addenda to these Specifications may be issued as required during the construction phase.

These Particular Technical Specifications shall be read in conjunction with General Technical Specifications (CIDA), the Conditions of Contract and the Bidding Drawings. The Contractor shall comply with all provisions contained within the Contract Documents.

The General Technical Specifications and the Particular Technical Specifications in conjunction with the Bidding Drawings define the technical standard and quality to be achieved during construction.

It is the intent of these Specifications, together with other relevant documents issued as part of the Contract Documents or to follow later on, to provide the Contractor with complete and detailed information and subsequent instructions necessary to enable him to carry out the design, where and when required, and to execute properly the work prescribed.

It is the intent of these Particular Specifications to establish acceptable standards of quality. On the other hand they shall also allow the construction of the Works in an efficient and economical way. Minor deviations in details due to selected work procedures and due to manufacturer's standard shop process will be considered for acceptance provided that, in the opinion of the Project Manager, the proposed substitutions are equal in quality to those specified.

The Drawings available shall serve as a basis for detail design drawings to be produced by the Contractor.

All work shall be executed according to the Drawings and requirements released for construction, in a professional and diligent manner, and all supplies and work shall comply with the quality requirements defined in the relevant Sections of these Specifications and other Contract Documents. The Contractor shall provide all necessary efforts to comply with the intent of the General and Particular Specifications to the satisfaction of the Project Manager.

2 CONTRACTOR'S SUBMITTALS AND PROJECT MANAGER'S APPROVAL

The Contractor shall provide the Project Manager with all submittals as requested in these Specifications and other Contract Documents. Although their extent shall be to the discretion of the Contractor, they shall be complete enough to illustrate adequately their intent and facilitate full for the understanding of the Project Manager.

At any time the Project Manager may call for additional information, completion of the submittals.

The Contractor shall submit these documents to the Project Manager so that, even if not specifically expressed, reasonable time will be given to the Project Manager to comment or approve the submittals.

The approval of the Project Manager shall always be given in written form prior to the commencement of any work under this Contract and the Contractor shall not be paid for any

work that is performed without the express written approval or instruction by the Project Manager.

3 SITE INSTALLATION, SERVICES AND ENVIRONMENTAL OBLIGATIONS

3.1 General

3.1.1 Scope of work

The Contractor shall be responsible for providing plant, equipment, materials and labour for the provision of all necessary site installations, temporary works and services adequate for the realisation of the Works under this Contract.

The Contractor shall furnish, install, maintain and operate all site installations, temporary works and Contractor's equipment for his own use and for the use of the Project Manager and Subcontractors, and as required for third parties, including workshops, warehouses, storage and assembly areas, all machinery, vehicles, scaffolding, equipment, water and power supply, etc.

Site installations, temporary works and services provided by the Contractor for his own use as well as for that of the Project Manager or for third parties shall conform to the applicable standards, codes and sanitary requirements set down by the Sri Lankan authorities for such purpose.

The construction, operation and maintenance of the Contractor's site installations, temporary works and services shall be subject to inspection and written consent by the Project Manager.

All plants, facilities, installations and services for the Contractor's and Project Manager's use shall at all times remain the Contractor's property, except as specified hereinafter. Should the Contractor wish to sell his plant after the Completion of the Contract facilities and equipment in the country of the Works, he shall pay any and all taxes and duties required by law as stipulated in the Conditions of Contract.

The scope of the Works includes but is not limited to following site installation parts:

a) All temporary structures required for the performance of the works such as access roads, temporary construction roads or temporary working platforms
b) Stores, Warehouses, Materials Yards
c) Materials testing laboratory
d) Construction equipment
e) Power supply and illumination
f) Water supply
g) Sanitation, sewerage and waste disposal
h) Communication System
i) Site security

All installations of any Subcontractors shall comply with these Specifications.

3.1.2 Submittals

Within 30 days from the date of contract award the Contractor shall submit to the Project Manager updated layout plans showing, at adequate scale, the locations and arrangement of all site installations. These plans shall be consistent with the plan submitted by the Contractor with his Bid as well as with any amendments and additions.

Within 14 days from the date of contract award the Contractor shall submit to the Project Manager an updated project schedule on paper and as soft copy in Microsoft MS Project form showing all the activities he intends to perform to meet his obligations in contract and to complete the works within its stipulated time for completion. This baseline schedule will be used for monitoring progress each month and for evaluating the impacts of any departures from the baseline schedule.

3.2 Prior to construction works

The Contractor shall carry out all necessary surveying work required for the approved performance of the works and shall ensure that the position and elevation of all works thus constructed are correct. The measuring methods and devices used must meet the standard of accuracy required for this purpose.

3.3 Access Works

The construction and maintenance of permanent and temporary access roads or access ramps from public roads to the sites, including crossings, shall be the Contractor's responsibility to the approval of the Project Manager.

In general, all roads within the site area shall be the Contractor responsibility, construction and maintenance, during the works until final handover to the Project Manager.

Proper maintenance of all roads being used by the Contractors during the entire construction period, both permanent existing ones as well as temporary roads, shall be the Contractor's responsibility.

Additional roads and ramps which have to be built to transport equipment and materials shall be constructed by the Contractor at his own expense and with the Project Manager's prior approval, and the maintenance of such roads during the construction period shall also be at the Contractor's expense. The same applies for existing public roads and bridges used by the Contractor in the vicinity of the site for the execution of the works.

Any work, improvement or modification at the existing access roads made by the Contractor, for his own convenience, and without being ordered by the Project Manager, shall be at the Contractor's own risk and expense.

If any damage or pollution occurs during the execution of the works, the Contractor must restore and clean the roads immediately at his own cost.

After completion of the Contract and before delivering the work to the Project Manager (final takeover), all temporary structures shall be removed to the satisfaction of the Project Manager.

3.4 Construction Facilities

3.4.1 Stores, warehouse, workshops and material yards

The Contractor shall provide and equip, for his own and his Subcontractors' use, warehouses, materials storage areas and fuel storage areas, all of which shall be maintained in good condition until the completion of works.

Listed hereunder are the buildings, workshops and warehouses expected to be constructed and equipped by the Contractor for use in the performance of the work under this Contract, in addition to facilities explicitly specified elsewhere in these specifications:

a) Workshop and service facilities for vehicles and construction equipment
b) Main warehouse and parts store
c) Storage facilities for all materials applied within the conduction of the rehabilitation works

3.4.2 Materials testing laboratory

The Contractor shall build and equip an adequate field laboratory for the sampling and for testing of all materials as specified in the pertinent sections of the specifications.

The laboratory shall be located in a building properly equipped with electricity, water, air-conditioning/heating, etc., and shall have enough room for storing the samples tested as required by the Project Manager.

The equipment to be supplied and the methods of testing shall be in accordance with the relevant codes and standards and as approved by the Project Manager. All apparatus and equipment shall be in good working conditions, functional and manufactured by a reputable manufacturer.

The Contractor shall operate and maintain the laboratory until the Completion of Works and make all facilities and services available to the Project Manager as required. All sampling and testing to be undertaken shall be under the direct supervision of the Project Manager. The laboratory shall be run by Contractor's personnel experienced in sampling and testing of materials, and quality control.

Specialised testing which may be required and which cannot be performed in the Contractor's laboratory due to lack of time or equipment shall be assigned to an independent organisation approved by the Project Manager. The Contractor shall accept all results, instructions or restrictions stipulated by the Project Manager in writing based on such tests.

Upon completion of the works, all laboratory equipment shall remain the property of the Contractor. However, the Project Manager reserves the right to purchase some or all of the equipment by mutual agreement.

3.4.3 Construction equipment

The Contractor shall provide suitable and adequate temporary construction equipment until the completion of the works under this Contract.

A schedule including a list of quantities for temporary construction equipment has to be delivered to the Project Manager on a monthly basis for information.

Full costs of all construction equipment shall be included under the unit prices of each part of the rehabilitation works.

3.5 Utilities

3.5.1 Power supply and illumination

The Contractor shall supply, install, operate and maintain an adequate power supply system and illumination for running the site and other site installation facilities during the whole construction period. The concept shall be approved by the Project Manager.

3.5.2 Water supply

The Contractor shall provide, install, operate and maintain adequate and suitable water supplies for the works within the contract including storage for drinking purposes, sanitation, construction, cleaning, testing and commissioning of the various equipment items and plant components of the construction lot.

The water supplies shall be continuously available during working hours and rated to meet the maximum demand required during construction on the basis of 'firm supply' and shall supply all temporary installations.

The drinking water provided shall at all times meet the criteria of the local health authority.

The concept shall be approved by the Project Manager.

3.5.3 Sanitation, sewerage and waste disposal

The installations shall meet the requirements of the local health authorities and environmental regulation.

The Contractor shall collect waste material and garbage from site on a daily basis and transport it to an approved area where it shall be treated and disposed of in accordance with local environmental requirements.

The Site shall be kept clean and free of refuse at all times. No waste shall be dumped in areas other than those approved by the Project Manager for waste disposal. No waste of any kind shall be deposited in any water courses.

3.5.4 Communication systems

The Contractor shall supply, install, operate and maintain a complete telephone system satisfying all his needs and the needs of the Project Manager at site including external lines to the public switched telephone network and external connection to an internet access provider.

3.5.5 Office space

The Contractor shall supply, construct, equip and maintain an office for the sole and exclusive use of the Project Manager, fully furnished and equipped with facilities and services.

The office building shall be provided with the necessary portable fire extinguishers and service facilities necessary for normal and comfortable occupation by 6 people. The building shall be air-conditioned.

The offices shall be equipped with adequate furniture (desk, chair etc.) and fittings (electricity, lights, toilets, water etc.) for use as an office. Furthermore the office shall be equipped with an Internet connection.

The offices shall be maintained by the Contractor at his expense.

3.6 Site security

The Contractor shall employ an adequate force of trained security guards at the worksite and at the construction camp on 24-hour duty including weekends and holidays.

3.7 Demobilisation

Upon the completion of works the Contractor shall reinstate the site and dismantle and demobilize all temporary facilities erected by himself or his Subcontractors, and remove all debris, objectionable material and all other refuse which may have been deposited on site during the construction period. Such materials may be deposited only in areas approved by the Project Manager.

All excavated areas shall be filled, graded and dressed in a clean and orderly condition acceptable to the Project Manager. As far as possible such areas should conform to the natural appearance of the landscape.

3.8 Environmental obligations

The Contractor shall, during the whole period of the works comply fully with all national Sri Lankan laws and regulations relating to environmental protection, mitigating measures for reducing environmental impacts and remedial works on completion of the Works. This obligation shall extend to the construction sites themselves and all of the Contractor's site installations.

Notwithstanding any specific obligations as these may be specified in prevailing Sri Lankan laws and regulations, the Contractor shall at all times comply with the following particular requirements for the protection of the environment, the local population and the workers at the construction site:

- Collect, treat, remove from site and dispose of in accordance with the regulations and to the satisfaction of the Project Manager all domestic and industrial waste and excess construction materials (both solid and liquid), fuel, chemicals and other matter.

- Make every effort to minimise the harmful effects of transport to and from the site, in particular vehicle emissions and noise and the control of dust on roads.

The Contractor shall maintain close contact with local representatives and government institutions in addressing issues arising from the construction activities. Such issues needing particular attention are the following.

- Pollution caused by construction work
- Disruption to the local community
- Disputes related to the use of land for construction activities and/or site installations etc.
- Disputes arising from traffic congestion and restrictions on the use of the main project access road and roads in the project area
- All matters relating to road safety and the reduction to a minimum of the risk of traffic accidents.

3.9 Social obligations

As far as may be reasonably practicable, the Contractor shall recruit his unskilled labour from those persons from the local community who may apply for work. Suitably skilled workers in the local community should also be recruited wherever practicable.

4 SAFETY AND HEALTH PRECAUTIONS

4.1 General

This section covers the precautions that have to be taken for the health and safety of all personnel on Site that the Contractor and his Sub-Contractors shall apply in all civil construction and equipment erection works during the construction time.

4.2 Safety precautions

4.2.1 Safety programme and its implementation

A safety program shall detail policies, procedures, and plans which the Contractor intends implementing to ensure the safety and health of his employees. It shall comply with the standards and regulations in force in the country of the Works applicable to construction safety.

The Contractor shall designate a competent employee specially trained and experienced to act as Safety Officer, who will administer and be responsible for the implementation of the safety program. He shall carry out frequent and regular safety inspections of the working areas, materials, and equipment. The name and qualifications of the Safety Officer shall be submitted for approval to the Project Manager prior to his appointment.

The Contractor shall be responsible for the implementation of health and safety provisions for his subcontractors employed at Site.

All serious and fatal injuries and diseases caused by the progress of work shall be immediately investigated by the Contractor and a comprehensive report shall be submitted to the Project Manager.

In case of a fatal accident, only rescue and emergency teams and operations shall be permitted at the place of the occurrence until the Project Manager gives permission to resume normal operations.

4.2.2 Safety standards

In addition to the requirements of the following specified herein, the Contractor shall comply with all currently applicable safety documents and/or organizations:

4.2.3 Safety of personnel

The Contractor shall be responsible for the safety of all personnel on the Site and shall provide his employees and his sub-contractors employees working on the Site, the Project Manager's staff and all visitors to the Site with safety equipment appropriate to the tasks upon which they are engaged, including helmets, high visibility vests or jackets, safety footwear and, where required, gloves, lamps, waterproof clothing, dust masks and/or safety belts. The use of such safety equipment shall be compulsory, as deemed necessary by the Project Manager.

During drilling works and in areas where the personnel are exposed to harmful noise levels and dust, ear protectors and masks shall be furnished and required to wear.

Employees engaged in work having an inherent danger of eye or face injury shall be furnished and required to wear protection glasses, goggles or masks. Where irritant or toxic substances may come in contact with the skin or clothing, employees shall be wearing protective clothing or shall be required to apply a protective ointment by a competent physician.

Personnel working on steep slopes or otherwise subject to possible falls from levels not protected by fixed guardrail or safety nets, shall be secured by safety belts and lifelines.

Portable ladders shall be wooden or steel ladders sufficiently strong and with suitable size for the use intended. Wooden ladders shall have the steps fixed to the longitudinal posts by assembly. The use of ladders with steps nailed or wired along the longitudinal posts is not permitted.

4.2.4 Security of personnel and working areas

The Contractor shall take at all times the necessary measures to ensure the safety and security of all persons, work and property. This shall include but not be limited to the following:

- Access control to all areas related to the Works
- Installation of fences
- Security patrols

4.2.5 Maintenance of traffic and safety on roads

The Contractor shall be responsible for the safety on the roads related to the Site. He shall take all necessary precautions for the protection of the work and the safety of the public on the roads affected by his activities. Where the work will be carried out at the site of, or close to an existing road, the Contractor shall maintain the vehicular and pedestrian traffic safe at all times. If his operations can cause traffic hazards, he shall repair or fence or take other measures for ensuring safety which are satisfactory to the Project Manager.

Roads subjected to interference with the work shall be kept open or suitable detours shall be provided and maintained by the Contractor, who shall provide, erect, and maintain all necessary barricades, suitable and sufficient flashlights, flagmen, danger signals, and signs.

Roads which will be closed to traffic shall be protected by effective barricades on which acceptable warning and detour signs shall be placed. All barricades and all lights shall be kept burning from sunset to sunrise.

The Contractor shall submit his weekly activities schedule and the locations of his work along the existing public roads to the authorities concerned, and obtain all necessary approvals prior to commencement of the respective work.

The Contractor shall provide temporary passes and bridges to give an access to the existing villages, houses, etc., to the satisfaction of the Project Manager and the authorities concerned whenever he disturbs such existing ways during the execution of the Works.

4.2.6 Weather precautions

In order that the Works may proceed according to the programme, the Contractor is to undertake at his expense all necessary precautions for protection against inclement weather, which shall be subject to the approval of the Project Manager.

4.3 Health precautions

4.3.1 First aid

Prior to the commencement of construction, the Contractor shall organize and train a first aid team composed of his employees. This team shall be capable to render help after accidents.

The first aid team shall be organized in such a way that sufficient number of members will be ready for action at any time until the completion of the Works.

The team members shall be instructed and trained for their task by a qualified and experienced person. Each team member shall be skilled in giving first aid, dealing with the appliances for artificial respiration, and fire fighting equipment and shall possess a good local knowledge. Adequate equipment for reaching even the remotest working area shall be at their disposal.

The Contractor shall submit the details of the proposed first aid team organization to the Project Manager for approval.

4.3.2 Noise control

The Contractor shall take the provisions required to assure that noise from his construction activities and from the operations of any plants are within the limits established by the WHO for the health of his personnel, or shall provide his personnel with ear protectors. Ear protectors shall be provided to all personnel subject to noise levels above 85 dB on a continuous basis during work shifts.

4.3.3 Ventilation of sluices

The Contractor shall furnish, install and operate ventilating systems for work in sluice barrels. Details of the proposed ventilation systems shall be submitted to the Project Manager for approval. This updated design shall include all calculations of fresh air supply volume, type of ventilation scheme, duct diameters, materials and equipment and position.

All parts of the works shall be maintained in a state which will not be injurious to the health of the personnel. The air in the sluice barrel shall contain no less than 20% oxygen and shall not contain a concentration of gases, vapours or dust greater than is safe for the health of workmen.

5 SITE SUPERVISION AND REPORTING

5.1 Site supervision

The Contractor is responsible for providing proper supervision of his site activities by employing suitably qualified and experienced site management and supervisory personnel so that he can carry out his obligations under the Contract.

For the Contractor's information, the Project Manager has issued a Construction Supervision Manual, dated August 2010, which is intended for use by the Project Manager and his staff for the supervision of the Works. This manual includes standard forms which will be used during construction for control of the work. It is available to view in the office of the Project Manager.

5.2 Monthly progress report

Before the tenth day of each month, the Contractor shall submit three copies of a monthly progress report in a form acceptable to the Project Manager detailing the progress during the preceding month. The monthly progress report shall show the amount of work completed, materials actually used, materials in storage and the cumulative results of all operations completed or in progress and shall be summarized in terms of percentage of completion referenced to the agreed programme for the works.

The monthly progress report shall include at least the following:

- Total percentage of work completed and total percentage programmed to be completed by the end of the reporting period;

- Actual percentage of each main work item completed including temporary works, as well as their scheduled percentage, both total and for the reporting period together with the estimated quantities;
- List of manpower by trade and foreign personnel by position for the reporting period;
- List of equipment and operational days for the reporting period and materials on site at the end of the period;
- Description of weather conditions for the period including records of each rainfall duration and recorded river water levels (if any);
- List of any accident except of minor nature and any damage that occurred;
- Any matter which affected or may affect the progress of the work, problems encountered and proposed remedial measures;
- Colour photographs with imprinted date, not smaller than 100 mm by 150 mm of the work progress during the period for all major components of the Works. The Contractor shall also provide digital versions as well as 5 sets of hard copies of these photographs in albums with titles.

Further the Contractor shall submit financial statements, purchasing and expediting reports, shipping reports, and any other data which the Project Manager may reasonably ask for.

Additional to the photographs included in the progress reports, the Contractor shall arrange for the taking of progress colour photographs every month, covering all aspects of the Work. Two copies of such photographs, suitably dated and captioned, shall be submitted to the Project Manager, plus a CD with all relevant files.

The Contractor shall submit the final report not later than one month after completion of the Work. This report shall include all relevant information related to the Works in a format approved by the Project Manager. The Contractor shall submit to the Project Manager one copy of the draft report. The final report shall be submitted in triplicate. The final report shall also be made available electronically in pdf format or alternative approved format. The submission of the final report shall follow within one week of acceptance of the draft report.

6 PREPARATION OF AS-BUILT DRAWINGS

During the construction and commissioning period any variations between the "Construction Drawings" and the "As-built Drawings" shall be agreed between the Contractor and Project Manager at site.

All agreed modifications will be marked up by the Contractor's draughtsman and included on the originals at site. A complete set of these mark ups shall remain at site. The Contractor shall allow for the provision of a draughtsman as required at site to co-ordinate and include all modifications on the drawings. The originals shall then be returned to the Contractor's head office and these shall form the basis of the “As-built Drawings”.

The Contractor shall submit to the Project Manager all final revisions of all original drawings depicting the "As-built" situation for the works. All drawings and documents prepared exclusively for the project shall become the property of the Project Manager.

Final drawing prints shall be size A1 or smaller. Reproducible of the final drawings shall be supplied as follows:

- 2 prints of each drawing to the Project Manager.
- 2 CDs with original AutoCAD drawing files to the Project Manager

Where drawings are reduced, an appropriate scale shall be included on the reduced print. To accompany the drawings, the Contractor shall provide a Master Schedule of "As Built" drawings.

7 CARE OF WATER

7.1 Scope of work

The Contractor shall provide all method, procedures, labour and materials necessary to protect all existing works under construction and all personnel and equipment. Further he shall design, build, install, operate, maintain and dismantle any temporary dewatering facilities required to remove service water and natural surface flow or groundwater seepage from the working areas.

7.2 Submittals

After the date of issue of the Notice to Commence, the Contractor shall present the Project Manager with conceptual details, designs, method statements, procedures and emergency plans for all required protection and dewatering systems.

7.3 Extent of the works

The work under "Care of Water" to be performed under this Contract shall include but not be limited to:

- Construction and maintenance of temporary cofferdams, drains and other protective works;
- Supply and installation, operation and maintenance of pumping systems for dewatering;
- Control and drainage of the water inflows on surfaces against which concrete shall be poured; and
- Handling of the water supply to areas downstream of the dam during construction.

Care of water during construction comprises all necessary measures to protect the works from the effects of water from any source during the construction period. The Contractor shall be fully responsible for the care of water during the construction of the works, including the construction of the upstream and

downstream cofferdams, the sealing of their foundation and the handling of the water supply for the downstream users during construction.

The Contractor shall submit with his Tender his proposal and method statement for taking care of water during construction including quantity, type, capacity, arrangement, location, etc., of all required equipment.

The Contractor shall also submit with his Tender his proposal and method statement for the design and construction of the cofferdams and the handling of the water supply during construction.

All works shall be executed in accordance with the specifications of this Contract and in agreement with the Project Manager. The approval given by the Project Manager shall not relieve the Contractor from being fully responsible for the protection of the works.

7.4 Execution

7.4.1 Drainage and dewatering systems

The Contractor shall design, furnish, construct and install, operate and maintain all care of water facilities, including cofferdams, drainage systems etc. necessary to maintain all work areas as free as possible form water during construction. This shall include all necessary labour, materials, equipment, power supplies and auxiliary works as required for a safe and dry construction of the works.

The water inflow existing on surfaces or against which concrete shall be poured shall be collected through steel and/or plastic pipes or other approved methods and conveyed to drainage ditches and pits. These water collectors shall be sufficient to drain all concentrated water inflows and also possible scattered water inflow that can affect the quality of concrete at the moment of pouring.

The Project Manager's approval of any care of water facility under the Contractor's responsibility shall not relieve the Contractor of the full responsibility for any adverse event which may result from the inadequacy of failure of the protective structures.

Having served their purpose, the protective works and dewatering equipment shall be removed and all temporary drainage systems filled or plugged as directed.

7.4.2 Dewatering

General

The Contractor shall furnish, operate and maintain all necessary pumps, pipes and other dewatering devices as necessary for keeping all work areas free from water. The Contractor shall be held liable for any damage caused by failure of the drainage and dewatering systems.

The Contractor shall prepare and submit to the Project Manager the design of all temporary drainage and dewatering systems and all auxiliary works required for safe and continuous operation of the drainage and dewatering system throughout the period of the works.

The design and installation shall be such that alterations and extensions of the system during operation are possible.

Diverted or pumped water shall be discharged at locations from which it cannot re-enter the work areas and in a manner which does not cause erosion, pollution or nuisance to other persons within or adjacent to the site.

Duration of drainage and dewatering

Drainage and dewatering shall continue until construction works are completed to a stage where drainage and dewatering are no longer necessary to prevent damage to the works or neighbouring works whether from flooding, hydrostatic pressures, flotation or by any other means to prevent hindrances of any kind.

The ceasing of drainage and dewatering measures requires the approval of the Project Manager. The removal of dewatering systems and the abandoning, removal or closing of drainage systems requires the express permission of the Project Manager.

Pumping systems and power supply

To remove water from various sections of the work and to handle the water supply to areas downstream of the site, pumping systems of sufficient capacity shall be provided. This shall include the supply, installation, operation and maintenance of all items comprising the pumping system.

The Contractor shall size his power supply and distribution system to have sufficient standby capacity to continue necessary dewatering work in case of failure of his main generating system.

Ready for service condition

The Contractor shall maintain ready for service and regularly clean all dewatering equipment and accessories and shall keep all accesses clear so that they can safely be used without the risk of accidents.

7.4.3 Cofferdams

All cofferdams shall be designed, constructed and maintained by the Contractor. The complete design of the cofferdams including all calculations, specifications of materials, proposed construction procedures, provisions for protection of existing or already completed works, provisions for protection against erosion, any necessary support work shall be submitted for the approval of the Project Manager prior to the commencement of the work. No work shall be started without the written approval of the Project Manager.

The Contractor shall be entirely responsible for the water tightness and maintenance of the cofferdams, care of water as well as safety of the works including sole liability for damages due to erosion and/or piping inside the cofferdam.

Where required by the different phases of the works, the Contractor shall modify, remove or dismantle and reconstruct the cofferdams as approved or directed by the Project Manager.

On completion of the works, the Contractor shall remove or dismantle all cofferdams as approved or directed by the Project Manager. The materials shall be brought to approved location and according to the requirements of paragraph 3 of this specification.

8 SURFACE EXCAVATION

8.1 Scope of work

This section covers all surface excavation work to be performed under this Contract, which shall consist of removing all existing material of whatever nature to the lines and grades shown on the drawings or as otherwise directed by the Project Manager in writing. This work shall include excavating, ripping, loading, hauling, double handling and disposal of materials in designated spoil or stockpile areas, according to these Specifications.

8.2 Submittals

Prior to the commencement of any surface excavation, the Contractor shall submit in writing to the Project Manager details of the proposed excavation methods and sequences, including necessary safety precautions.

Prior to dumping or stockpiling any material, the Contractor shall submit in writing the layout of spoil or stockpile areas to the Project Manager and wait the approval in writing. All pertinent data of working methods and provisions for the security, stability and temporary and permanent drainage of the areas shall be included by the Contractor. Details of volumes, material types, heights and grades shall be provided.

8.3 Lines and grades

The final excavation grades shall in general bed rock of specified quality. However, where the final excavation grades are defined by line and grade, the Contractor shall take every precaution and use the most appropriate method of excavation, to avoid the loosening of material or the breaking of rock beyond the lines and grades shown on the drawings. Loose weathered rock shall be removed.

The bottoms of all excavations shall be trimmed to line and grade to the satisfaction of the Project Manager.

If, for any reason, excavation is carried out beyond the lines and grades shown on the drawings, the Contractor shall remove the excess material and take the necessary measures to restore the required lines and grades with approved backfill or concrete, at his own expense.

Should the Contractor wish to excavate beyond the limits given on the drawings for his own convenience, he may do so, at his own expense but only with the prior written approval of the Project Manager.

8.4 Slopes, slides, geological over break and unsuitable foundations

If geological conditions during the performance of the work do not permit excavation of slopes as shown on the drawings, or where the material is unsuited to forming a firm foundation for the structures, the Contractor shall modify the drawings accordingly or issue a direct request to the Project Manager to change the grades. The prior written approval of the Project Manager is mandatory.

If, in the Contractor's opinion the slopes as shown on the drawings are objectionable, and in his opinion should be changed, he shall obtain the written agreement of the Project Manager prior to starting the work on such modified excavation.

If over break, slides or rock falls occur, which are due to improper working methods or negligence by the Contractor, and the effective excavated surfaces are beyond the excavation lines shown on the drawings, the Contractor shall remove all excessive material and place suitable and approved backfill material in the excavated voids. This work and material shall not be paid.

8.5 Execution

The surface excavation shall be performed by any approved method using any excavating and hauling equipment suitable for the work in accordance with the submitted detailed plans and time schedule or approved modifications thereof. The work areas shall be kept dry and drained.

The work areas shall be kept dry and drained at all times during construction.

All final or remaining surfaces shall be protected against damage by erosion and travel of the construction equipment with methods proposed by the Contractor and approved by the Project Manager in writing. Any damage caused shall be repaired by the Contractor.

The Contractor shall exercise particular care when excavating in the vicinity of existing structures or those under construction. He shall reinstate any damage to structures or equipment caused by his operations, at his own cost.

The Contractor shall protect the subsoil and particularly the ground water from contamination by fuel or oil from his equipment.

8.5.1 Clearing and grubbing

Clearing means the removal, transport and appropriate disposal of all trees, brush, stumps, fences, existing structures, spoil, debris and other obstructions in the areas to be occupied by the Permanent works, surfaces of borrow and quarry areas, spoil and stockpile areas, and where interfering with the procedure or functioning of the work.

Grubbing means the removal, transport and disposal of all roots, buried logs, foundations of structures (except concrete or masonry in mortar) and other materials foreign to the natural topsoil in the areas to be occupied by Permanent works and surfaces of borrow and quarry areas.

Clearing and grubbing work shall be performed either manually or with mechanical equipment. The Contractor shall make every reasonable effort to salvage such material which may be put to beneficial use.

All materials from clearing and grubbing work shall remain the Employer’s property but the Contractor may, subject to written approval from the Project Manager, retain any material for his use. Materials which the Contractor does not wish to use shall be disposed of in an approved manner.

Materials to be burnt shall be piled neatly in such a manner and in such locations as to not cause any fire risk and shall be burnt completely so that all material is reduced to ashes.
The Contractor shall have suitable equipment and supplies for fighting fire during the burning of material and shall take all necessary precautions to prevent fire from spreading. Toxic materials such as tyres etc. shall not be burnt but disposed of in the approved manner.

8.5.2 Stripping and loose excavation

Stripping consists of removing all rubbish, humus, vegetable material and all or part of the organic topsoil in the areas and to the depth as indicated on the drawings or as otherwise directed by the Project Manager.

Loose Excavation means general excavation of material such as organic topsoil, clay, silt, sand, gravel, and boulders of up to 0.75 m^3 in volume and soft or disintegrated rock, which can be removed by common earth moving equipment without ripping or blasting.

Stripping and loose excavation shall be accomplished by proper excavation and hauling equipment suitable for the work which allows for an efficient work progress adopted to the soil conditions encountered.

8.5.3 Rock excavation by ripping

Rippable material is defined as rock which can be loosened or broken down by a bulldozer capable of developing 220 kW (300 PS) of continuous power equipped with a single shank rear-mounted, heavy-duty rock ripper, operating in low gear.

Material which in the opinion of the Contractor should be removed by ripping shall be exposed, and the Project Manager notified before proceeding further. The top of the rock surface shall be surveyed by the Contractor. The survey and classification is subject to the written approval of the Project Manager.

Contractor's failure to follow the procedure outlined above will forfeit his right to claim any classification other than that allowed by the Project Manager, who, in such case, will classify the excavated quantities.

Ripping shall be performed in such manner that the ripper tooth does not damage the material lying beyond the final excavation lines. Any material remaining to the final excavation lines shall be removed by wedging, barring, broaching or other suitable methods approved by the Project Manager.

8.5.4 Dental excavation

Dental excavation shall include the removal of unsuitable material from shear zones, clay seams, pockets, joints, cracks or from spaces between boulders beyond the lines of excavation as indicated by the Project Manager established in the field, which are too small to be excavated by common earth moving equipment.

Dental excavation, depending on its extent, will require the use of a backhoe, hand tools, or other small excavating equipment, as well as the use of a high velocity air-water jet. The methods employed shall be such as to avoid fracturing of the rock adjacent to the material being removed.

Dental excavation shall be performed where directed. The extent to which such material shall be removed including the depth, direction, and dimensions of the work, shall be determined in agreement with the Project Manager in writing. In general, however, excavation into cracks or seams shall be to the depth that is a minimum of three times the seam width and such excavation shall be backfilled with concrete. No blasting will be permitted.

8.6 Excavated materials

All suitable materials from the excavations shall be utilised to the fullest extent practicable as construction materials in permanent and temporary works, subject to the written approval of the Project Manager.

The Contractor's excavating techniques shall be such, that as much as practicable, construction materials will be yielded.

The suitable material shall be stockpiled. If the moisture content of excavated materials suitable for embankments or backfill is too high after excavation, the material shall be drained and dried in the stockpile until the moisture content is sufficiently reduced to allow placement, or vice versa moistened if too dry.

8.7 Disposal of excavated materials

Excavated material which is not suitable for, or are in excess of the construction requirements shall be disposed of in the spoil area as directed or approved by the Project Manager.

The spoil tips shall be located where they will not interfere with the natural flow of streams or rivers or other works. No rock material may be dumped into the river bed.

The Contractor shall shape and trim the stockpiles to the lines and grades as directed. Adequate diversion of water courses in such areas and proper drainage shall be provided as proposed by the Contractor and approved by the Project Manager. The Contractor shall be liable for any damage to the works or to the property of third parties caused by poor drainage in the spoil or stockpile areas.

8.8 Preparation and protection of excavation surfaces

Excavation surfaces against or upon which concrete, embankment fill, or backfill will be placed shall be prepared and protected as specified herein and in combination with specifications contained in the pertinent sections of these specifications or as shown on the drawings.

If, during excavation work, materials beyond the limits of excavation shown on the drawings are loosened or disturbed, the Contractor shall re-compact the loosened material or remove it altogether and replace it with other compacted fill or concrete as directed.

Foundation excavation shall be kept well drained and free of standing water. The Contractor shall provide all necessary drains, ditches and sumps and use pumps when necessary to ensure that foundation surfaces are not harmed by water. When foundations are thus affected, the affected material shall be removed and replaced with approved backfill.

Any support to be applied to the finished excavation surfaces where it is deemed necessary shall be carried out by the Contractor and approved by the Project Manager.

8.9 Dental filling works

Zones of unsatisfactory material below the foundation levels shown on the drawings or as directed by the Project Manager in writing which will require excavation, may be encountered.

All such material should be removed and disposed of as directed by Project Manager. Dental excavation shall consist of the removal of earth such as talus, or unsound rock in fault zones, such as soft, or highly weathered rock from below the foundation or other base excavation lines indicated on the drawings or directed by the Project Manager where the use of power excavating equipment is not practicable.

Dental work consists of the treatment and filling with concrete of all fault joints and fractures or localised loose material where dental excavation has been done. Mainly the shear zones, fault joints, fractures and cracks which should be discovered in excavation the structure foundation and where the location is considered necessary by the Project Manager shall be treated accordingly.

After excavation and cleaning with water under pressure the opening shall be filled with concrete in accordance with the related specifications. The depth of the filling shall be at least three times the width of loose zone or fault when less than 1 m wide and 1.5 to 2 times the width for those more than 1 m wide. Within the dam foundation area, faults or other discontinuities wider than 1 m shall be dealt with on an individual basis as approved by the Project Manager in writing.

8.10 Particular excavation applications

8.10.1 Excavation of parts of an existing embankment

The excavation of part of an existing embankment such as the removal of a distinct part of the crest requires special care to be taken by the Contractor. In this respect the Contractor has to take all precautions to avoid the following:

- To destroy the existing structure to a larger extent than required;
- To demolish the function of any detail of the structure; and
- To be able to re-construct the particular part.

Prior to the start of any work the Contractor shall submit to the Project Manager for written approval a method statement describing the procedure required to carry out the specific excavation. The method statement shall include but not be limited to the following:

- Excavation method (including the applied equipment, materials etc.).
- Storage procedure for the excavated materials and details regarding the protection of these.

- Description of all temporary support measures to ensure that the remaining embankment is kept unchanged, if applicable.
- Preparatory works (such as shaping of the slope) required for the reconstruction of the excavated part of the embankment.
- Reconstruction procedure in respect to the different material to be backfilled.

8.10.2 Excavation of trenches in existing embankments

The excavation of trenches such as for the removal and/or reconstruction of sluices barrels require special consideration and attention.

The excavation shall be wide enough to allow for backfill compaction parallel to the structure using heavy rolling compaction equipment. The inclination of the embankment slopes shall be as flat as possible to reduce differential strain. The final slope inclinations shall be determined by the Contractor. He shall provide evidence to the Project Manager that the inclination he intends to use is sufficient stable. No work shall start before the Contractor receives the written approval of the Project Manager.

The embankment material of the previously excavated slopes shall be cut back to well-compacted material that has not been affected by wetting or drying.

Excavation shall extent to rock foundation, where line, grade and density are uniform. Rocks and/or irregularities at the foundation contact that might create a stress concentration should be removed. Cleaning and backfilling should treat existing defects such as soft or pervious soil filling in the rock, fault gouges, fractures, erosion channels or solution cavities that cannot be removed. These defects require removal to an adequate depth and replacement with lean concrete slush grout, dental concrete or specially compacted earth fill as specified or directed by the Project Manager.

The embankment slopes as well as the foundation surfaces shall be protected until reconstruction commences.

9.1 MONITORING

The Contractor shall be responsible for the procurement of all the instrumentation components in due time. Before placing the purchase order the Contractor shall seek for the Project Manager's approval of the instruments.

The equipment to be supplied and installed comprises the following:

a) Levelling monuments and fix points;

The Contractor shall be prepared to accept changes in the instrumentation layout or additional installations of instruments, if required by the Project Manager, and shall also be prepared to receive installation instructions for changed site conditions. The Contractor shall provide access to any instrumentation location at any time during the construction.

9.1.1 Levelling monuments and fix points

A network of levelling points and fix points shall be installed on the embankment as indicated herein or as directed by the Project Manager.

If not already existent, a minimum of 2 permanent fix points shall be established on each abutment. The location of each fix point shall be marked in detail on drawings supplied by the Contractor. The levelling monuments shall be built along the dam crest at intervals of 100 m close to the upstream dam shoulder.

The Contractor shall supply, install and survey all monuments including survey pins, pipes and caps, concrete and backfill as shown on the drawings or as directed by the Project Manager. Levelling pins shall be of stainless steel, cast iron or steel bolts embedded in concrete of suitable size. A stainless steel plate fixed to the monument shall mark the chainage of the dam.

Immediately after installation of any point, its position and level shall be precisely surveyed. The level and coordinates shall be computed and submitted in writing to the Project Manager.

9.1.2 Installation of Standpipe piezometers

Standpipe piezometer tips shall be of porous ceramic not less than 150mm long and at least 40mm diameter and shall be protected at each end by unplasticised polyvinyl chloride (uPVC) fittings. The ceramic shall be high air-entry type.

Standpipe tubing shall consist of uPVC tubing to BS 3506 Class 6. Tubing to extend existing standpipes shall be of the same size as the existing tubes and have an appropriate jointing detail to provide a flush internal joint.

During earthwork filling operations standpipes shall be extended in 1.5 m lengths. Fill material shall then be placed and compacted around the tube by hand in a mound shape, the tube being maintained vertical with the top of the mound 750mm higher than the surrounding fill at all times.

Installation of standpipe piezometers in boreholes shall be as follows:

(i) Each piezometer shall be installed in a separate borehole 100 mm minimum diameter. The installation shall be completed as soon as practicable after drilling so as to minimize the amount of deterioration or alteration that occurs in the ground around the location of the piezometer tip. Holes shall be cased through unstable ground.

(ii) After drilling to the required depth, using percussive or rotary methods, but without the use of air flush or drilling mode in the vicinity of the tip position, the hole shall be flushed clean.

(iii) Sand falling wholly between the limits of grading 1200 and 200 microns will be placed to a minimum depth of 150 mm at the base of the hole by flushing using clean water and a tremie pipe. The piezometer tip, saturated in water prior to the installation, shall then be coupled to the appropriate standpipe tube and lowered onto the sand, and more sand added by flushing through the tremie pipe to surround and cover the tip and to fill the hole to the level shown on the Drawings.

(iv) A plug of bentonite formed of either stiff hand rolled balls or pellets shall then be tamped over the sand approximately 500 mm thick. The hole shall then be backfilled with a 3:1 by weight bentonite/cement grout mix prepared by thorough mixing using equipment approved by the Project Manager with just sufficient water to allow it to be tremied to the bottom of the hole.

(v) Casing if used to maintain the hole open shall be withdrawn concurrently with the progress of the backfilling.

(vi) An accurate record of the depths of the piezometers, sand surround and seals shall be kept.

At final ground level the standpipes shall be protected by a lockable vandal-proof cover set in a concrete surround.

9.2 REPAIR OF DEFECTIVE CONCRETE

9.2.1 General

Concrete that is damaged from any cause, structural concrete that has cracked, concrete that is honeycombed, fractured or otherwise defective and concrete that – because of excessive surface depressions, must be excavated and built up to bring the surfaces to the prescribed lines, shall be repaired or replaced in accordance with these particular specifications, the ICTAD specification and the contract requirements.

All design requirements shall be as specified herein. Designs by the Contractor shall be subject to the approval of the Project Manager

9.2.2 Quality assurance

All concrete shall be repaired as necessary to produce surfaces conforming to the specified tolerances and finish requirements of the contract and in which these specifications are incorporated.

If in the opinion of the Project Manager, the results of concrete repair indicate that proper quality control procedures are not being consistently utilized; further repair work may be suspended in the whole or in part at the discretion of the Project Manager. Such supervision will be effective until the Contractor demonstrates substantial improvement in quality control procedures and repair results.

9.2.3 Materials and workmanship

The Contractor shall furnish all materials for repair or maintenance of concrete and shall furnish all materials for forming, curing, and protection of the repairs, as required. All materials shall meet materials specifications and all equipment used and methods of operation for the repair or maintenance of concrete shall be subject to approval of the Project Manager.

The reference to materials in the specifications, wherein manufacturer's products or brands are specified by "brand name or equal" purchase descriptions, are made as standards of comparison only as to type, design, character, or quality of the article required, and do not restrict the Contractor to the manufacturer's products or to the specific brands named. It shall be the responsibility of the Contractor to prove equality of materials and products to those referenced and to provide all necessary to prove the equality of materials or products which the Contractor offers as being equal to those referenced.

Concrete shall be repaired by skilled workmen.

9.2.4 Safety and environmental precautions

All work shall be performed in accordance with the applicable safety and health standards, the contract and these specifications. Certain additional safety precautions shall be employed to prevent skin and eye contact with chemicals and resins.

All contaminated materials such a swipes, empty containers, and waste material shall be continually deposited in containers that are protected from spillage. Spillage shall be immediately and thoroughly cleaned up and disposed of in accordance with applicable regulations.

9.2.5 Preparation for repair

All damaged, deteriorated, loosened, or un bonded portions of existing concrete shall first be removed by water blasting, bush hammering, jack hammering, or any other approved method and equipment. Finally, all surfaces of the existing concrete shall be prepared by contained wet sandblasting, or water blasting to remove any micro fractured surfaces resulting from the initial removal process.

The surface shall then be cleaned and allowed to dry thoroughly, unless the specific repair technique requires application of materials to a saturated surface.

Concrete removal processes involving the use of jack hammers in excess of 15 kg, dry sandblasting, or scabblers shall not be used without the prior approval of the Project Manager. The use of acids for cleaning or preparing concrete surfaces for repair will not be permitted.

9.2.5.1 Saw cut edges

The perimeters of repairs to concrete that involve concrete removal and subsequent material replacement shall be saw cut perpendicular to the repair surface to a minimum depth of 2.5 cm. Featheredge repairs to concrete shall not be used.

9.2.5.2 Reinforcement

All loose scale, rust, corrosion by products or concrete shall be removed from exposed reinforcing steel. Reinforcing steel exposed for more than one-third of its circumference shall be completely exposed to provide 2.5 cm minimum clearance between the steel and the concrete.

Damaged or deteriorated reinforcement steel shall be removed and replaced as directed by the Project Manager.

9.2.5.3 Maintenance of prepared surfaces

After the concrete has been prepared and cleaned, it shall be kept in a clean, dry condition until the repair has been completed. Any contamination, including oil, solvent, dirt accumulation, or foreign material shall be removed by additional wet sandblasting and air-water jet cleanup followed by drying.

9.2.6 General repair procedures

Concrete that is damaged or defective, such as that containing spalls, broken edges, rock pockets, honeycombs, or unconsolidated concrete shall be repaired by removing the damaged or defective concrete to sound concrete.

All repair work shall be finished to the same standard as the surrounding concrete, and shall be adequately cured. Plastering or rendering of surfaces to produce a smooth surface finish shall not be permitted.

No repair of defective concrete shall be undertaken until the imperfections have been inspected by the Project Manager. The methods used to repair each individual area of imperfection shall be approved by the Project Manager prior to the start of the works. Repairs shall be performed by skilled workmen.

For bonding new concrete to older one, a bonding medium of epoxy, formulated for this purpose, shall be used in accordance with the manufacturer's instructions. Alternatively, a neat cement paste may be used. A paste of Portland cement and water mixed to a thick cream consistency shall be applied to damp, clean concrete. The concrete shall have no free water on its surface.

Concrete shall be repaired as follows:

9.2.6.1 Minor areas of defective concrete

The Contractor shall drill a hole of such diameter in the defective area into sound concrete, that the defective concrete is completely removed. The minimum diameter of such a hole shall be 50 mm, the minimum depth shall be equal to the diameter of the hole drilled and the maximum depth shall be 70 mm. The hole shall then be reamed out such that the diameter at the bottom of the hole is at least 20 mm larger than the hole at the surface. Finally, the hole shall be cleaned and washed out, the surplus water removed and filled with suitable material and methods as approved by the Project Manager and as described below.

9.2.6.2 Large areas of defective concrete

Concrete which contains defective areas too large to be repaired as described above shall be cut to a minimum of 25 mm into sound concrete in all directions and to the far face of surface reinforcement or further if necessary to remove all the defective material, and then the edges undercut. The area to be removed shall be outlined to a depth of 15 mm with a diamond saw prior to removing the defective concrete. The fresh concrete surface shall then be cleaned, washed down and thoroughly soaked with water until the concrete becomes saturated. The concrete surface shall be damp. Finally the hole shall be filled with suitable material as approved by the Project Manager and as described below.

9.2.7 Fillings

All fillings for depressions shall be bonded tightly to the surfaces of the holes and shall be sound and free from shrinkage cracks and drummy areas after fillings have been cured and have dried. Repairs shall be made with concrete filling, dry-pack filling, or epoxy concrete and/or epoxy mortar. Concrete, mortar and dry pack mortar filling shall each be mixed in proportions to produce a repair at least equivalent in strength and durability to concrete in which the repair is required.

9.2.7.1 Dry-pack mortar

Dry-pack mortar fillings shall be used for filling holes having a depth nearly equal to, or greater than the least surface dimension; for narrow slots cut for repair of cracks and for grout pipe recesses. Dry-pack mortar shall not be used for filling behind reinforcement, for filling of holes that extend completely through a concrete section or for any critical repairs which will be expected to be exposed to severe service conditions e.g. high velocity water flow.

The dry-pack mortar shall consist of 1 part type I or II Portland cement (according to ASTM C150) to 2.5 part of clean sand that will pass the US Standard Sieve No.16 (1.18 mm). Only enough water shall be used to produce a mortar which will stick together when moulded into a ball by a slight pressure of the hands and will not exude water but will leave the dry-pack in thin layers.

A careful inspection of the concrete shall be carried out to ensure that the hole is thoroughly clean and is in sound concrete. The interior surface of the hole shall be pre-soaked prior to application of the dry pack.

A mortar bond coat shall be applied to the concrete hole surface prior to placing dry pack. The mortar bond coat shall consist of 1 part Portland cement to 1 part sand mixed with water to give a fluid paste consistency. The mortar bond coat shall be thoroughly brushed onto the hole surfaces.

Dry-pack mortar shall be placed and packed in layers. Each layer shall be solidly compacted over the entire surface by use of a hardwood stick and hammer.

Proper curing is essential for a successful dry-pack repair. The surface of the repair area shall be protected from drying and shall be kept continuously moist for 7 days. After 7 days and while the surface is still damp, two coats of curing compound shall be applied to prevent moisture loss.

9.2.7.2 Concrete filling

Concrete filling shall be used for holes extending entirely through concrete sections, for holes in which no reinforcement is encountered and which are greater in area than 0.1 m^2 and deeper than 100 mm, and for holes in reinforced concrete which are greater in area than 0.05 m^2. Holes in reinforced concrete which extend beyond the reinforcement shall be enlarged as necessary to permit satisfactory filling of the hole with concrete.

Concrete filling shall be tightly packed and completely bonded to the surfaces of the hole. The mix proportions of the filling materials shall be such as to provide a strong, dense repair.
A non-shrink agent shall be used where a watertight joint is required. The surface of patches shall be smooth and flush with the surrounding concrete.

9.2.7.3 Epoxy mortar and concrete

General

Deficient concrete which is exposed to flowing water shall be repaired with epoxy mortar or epoxy concrete and shall conform to the requirements specified hereunder.

Except otherwise directed by the Project Manager, repairs less than 5 cm deep shall be carried out applying epoxy mortar, whereas epoxy concrete shall be applied for repairs with a depth greater than 5 cm.

The locations where epoxy mortar or concrete shall be used will be agreed with the Project Manager, who will approve the type and brand to be used.

The method of repair, the proportions of the epoxy mortar and concrete and the method of mixing and placing shall be as recommended by the manufacturer. The product used shall not contain toxic elements. The same epoxy resin system shall be used for both the bond coat and the epoxy mortar and concrete.

Particular safety precautions using epoxy materials

Additional safety precautions shall be employed when using epoxy materials. Skin contact with uncured epoxy shall be avoided. Protective clothing, including rubber or plastic gloves, shall be worn by all persons handling epoxy materials. All exposed skin areas that may come in contact with the material shall be protected with a protective barrier cream formulated for that purpose. Appropriate solvent may be used to clean tools and spray guns, but in no case shall the solvents be incorporated in any epoxy resin or in the placing operation. Solvents shall not be used to remove epoxy materials from skin. Only soap, water and rags shall be used for this purpose.

Material

Epoxy resin: The epoxy resin shall meet the requirements of ASTM C881 for a type I, grade 2, class B or C or a type III, grade 2, class B or C epoxy system. In addition, it shall be a 100 percent solids system, and no unreactive diluents, wetting agents, or volatile solvents shall be used.

*Aggregates for epoxy concrete:*The aggregates used for epoxy concrete shall be clean and dry. Except for gradation, fine and coarse aggregates shall meet the requirements of ASTM C33, Standard Specification for Concrete Aggregates. Aggregates for epoxy concrete shall meet the requirements for gradation specified below, except that the percentages of fine aggregates passing a No.100 sieve shall be held to the lower limit specified to the greatest extent practicable. The fine and coarse aggregates used in the preparation of epoxy resin concrete shall be oven dry and shall be conditioned to a temperature of 15 to 20°C prior mixing the epoxy resin binder. Gradation of the coarse and fine aggregate shall conform to the following requirements when tested in accordance with ASTM C136, Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.

The gradation of fine aggregates shall be as follows:

Maximum size of fine aggregates Dmax shall be 3 mm. The fineness modulus of the fine aggregates shall lie between 2.3 and 3.1. The amount of fines (i.e. passing sieve No. 200) should generally be kept to 5% or less by weight. Fine aggregates with an amount of fines in excess of 5% shall only be used for concrete if clearly demonstrated by tests that this will not deteriorate neither strength, nor water tightness or durability of the concrete.

Approximate gradation for coarse aggregate for epoxy concrete is given below:

Sieve size (ASTM Standard)	Openings in mm	Percentage passing by weight
¾''	19.1	100
½''	12.7	90 – 100
3/8''	9.52	40 – 70
No. 4	4.76	0 – 15
No. 8	2.38	0 – 5

Aggregates for epoxy mortar: Except for gradation, fine aggregate for use in epoxy mortar shall conform to the requirements to ASTM D404, Standard Specification for Aggregate for Masonry Grout. The gradation of fine aggregate for epoxy mortar shall conform to the requirements specified below. The aggregate used in the preparation of the epoxy resin mortar shall be oven dry and shall be conditioned to a temperature of 15 to 20°C prior to mixing the epoxy resin binder. Gradation of the fine aggregate shall conform approximately to the following requirements when tested in accordance with ASTM C136, Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.

Sieve size (ASTM Standard)	Openings in mm	Percentage passing by weight
No. 4	4.76	100
No. 8	2.38	95 – 100
No. 16	1.19	60 – 100
No. 30	0.595	35 – 70
No. 50	0.297	15 – 35
No. 100	0.149	2 – 5
No. 200	0.074	0 – 2

The aggregate shall be well graded from coarse to fine and the material passing the No. 100 sieve shall be held to a minimum.

Commercially available sand grading prepared specifically for epoxy mortars may be used on approval of the Project Manager.

Mixing and batching

The epoxy components shall be mixed thoroughly prior to the application of the bond coat and prior to the addition of the aggregates. The epoxy mortar shall be thoroughly mixed with a slow-speed mechanical stirrer or other equipment producing equivalent results. The mortar shall be mixed in small-sized batches so that each batch will be completely mixed and placed within approximately 30 minutes form the time the two components for the epoxy resin are combined. The rate of mixing should be such that entrained air is held to a minimum.

To obtain epoxy concrete the fine aggregate shall be added to the epoxy resin binder and the material shall be mixed until a rich mortar consistency is attained. Then the coarse aggregate shall be added and the epoxy concrete thoroughly mixed.

To obtain epoxy mortar the fine aggregate shall be added to the binder gradually and mixing continued until all particles are coated providing a stiff, workable mixture.

Surface preparation

Epoxy concrete: All fines, dust and other loose materials on the contract surface shall be removed by scrubbing with a stiff bristle brush, followed by washing. The dry, cleaned surface shall receive a prime coat of epoxy resin binder of composition as recommended by the manufacturer of the epoxy resin. The prime coat shall be applied in a thin coat and briskly scrubbed into the dry concrete surface with a still bristle brush.

Care shall be exercised to confine the epoxy resin to the area being bonded and to avoid contamination of adjacent surfaces. However, the epoxy bond coat shall extend slightly beyond the edges of the repair area.

Epoxy mortar: The surface of the existing concrete to which epoxy mortar is to be bonded shall be prepared and maintained in a clean and dry condition, unless epoxy mortar application to wet concrete surfaces is approved by the Project Manager.

Epoxy mortar shall be placed only on sound clean and dry surfaces. All repairs shall be protected from rain or seepage water for at least 12 hours and from all types of traffic for a period of 24 hours.

The dry, cleaned surface of the cavity shall receive a prime coat of epoxy resin binder of composition as recommended by the manufacturer of the epoxy. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff bristle brush.

Care shall be exercised to confine the epoxy resin to the area being bonded and to avoid contamination of adjacent surfaces. However, the epoxy bond coat shall extend slightly beyond the edges of the repair area.

Placement of epoxy mortar and concrete

Epoxy concrete and mortar shall be placed when the atmospheric and concrete temperatures are less than 40°C and remain below this value for a period of at least 24 hours. If the work is required to be carried out at temperature higher than those specified, approved measures such as recommended by the manufacturer of the epoxy binder and approved by the Project Manager shall be provided to lower the ambient and concrete temperatures as required for satisfactory work. Such measure might include but are not limited to cooling equipment and necessary shelters.

Forms shall be used as necessary to prevent slumping or sagging of finished epoxy-bonded epoxy mortar and concrete. Such forms shall be covered with polyethylene film. Form oil shall not be used.

Epoxy concrete: Placement of the epoxy resin concrete shall be delayed until the prime coat becomes tacky. The epoxy resin shall be places in layers not over 10 cm in thickness. The thickness of courses and time interval between courses shall be such that the temperature of the epoxy concrete does not exceed 60°C any time during hardening.

Mechanical plate, screed, or float vibrators or hand tampers shall be used to consolidate the epoxy concrete. Excess epoxy concrete which becomes spread on the adjacent surfaces of the hardened concrete shall be removed before it hardens.

Epoxy mortar: Placement of epoxy resin shall be delayed until the prime coat becomes tacky. The epoxy resin may be allowed to stiffen to a very tacky condition rather than a fluid condition before epoxy mortar is placed on steep sloping or vertical surfaces, in which case special care shall be taken to thoroughly compact the epoxy mortar against the stiffening bond coat. If any bond coat has cured beyond the tacky state, it shall be completely removed by sandblasting, and proper clean-up, and drying shall be accomplished a new bond coat applied.

The epoxy mortar shall then be placed in the cavity in layers not exceeding 3 cm in thickness. The time interval between placements of additional layers shall be such that the temperature of the epoxy resin mortar does not exceed 60°C at any time during hardening.

The prepared epoxy mortar shall be tamped, flattened and smoothed into place in all areas. The mortar shall be worked to grade and given a steel trowel finish. Special care shall be taken at the edges of the area being repaired to ensure complete filling and levelling and to prevent the mortar from being spread over surfaces not having the epoxy bond coat application. Steel troweling shall be performed in a manner to best suit the prevailing conditions but, in general, shall be performed by applying slow, even strokes. After levelling of the epoxy mortar to the finished grade, the mortar shall be covered with panels smoothly lined with polyethylene sheeting and weighted with sandbags or otherwise braced or by other means acceptable to the Project Manager until danger from slumping has passed. When polyethylene sheeting is used, no attempt shall be made to remove it from the epoxy mortar repair before final hardening.

Mechanical plate, screed or float vibrators or hand tampers shall be used to consolidate the epoxy resin mortar. Excess epoxy resin mortar which becomes spread on the adjacent surfaces of the hardened concrete shall be removed before it hardens.

Epoxy mortar repairs shall be cured immediately after completion of each repair area until the mortar is hard.

In no case shall epoxy-bonded epoxy mortar be subjected to moisture until after the specified post curing has been completed.

9.2.8 Sealing of cracks with resin injection

When hardened concrete is cracked in depth or when hollow plane delamination or open joints exist in hardened concrete and when structural integrity or water tightness must be restored for the structure to be serviceable, resin injection shall be used for repair, as directed by the Project Manager.

However, since not all cracked, delaminated, or jointed concrete can be restored to serviceable condition by resin injection, resin injection repairs shall be made only as directed by the Project Manager.

Two basic types of injection resin are used to repair concrete:

- Epoxy resins are used to rebond cracked concrete and to restore structural soundness. Epoxy resins may also be used to eliminate water leakage from concrete cracks or joints, provided that cracks to be injected with epoxy resin are stationary. Cracks that are actively leaking water and that cannot be protected from uncontrolled water shall not be injected with epoxy resin. Cracks to be injected with epoxy resin shall be between 0.125 mm and 5 mm in width.
- Hydrophilic polyurethane resin is used to eliminate or reduce water leakage from concrete cracks and joints and to inject cracks subject to some degree from movements. Hydrophilic joints shall be used when restoration of structural bond is desired. Cracks to be injected with polyurethane resin shall be 0.125 mm in width or greater.

Other types of injection resin are available for nonstandard or specialized repair applications. Use of these materials shall require the prior approval of the Project Manager.

The Contractor shall submit to the Project Manager evidence that the contractor is qualified to perform resin injection repairs. The data shall show that the Contractor has a minimum of 3 years of experience in performing resin injection work similar to that detailed in the drawings.

The Contractor shall submit to the Project Manager prior to the start of the works a detailed proposal for the injection repairs for approval.

The Contractor shall provide a full-time, onsite supervisor throughout the duration of the resin injection works.

Epoxy resin for injection shall meet the requirements of specification ASTM C 881 for a type I, grade 1 epoxy system. The class of the system shall be appropriate for the temperature of the application.

The polyurethane resin system for injection into cracked concrete shall be a two-part system composed of 100 percent hydrophilic polyurethane resin and water. The polyurethane resin, when mixed with water, shall be capable of forming either a flexible closed-cell foam or a cured gel dependent upon the water-to-resin mixing ratio. The amount of water mixed with the polyurethane resin shall be such that the cured material meets the following physical properties:

- minimum tensile strength 140 kPa
- bond to concrete (wet) greater than 140 kPa
- minimum elongation 400 percent

The injection of pure polyurethane resin, not mixed with water shall not be allowed.

Additional safety precautions as described in paragraph 9.2.7.3 shall apply.

The concrete surface to be repaired by resin injection shall be thoroughly cleaned of all deteriorated concrete, efflorescence and all other loose material. The area to be injected shall then be thoroughly inspected and an injection port drilling and pumping pattern established.

Upon completion of resin injection, all excess materials shall be removed from the exterior surfaces of the concrete.

The application of resin injection for concrete repair shall include the following:

- Epoxy resin injection repair

  The epoxy resin shall fill the entire crack or hollow plane delamination with liquid epoxy resin system and shall contain the resin system in the crack until it has hardened. The Contractor shall be responsible for drilling and removing three cores, minimum 50 mm diameter, from the injected concrete at locations determined by the Project Manager to determine the completeness of the injection repair. Injection shall be considered complete if more than 90 percent of the void is filled with hardened epoxy. If injection is not complete, reinjection and additional cores may be required at the direction of the Project Manager at no additional cost. Epoxy injection repair methods shall be in accordance with the approved detailed proposal for epoxy injection repair and shall be adjusted to fit the repair situations encountered at site.

- Hydrophilic polyurethane resin injection repair

  The process used for polyurethane injection of cracks or joints to reduce water leakage shall consist of the following basic steps:

  1. Intercept the water flow paths with valved drains installed into the concrete to control the leakage.
  2. Install injection ports by drilling holes designed to intersect the cracks at depth below the concrete surface. The maximum spacing of injection ports shall not exceed 150 cm and closer spacing of ports may be required.

3. All injection holes shall be flushed with clean water to remove drilling dust and loose debris and to clean the intersected crack line. Each drill hole shall be water tested at the resin injection pressure to determine if the crack intersection is open. Polyurethane resin shall not be pumped into a drill hole that refuses to take water at the resin injection pressure.
4. Inject polyurethane resin system into cracks or joints at the minim pressure required to obtain the desired travel, filling and sealing. The mix water to resin ratio shall be 1:1 unless otherwise approved by the Project Manager. The Contractor should anticipate the necessity to provide a surface seal for the crack or joint to retain the injection resin. It may also be necessary to inject the crack or joint in an intermittent manner to achieve filling and sealing. Injection shall be by the method of split spacing unless otherwise approved by the Project Manager. Primary holes shall be drilled and injected on centers not exceeding 3 m. Secondary holes, half between the primary holes, will then be drilled and injected. If resin take occurs in the secondary holes, a series of tertiary holes, half way between the secondary and primary holes, shall then be drilled and injected. All holes shall be injected to absolute refusal.
5. Remove drains, injection ports, and excess polyurethane upon completion of resin cure.

This process shall entirely stop the water leakage to a dust dry condition or as directed by the Project Manager.

The pump used to inject the polyurethane resin system shall be a two-component positive-displacement-type pump with static mixing head and pressure regulation necessary to control injection pressures while pumping low volumes. The equipment will be subject to approval by the Project Manager. The use of single component pumps and/or the injection of pure water followed by injection of pure resin will not be approved.

Polyurethane resin injection methods shall be in accordance with the approved, detailed proposals for injection repair and shall be adjusted to fit the repair situation encountered at site.

9.2.9 Repair of existing open joints

Repair of existing open joints, for example in stilling basins shall be repaired with a mastic product. The mastic shall be flexible, waterproof, easy to apply to existing joints, have good bonding properties to existing mastic and concrete and be appropriate for the climatic conditions at site.

The method of application shall be as recommended by the manufacturer.

The joint shall be cleaned and the existing mastic shall be removed as far as possible and replaced by the new joint mastic. The product and methodology shall be submitted by the Contractor to the Project Manager for written approval before the product is ordered from the manufacturer.

9.3 MISCELLANEOUS

9.3.1 Clearance of vegetation

Inappropriate vegetative growth and animals are a common concern regarding the maintenance and in some rare cases also regarding the stability of the embankment slopes.

The Contractor shall undertake the following corrective measures:

General

- Trimming of vegetative growth.

Upstream slope

- Removal of dead and smaller trees with trunk perimeter <100 cm including the refurbishment of damaged embankment sections.
- Trimming of large trees with trunk perimeter ≥100 cm which cannot be removed due to the size of the root system.

Downstream slope

- Removal of dead and smaller trees with trunk perimeter <30 cm including the refurbishment of damaged embankment sections.
- Trimming of large trees with trunk perimeter ≥30 cm which cannot be removed due to the size of the root system.

9.3.2 Clearance and restoration of existing toe drain

The Contractor shall clean all areas of the existing surface drain. “Cleaning” refers to the removal of all accumulated sediments, debris, vegetation (including bushes), garbage or any other foreign material and its disposal to the satisfaction of the Project Manager and according to the provision presented in the technical specification. The attention of the Contractor is drawn particularly to paragraph “Site Installation, Services and Environmental Obligations”.

The Contractor shall take all precautions to avoid any damage to existing structure. Any destruction caused by the works carried out under this Contract shall be repaired on expense of the Contractor.

9.3.3 Removal of ant mounds

Ant colonies generally consist of a complex series of tunnels that exacerbate existing cracks leading to “softening” of the embankment and thus threatening the structural integrity of an earthen embankment.

To reduce ant populations the Contractor shall physically destroy visible ant mounds. This can be accomplished by simply knocking down or disturbing mounds with a stick or a shovel. In a second step the anthill including the queens of the colonies shall be completely removed to the satisfaction of the Project Manager.

Fumigants and chemical treatment shall be the second step to control ant populations. Both must be purchased and applied by a certified pesticide

applicator. The treatment should be tailored to the type of ant species present and the extent of infestation. The Contractor shall contact a professional pest removal company for assistance to achieve a long term solution.

After the ant population has been eradicated the area of the mound shall be be refilled with selected material according to the specifications of this document and as directed by the Project Manager.

6.4 ENVIRONMENTAL MANAGEMENT PLAN				
	Environmental Management Plan for Proposed Developments will be issued with Awarding of the Contract			
No	**Intervention**	**Proposed activity**	**Anticipated Impacts**	**Mitigation measures proposed**

Section – 7

Form of Bid

Section 7 - FORM OF BID

Name of Contract: **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System C**

Contract No: **LK-MoMDE-465708-CW-RFB**

To: **The Director General, Mahaweli Authority of Sri Lanka**

Gentlemen:

1. Having examined the Standard Bidding Document - Procurement of Works – Major Contracts [ICTAD/SBD/02 - Second Edition, January 2007], Specifications, Drawings and Bills of Quantities and Addenda for the execution of the above-named Works, we the undersigned, offer to execute and complete such Works and remedy any defect therein in conformity with the aforesaid Conditions of Contract, Specifications, Drawings, Bills 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 acknowledge that the Contract Data forms part of our Bid.

3. We undertake, if our Bid is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Contract Data.

4. We agree to abide by this Bid until the date specified in ITB Clause 16 …… *[insert date]*, and it shall remain binding upon us and may be accepted at any time before that date.

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 understand that you are not bound to accept the lowest or any bid you may receive.

7. We declare that civil work contracts *have/ have not been* suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social, (including sexual exploitation and abuse (SEA) and gender based violence (GBV)), or health or safety requirements or safeguard in the past five years.
   (Note: If suspended, terminated or Performance Security is called give details)

Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US$ equivalent)
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for suspension or termination: *[indicate main reason(s) e.g. for GBV/ SEA breaches]*	*[insert amount]*
...	...	*[list all applicable contracts]*	...
Performance Security called by an employer(s) for reasons related to ESHS performance			
Year	**Contract Identification**		**Total Contract Amount (current value, currency, exchange rate and US$ equivalent)**
[insert year]	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for calling of performance security: *[indicate main reason(s) e.g. for GBV/ SEA breaches]*		*[insert amount]*

8. We certify/confirm that we comply with the eligibility requirements as per ITB Clause 3 of the bidding documents.

Dated this ……... day of……..20……...…

Signature …….. in the capacity of ……...……..….

duly authorized to sign bids for and on behalf of ……..

[in block capitals or typed]

Address: ……..…

Witness: ……..…….

Section - 8

Bills of Quantities

Notes: In preparation of the bidding document the users are advised to:

(1) Include the VAT Component separately and shall not carry the VAT component to the Form of Bid.

(3) Any discount offered will not be considered for Provisional Sum Items.

A GENERAL INFORMATION

Location of the Site

Veheragala, Dolakanda

Salient Features

Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ‘‘c’’

B SCOPE of Work

Civil Engineering Work

Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ‘‘c’’

Miscellaneous Requirements

Where in the course of the execution of the Works and existing foundations, walls, sewers, drains, pipes, wires, cables and other structures, places and things are exposed or are otherwise affected by the execution of the works, they shall be properly maintained and adequately supported and protected. And expedients adopted as will prevent inconvenience and ensure the safety and continuity in use of all services, all to the approval of the Engineer.

The contractor shall provide, erect and maintain suitable and sufficient warning lights, danger signals, signs and barricades, and shall take necessary precautions for the protection of the Works and the safety of the public. Roads closed to traffic shall be protected by effective barricades and suitable diversions provided where necessary. Obstructions shall be illuminated at night form sunset until sunrise.

The contractor shall minimize the pollution of and disturbance to the river, lands and other places on and around the Site. No trees or other vegetation shall be damaged or stripped except to the extent necessary for the works.

Excavated material and other things shall not be tipped or stockpiled near rivers or in places from which they could become dislodge, whether by reason of climatic condition of otherwise. The contractor shall provide, maintain and remove on completion of the Works, setting lagoon and other facilities to minimize pollution due to his operations such as, inter alia, quarrying, aggregate washing, concrete mixing and grouting.

The contactor shall as required by the Engineer, deliver to the Engineer or the Engineer’s Representative a return in such detail and at such intervals as the Engineer may prescribe showing the delivery, consumption and stock of materials, operating hours and fuel consumption of plant, concrete returns, labor returns and similar information.

C Preamble to the Bill of Quantities

1.1 The Bill of Quantities shall be read in conjunction with all parts of this entire Bidding Document; the Instructions to Bidders, General and Particular Conditions of Contract, Technical Specifications, Drawings, and supplementary information.

1.2 The Bill of Quantities includes lump sum items, unit price items and provisional sum items. The lump sum price quoted will be deemed to be full compensation for completion of work items and paid in full when the work is completed. The quantities given in the Bill of Quantities for the unit price items are estimated and provisional, and are given to provide a common basis for bidding. They are not intended to be the maximum or minimum quantities for payment. The unit prices will be considered full compensation for those work items. The basis of payment will be the actual quantities of work carried out under the provisions of the Contract, measured and valued at the applicable rates and prices in the priced Bill of Quantities.

1.3 The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction plant, equipment, labour, supervision, materials, transport, erection, maintenance, testing, insurance, overheads, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

1.4 A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

1.5 The rates and prices entered in the Bill of Quantities shall be full compensation for completed work and shall have taken full account of all requirements and obligations, covered by all parts of the contract, including but not limited to, the following, unless expressly stated otherwise:

a. All setting out and survey works including Pre and Post Construction Surveys.
b. All additional site surveys and investigations, preparation of field amendment drawings, shop drawings and As-Built drawings.
c. Mobilization and Demobilization of labour, all construction plant and equipment.
d. Establishment, Maintenance and Removal of all temporary facilities (Contractor’s and Engineer’s) including offices, workshops, houses, labour camps construction and storage yards, Laboratory facilities and Equipment, Transport for staff and labour etc.
e. Labour and all costs in connection therewith, including but not limited to social charges or fringe benefits.
f. The supply of material and goods, storage and costs in connection therewith including delivery to site and handling material within the site/sites.
g. Taking delivery of materials and goods supplied by others, unloading, storage, handling materials within site, and costs in connection therewith.
h. Construction Plant & Equipment and all costs in connection therewith.
i. Fixing, erecting and installing or placing of materials and goods in position, including usual auxiliary material etc.
j. Temporary Works.
k. Complying with any limitations and constraints on the use of the site/sites including coordinating with other Contractor's, with regard to site access, security etc.,

maintenance of access to households and other users, maintenance of existing roads, waterways etc.

l. Dealing with the existing flow of water from any source including irrigation flow requirement, rainfall and surface runoff, groundwater, wave action and the like. This includes all and any dewatering operations necessary for the execution of the Works as well as coffer damming if required.

m. General obligations, liabilities and risks involved in the execution of the Works set forth or reasonably implied in the documents on which the tender is based.

n. Overheads and profit.

o. Waste of material.

p. Attendance and transport for surveys including provision of boats and survey instruments, sampling and testing carried out by the Engineer.

q. Performing all sampling and testing which are required to be carried out by the Contractor, and supplying results of such tests.

r. Providing required material delivery certificates.

s. Coordination with Regulatory Institutes & all stake holders.

t. Disposal of all waste material.

u. Complying with all requirements in Specifications and Conditions of Contract where separate items have not been provided.

1.6 Where Bill of Quantities items describe the replacement of existing equipment or components, including mechanical and electrical equipment, the equipment removed remains the property of the Employer, unless stated otherwise in the contract documents. The rates entered shall include for delivery of such equipment to the Employer or for disposal if so directed by the Employer.

1.7 The whole cost of complying with the provisions of the Contract (excluding VAT) shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

1.8 General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.

1.9 Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part or not at all at the direction and discretion of the Engineer and in accordance with the Conditions of Contract. Where the expenditure against a Provisional Sum is made in the form of a Variation, the payment for the work will be made in accordance with Clause 37 of the Conditions of Contract.

1.10 The method and unit of measurement of completed work for payment shall be in accordance with the method described in the specifications for each item or in the Bill of Quantities. For Lump Sum items, measurements for Interim Payment Certificates shall be based on percentage completion of such item of work or milestone as per the Contractor's proposed schedule of monthly payments, as approved by the Engineer.

Bills of Quantities

SUMMARY

Bill No.	Description	Amount (LKR)
Bill No.1	**Preliminaries**	
Bill No.2	**Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System C**	
A	**Sub Total 1 - Summary of Bills 1 to 2**	
B	**Ddt: Provisional Sums**	**4,415,000.00**
C	**Sub Total 2 (A-B)**	
D	**Discount if any (%)**	
E	**Sub Total 3 (C-D+B)**	
F	**Provisional Sum 10% for Physical Contingencies (0.1xE)**	
G	**Sub Total 4 (E+F)**	
H	**Provisional Sum – 7% for Price Contingencies (0.07xE)**	
I.	**TOTAL BID PRICE, CARRIED TO LETTER OF BID (G+H)**	
Total Bid Price (Amount in words)		
J.	**VAT- 18 % of Bid Price ((I×0.18)**	
GRAND TOTAL INCLUDING VAT (I+J)		
Bill No. 3	**DAY WORKS**	
Sub Total 5 (Bid price with Day Works) (I+ Bill No. 3) [Will be consider only for evaluation purpose]		

Signature of Bidder:-……

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
	BILL 01: PRELIMINARIES					
1.1	**Insurance, Security bond and Management Services**					
1.1.1	Allow for Performance Security in accordance with Sub- Clause 4.2 of the Conditions of Contract	Provisional Sum			1,000,000.00	
1.1.2	Allow for Security Bonds & Guarantee in accordance with Sub-Clause 14.2 of the Conditions of Contract	Provisional Sum			885,000.00	
1.1.3	Allow for Insurances in accordance with Clause 18 of the Conditions of Contract	Provisional Sum			535,000.00	
1.1.4	Allow sum for third party insurance	Provisional Sum			535,000.00	
1.1.5	Allow sum for insurance against accidents and injury to workers	Provisional Sum			535,000.00	
1.1.6	Allow sum for Employment of Personals for Contract Management services. Payment base on the actual basis and submission of required Documents. (Attendance etc.)	Lump Sum				
1.1.7	Allow Lump sum for Protecting and Safe Guard the Workers Materials and Plants against Damage Trespass or theft	Lump Sum				

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
1.2	**Infrastructure and Facilities for the Employer and the Engineer**					
1.2.1	Provide & Maintain Project Manager's office and Employer's Office provide assistance to the Project Manager on Instructions.	Provisional Sum			251,000.00	
1.3	**Contractor's Site Facilities**					
1.3.1	Constructing, Maintaining, Dismantling and removal on completion of the works, a temporary site office of adequate size including staff rest room and toilets and other facilities for the contractors site management staff in accordance with the plans prepared by the contractor and Mobilization of Plant & Equipment and Demobilization of Same and concurred by the Engineer	Lump Sum				
1.3.2	Maintenance of all Contractors facilities including services (water supply, electricity, communications etc.) and security	Lump Sum				
1.4	**Other Requirements**					
1.4.1	Supplying, Erection and Maintenance of Name Board During the Contract Period with 2400mm X 1800mm in Size and Bottom Level of the Name Board shall be 1800mm above the Ground level as per the Drawing	Lump Sum				
1.4.2	Removal of all rubbish and debris and clearing up site on completion, leaving all in good order and handing over.	Lump Sum				

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
1.4.3	Provide 02 sets of as-built drawings (Hard copies & Soft copies)	Lump Sum				
1.4.4	Provision of monthly progress photographs & reports	Lump Sum				
1.4.5	Compliance with environmental regulations and project environment Plan as per ESMP report	Provisional Sum			100,000.00	
1.4.6	Employers Share of Adjudicators Fee and expenses	Provisional Sum			100,000.00	
1.4.7	Provision for Traffic Safety and Control (Management, Safety & Control & Temporary Diversion of Traffic, including provision of a general traffic management plan due to lane closure Provision for Traffic Safety and Control)	Provisional Sum			124,000.00	
1.4.8	Additional Setting Out Road Center Line and Submission of Existing Cross Sections in 20m intervals	Provisional Sum			100,000.00	
1.4.9	Maintenance of Road including Provisions of Byroad During the Construction period	Provisional Sum			250,000.00	
	Total Amount of Bill No. 1 carried to Summary					

Note: Item Nos. 1.1.6, 1.1.7, 1.3.1, 1.3.2 & 1.4.4 will be Paid based on percentage of progress.

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
	BILL 02					
	Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System C					
2.1	Stripping top soil to a depth of 75 - 150 mm, to receive new earth & spoil to waste including Loading, Unloading & Transporting any haul as directed by Engineer	m^2	7000.00			
2.2	Trimming, Leveling & Compaction of Original ground/subgrade to 95% STD.	m^2	7000.00			
2.3	Scarifying Pot Holes of Road surface to 50-100mm depth, screen & replace old aggregate and Removal of all Debris	m^2	4400.00			
2.4	Roadway Excavation and Removal of Unclassified Soil as directed by the Engineer, including loading & transporting up to any Haul Distance	m^3	14.20			
2.5	Furnishing and Construction, using Approved Type I & Type II Material for Sub bases & Shoulder including Excavation, loading, transporting, piling, Spreading & Rolled Using machinery including Watering (Material transport up to any Haul Distance)	m^3	3800.00			

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
2.6	Dense Graded Aggregate base (Aggregate Base Course) Furnishing, Spreading and Watering & Compacting Graded 37.5mm Aggregate to form a Dense Aggregate Base using machinery. (Haulage – any Haul)	m^3	2600.00			
2.7	Prime Coat with Bitumen Emulsion (CSS-1) Using 1Ltr/sqm including Blinding with sand at the rate of 250 sqm/cum & Brushing, Cleaning & Moistening Road surface. (Including Transport Sand & Bitumen up to any Haulage)	m^2	11500.00			
2.8	Applying Tack Coat Using Bitumen Emulsion (CRS-1) @ The Rate of 0.75Ltr/Sqm Inclusive of Furnishing, Brushing, Cleaning Road Surface & Cost of Bitumen Emulsion. (Including Transport Bitumen Emulsion)	m^2	11500.00			
2.9	Supply, Laying & Compact Asphalt Premix Concrete (19mm, Binder 60/70 Bitumen @ 4.7% of mix, Plant made) Using Paver and Other necessary machines including Transport Asphalt for Wearing Surface	M. ton	1602.50			

Item	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Rates in words
2.10	225 x 150 mm Rubble Filling for choking with Aggregate Base Course for soft ground treatment (Including Loading, Unloading & transport of Material)	m^3	30.00			
2.11	Road marking Continuous Edge Lines 100mm Width using Thermoplastic Paint & Glass beads	m^2	770.00			
2.12	Furnishing, Placing & Watering turf till take roots	m^2	4900.00			
	Total Amount of Bill No. 2 carried to Summary					

	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Amount in words
	BILL 03					
	DAY WORKS - LABOUR					
	The day works rates quoted for labour shall be the total amounts payable, and shall include all costs such as allowances for complying with the Labour Laws, insurances, accommodation, travelling time, overtime compensation, use and maintenance of small tools of trade, supervision, overhead and profit. Only the actual time engaged upon the work will be paid for.					
1	**Labour**					
1.1	Semi-Skilled Labourer	L/day	20.00			
1.2	Unskilled Labour	L/day	20.00			
	CONTRACTOR'S EQUIPMENT					
2	**Earthworks and Road Construction Equipment**					
2.1	Excavator (120 HP)	Hrs.	15.00			
2.2	Loader Backhoe (JCB)	Hrs.	15.00			
2.3	Motor Grader – 12ft Blade	Hrs.	15.00			
2.4	Vibrating Roller - 10 Ton	Hrs.	15.00			
2.5	Tractor Bowser with Tailor 4000 liters	Days	5.00			
2.6	Tipper - 3 Cube	Days	5.00			
2.7	Tractor With Tailor - 0.75 cube	Days	5.00			
2.8	Pneumatic Road Roller (8-10 Ton)	Hrs.	8.00			
2.9	Air Compressor - 250 cfm	Hrs.	8.00			

	Description	Unit	Quantity	Rate (LKR)	Amount (LKR)	Amount in words
2.10	Bitumen Distributor - 4500 L	Hrs.	8.00			
2.11	Asphalt Paver (Crawler)	Hrs.	12.00			
3	**Materials**					
3.1	Earth	m^3	5.00			
3.2	ABC	m^3	10.00			
3.3	150/225 Rubble	m^3	2.00			
3.4	Gravel	m^3	2.00			
3.5	Turf	m^2	1000.00			
	Sub Total carried to Bill No 03 carried to Summary					

Section 9 - Schedules

Schedule 1 – General Information

(i) If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.
(ii) For joint ventures, each joint venture partner shall furnish information separately.

ITB Clause reference	Description	Information *(to be filled by the Bidder)*	Remarks
4.1 (a)	**Legal Status**		*Provide certified copies of Registration*
	Written power of attorney of the signatory to the Bid	*Provide original or certified copy of the power of Attorney attested by a Notary and label as attachment to Clause 4.1(a)*	
	If a Joint Venture, names and addresses of Joint Venture Partners	1. …… 2. ……... 3. ……	*Provide a draft copy of the Joint Venture Agreement or alternatively the memorandum of understanding*
	If a Joint Venture, name of Lead Partner		
	For joint ventures, each joint venture partner shall furnish Legal Status separately		
	Name (Lead partner)		*Provide certified copies and label as attachment to Clause 4.1(a)*
	Legal status		
	Place of registration		
	Principle place of business		
	Written power of attorney of the signatory to the Bid	*Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 5.1*	
	VAT Registration Number		

	Name (Partner 2)		*Provide certified copies and label as attachment to Clause 4.1 (a)*
	Legal status		
	Place of registration		
	Principle place of business		
	Written power of attorney of the signatory to the Bid	*Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 4.1 (a)*	
	VAT Registration Number		
	Name (Partner 3)		*Provide certified copies and label as attachment to Clause 4.1 (a)*
	Legal status		
	Place of registration		
	Principle place of business		
	Written power of attorney of the signatory to the Bid	*Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 4.1 (a)*	
	VAT Registration Number		
4.2 (a)	*CIDA Registration*		*Provide certified copies and label as attachment to Clause 4.2(a)*
	Registration number		
	Grade		
	Specialty		
	Expiry Date		

Schedule 2 – Annual Turn-over Information

(Construction only – Last five years)

(i) If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.

(ii) For joint ventures, each joint venture partner shall furnish information separately.

Year	Turn-over	Remarks
1		*Attach audited reports and label as attachment to Clause 4.2*
2		
3		
4		
5		

Schedule 3 – Adequacy of Working Capital

If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application

Source of credit line	Amount	Remarks
		Provide documentary evidence and label as attachment to Clause 4.2
Total		

Schedule 4 A – Construction Experience in last Ten years

(i) If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.

(ii) For joint ventures, each joint venture partner shall furnish information separately.

Year	Employer	Description of Works	Amount	Contractor's Responsibility (%)
		Total		

Provide documentary evidence and label as attachment to Clause 4.2

Schedule 4 B – Similar Experience in last Ten years

Bidder's Legal Name: _____ Date: _____

JV Partner Legal Name: _____ Bidding No.: _____

Page _____ of _____ pages

Similar Contract Number: of *(total number of contracts)* **required.**	**Information**		
Contract Identification	_____		
Award date Completion date	_____ _____		
Role in Contract	Contractor	Management Contractor	Subcontractor
Total contract amount	_____		LKR_____
If partner in a JV or subcontractor, specify participation of total contract amount	_____%	_____	LKR_____
Employer's Name:	_____		
Address: Telephone/fax number: E-mail:	_____ _____ _____ _____		

Schedule 4 B – Similar Experience in last Ten years (cont.)

Bidder's Legal Name: _____ Page _____ of _____ pages

JV Partner Legal Name: _____

Similar Contract Number: of *(total number of contracts)* required.	**Information**
Description of the similarity contracts given in the Form of General Experience	
Amount	_____
Physical size	_____
Complexity	_____
Methods/Technology	_____
Physical Production Rate	_____

Schedule 5 – Major Items of Construction Equipment Proposed	
Type	**Capacity**

Schedule 6 – Construction Management Staff		
A. Key Professionals		
Name	**Position**	**Task**
B. Support Staff		
Name	**Position**	**Task**

Full-time: _____ Part-time: .....

Schedule 8 – Work Programme

Sheet 1 of ……

	[1st, 2nd, etc. are months from the Start Date.]														
Construction Activity	1st	2nd	3rd	4th	5th	6th	7th								

Schedule 9 - Works in Hand

Contract	Name of the Employer	Description of work (attach a copy of letter of award)	Date of award of contract	Value of contract(Rs.)	Contract period	Whether extension of time has been granted	Percentage completion as at present
Contract 1							
Contract 2							
Contract 3							
Contract 4							
Contract 5							

Schedule 10: ESHS Management Strategies and Implementation Plans

(ESHS-MSIP)

The Bidder shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP) as required by ITB 13.1 A (j) and 13.1 B (d). These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Contractor, and its subcontractors.

Code of Conduct: Environmental, Social, Health and Safety (ESHS)

The Bidder shall submit the Code of Conduct that will apply to the Contract Manger and other key personnel as required by ITB 13.1 A (j) and 13.1 B (d) and subcontractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the Contract.

In addition, the Bidder shall submit an outline of how this Code of Conduct will be implemented. This will include: how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches**.**

Environmental, social, health and safety requirements

The Employer should use the services of a suitably qualified environmental, social, health and safety specialist/s to prepare the specifications for ESHS working with a procurement specialist/s.

The Employer should attach or refer to the Employer's environmental, social, health and safety policies that will apply to the project. If these are not available, the Employer should use the following guidance in drafting an appropriate policy for the Works.

SUGGESTED CONTENT FOR AN ENVIRONMENTAL AND SOCIAL POLICY (STATEMENT)

The Works' policy goal, as a minimum, should be stated to integrate environmental protection, occupational and community health and safety, gender, equality, child protection, vulnerable people (including those with disabilities), sexual harassment, gender-based violence (GBV), sexual exploitation and abuse (SEA), HIV/AIDS awareness and prevention and wide stakeholder engagement in the planning processes, programs, and activities of the parties involved in the execution of the Works. The Employer is advised to consult with the World Bank to agree the issues to be included which may also address: climate adaptation, land acquisition and resettlement, indigenous people, etc. *The policy should set the frame for monitoring, continuously improving processes and activities and for reporting on the compliance with the policy.*

The policy shall include a statement that, for the purpose of the policy and/or code of conduct, the term "child" / "children" means any person(s) under the age of 18 years.

The policy should, as far as possible, be brief but specific and explicit, and measurable, to enable reporting of compliance with the policy in accordance with the Particular Conditions of the Contract Sub-Clause 4.21 and Appendix C to the General Conditions of Contract.

As a minimum, the policy is set out to the commitments to:

1. *apply good international industry practice to protect and conserve the natural environment and to minimize unavoidable impacts;*
2. *provide and maintain a healthy and safe work environment and safe systems of work;*
3. *protect the health and safety of local communities and users, with particular concern for those who are disabled, elderly, or otherwise vulnerable;*
4. *ensure that terms of employment and working conditions of all workers engaged in the Works meet the requirements of the ILO labour conventions to which the host country is a signatory;*
5. *be intolerant of, and enforce disciplinary measures for illegal activities. To be intolerant of, and enforce disciplinary measures for GBV, inhumane treatment, sexual activity with children, and sexual harassment;*
6. *incorporate a gender perspective and provide an enabling environment where women and men have equal opportunity to participate in, and benefit from, planning and development of the Works;*
7. *work co-operatively, including with end users of the Works, relevant authorities, contractors and local communities;*
8. *engage with and listen to affected persons and organizations and be responsive to their concerns, with special regard for vulnerable, disabled, and elderly people;*
9. *provide an environment that fosters the exchange of information, views, and ideas that is free of any fear of retaliation, and protects whistleblowers;*
10. *minimize the risk of HIV transmission and to mitigate the effects of HIV/AIDS associated with the execution of the Works;*

The policy should be signed by the senior manager of the Employer. This is to signal the intent that it will be applied rigorously.

MINIMUM CONTENT OF ESHS REQUIREMENTS

In preparing detailed specifications for ESHS requirements, the specialists should refer to and consider:

- *project reports e.g. ESIA/ESMP*
- *consent/permit conditions*
- *required standards including World Bank Group EHS Guidelines*
- *relevant international conventions or treaties etc., national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines)*
- *relevant international standards e.g. WHO Guidelines for Safe Use of Pesticides*
- *relevant sector standards e.g. EU Council Directive 91/271/EEC Concerning Urban Waste Water Treatment*
- *Grievance redress mechanism including types of grievances to be recorded and how to protect confidentiality e.g. of those reporting allegations of GBV/SEA.*
- *GBV/SEA prevention and management.*
- *The detail specification for ESHS should, to the extent possible, describe the intended outcome rather than the method of working*
- *Relevant Covid 19 safety manual (Refer Annex 2)*

The ESHS requirements should be prepared in manner that does not conflict with the relevant General Conditions of Contract and Particular Conditions of Contract, and in particular:

General Conditions of Contract	
Sub-clause 1.13	*Compliance with Laws*
Sub-clause 2.2	*Permits, Licenses and Approvals*
Sub-clause 4.1	*Contractor's General Obligations*
Sub-clause 4.4	*Subcontractors*
Sub-clause 4.8	*Safety Procedures*
Sub-clause 4.14	*Avoidance of Interference*
Sub-clause 4.18	*Protection of the Environment*
Sub-clause 4.23	*Contractor's Operations on the Site*
Sub-clause 4.24	*Fossils*
Section 6	*Staff and Labour (includes health and safety)*
Sub-clause 7.1	*Manner of Execution*
Sub-clause 11.11	*Clearance of Site*
Sub-clause 12.3	*Evaluation (reference ITB 14.2 "Items against which no rate or price is entered by the Bidder shall be deemed to be covered by the rates for other items in the Bill of Quantities and will not be paid separately by the Employer.")*

MINIMUM REQUIREMENTS FOR THE BIDDER'S CODE OF CONDUCT

[A minimum requirement for the Code of Conduct should be set out by the Employer, taking into consideration the issues, impacts, and mitigation measures identified, for example, in:

- *project reports e.g. ESIA/ESMP*
- *any particular GBV/SEA requirements*
- *consent/permit conditions (regulatory authority conditions attached to any permits or approvals for the project)*
- *required standards including World Bank Group EHS Guidelines*
- *relevant international conventions, standards or treaties, etc., national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines)*
- *relevant standards e.g. Workers' Accommodation: Process and Standards (IFC and EBRD)*
- *relevant sector standards e.g. workers' accommodation*
- *Grievance redress mechanisms.*

The types of issues identified could include. Risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining *a safe environment etc.*

[Amend the following instructions to the Bidder taking into account the above considerations.]

A satisfactory code of conduct will contain obligations on all Contractor's Personnel project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum. Additional obligations may be added to respond to particular concerns of the region, the location and the project sector or to specific project requirements. The code of conduct shall contain a statement that the term "child" / "children" means any person(s) under the age of 18 years.

The issues to be addressed include:

1. Compliance with applicable laws, rules, and regulations
2. Compliance with applicable health and safety requirements to protect the local community (including vulnerable and disadvantaged groups), the Employer's Personnel, and the Contractor's Personnel (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
3. The use of illegal substances
4. Non-Discrimination in dealing with the local community (including vulnerable and disadvantaged groups), the Employer's Personnel, and the Contractor's Personnel (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, age, disability (physical and mental), sexual orientation, gender identity, political conviction or social, civic, or health status)
5. Interactions with the local community(ies), members of the local community (ies), and any affected person(s) (for example to convey an attitude of respect, including to their culture and traditions)
6. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women and/or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
7. Violence, including sexual and/or gender based violence (for example acts that inflict physical, mental or sexual harm or suffering, threats of such acts, coercion, and deprivation of liberty
8. Exploitation including sexual exploitation and abuse (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading behavior, exploitative behavior or abuse of power)
9. Protection of children (including prohibitions against sexual activity or abuse, or otherwise unacceptable behavior towards children, limiting interactions with children, and ensuring their safety in project areas)
10. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
11. Avoidance of conflicts of interest (such that benefits, contracts, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
12. Respecting reasonable work instructions (including regarding environmental and social norms)
13. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
14. Duty to report violations of this Code
15. Non retaliation against workers who report violations of the Code, if that report is made in good faith.

The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and
- Understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

A copy of the code shall be displayed in a location easily accessible to the community and project affected people. It shall be provided in languages comprehensible to the local community, Contractor's Personnel, Employer's Personnel, and affected persons.

PAYMENT FOR ESHS REQUIREMENTS

The Employer's ESHS and procurement specialists should consider how the Contractor will cost the delivery of the ESHS requirements. In the majority of cases, the payment for the delivery of ESHS requirements shall be a subsidiary obligation of the Contractor covered under the prices quoted for other Bill of Quantity items. For example, normally the cost of implementing work place safe systems of work, including the majors necessary for ensuring traffic safety, shall be covered by the Bidder's rates for the relevant works. Alternatively, provisional sums could be set aside for discrete activities for example for HIV counseling service, and, GBV/SEA awareness and sensitization or to encourage the contractor to deliver additional ESHS outcomes beyond the requirement of the Contract.

Schedule 11: AFFIDAVIT

I……..……..……. *(Name of the bidder)*

of ...……..……..…… ……. ……..…..*(addressed of the bidder),* being a Buddhist/Christian/ Muslim/……..……(religion) do hereby solemnly, sincerely and truly declare and affirm as follows;

1. I am the Affirmant/sworn above named.

2 My National Identity Card No. is……. ……

3 I hereby declare and affirm that all information furnished in our tender including details submitted in Annex-2a as Work in Hand are true and correct.

…….

Signature

The above contents were read by the affirmant who having understood the same, affirmed/swore to and placed his signature in my presence at …… on this …… day of …… ……..

Before me

Justice of the Peace……

Section - 10

DRAWINGS

The drawings included in the Bidding Document are listed below:

No.	Title	Drawing No.
01	Typical Section of Asphalt Road	RRB/BC05/ASP/02
02		
03		
04		

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: Director General, Mahaweli Authority of Sri Lanka, 500, T.B. Jaya Mawatha, Colombo 10

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 execution of **Rehabilitation & Improvement of Operational & Maintenance Road from Kekuluwela Tank to Muwagammana Tank (3+350km) in System ''c''** under Invitation for Bids No. **LK-MOMDE-465708-CW-RFB** ("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") of the IFB; or

(c) having been notified of the acceptance of its Bid by the Employer/Purchaser 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 (i) 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 ----------

Annex – 01

Check List for Bidders

Bidders are advised to fill the following table:

ITEM	YES (tick)	REFERENCE
Form of Bid		
Addressed to the Employer?		
Completed?		
Signed?		
Bid Security		
Submitted in the given format?		
Qualification Information		
All relevant information completed?		
Signed?		
Addendum		
Contents of the addendum (if any) taken into account?		
Other		
Affidavit completed as Schedule 11?		
Liquid Assets and/or credit facilities		
Construction programme		
CV of personnel to be engaged in construction management services and key personals to be engaged in this contract.		
List of Resources intended to be deployed for this tender		
BID package		
All the documents given in ITB Clause 12 enclosed in the original and copy?		