**Ref. No.: NWSDB/SBD/Plant & Design-Build (Local)/Ver 1**

***REVISED ON 29-04-2019***

**GOVERNMENT OF THE DEMOCRATIC SOCIALIST REPUBLIC**

# OF SRI LANKA

## MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION

# NATIONAL WATER SUPPLY AND DRAINAGE BOARD

**BID FOR DESIGN AND BUILD CONTRACT FOR**

**CIVIL AND M&E WORKS**

**……………………………. WATER SUPPLY SCHEME**

**(DESIGN AND BUILD)**

**CONTRACT No.: ……………………………………..**

***REVISED ON 29-04-2019***

**NATIONAL WATER SUPPLY AND DRAINAGE BOARD**

**GALLE ROAD,**

**RATMALANA.**

**MAY2013**

#### DOCUMENT ISSUANCE CERTIFICATE

(To be filled at the time of issue by the authorized issuing officer)

1. STANDARD DOCUMENT REFERENCE NUMBER : **ICTAD/SBD/04**

2. CONTRACT NUMBER : ……………………………………………………………

3. a) ISSUED TO : ………..........................……...............................

b) ADDRESS : ………….................................…….....................

c) TELEPHONE NUMBER : ....……...............................…..................

d) FACSIMILE NUMBER : ………………………………..………..

4. a) TENDER FEE :Rs. .................... RECEIVED/NOT RECEIVED

IN CASH/BANK DRAFT

b) RECEIPT/BANK DRAFT NUMBER : .....................…….............

5. NUMBER OF COPIES ISSUED : ..................…….…....................…...........

6. NUMBER OF CANCELLED COPIES ISSUED : …….....................…........

7. CANCELLED COPY FEE : Rs...............…….... RECEIVED/NOT RECEIVED (IN CASH/BANK DRAFT)

8 BUSINESS REGISTRATION NUMBER : ..........................………................

9. a) ISSUING OFFICER : ................................................…….........

b) DESIGNATION : ....................................................………..

c) SIGNATURE : ..................................................………..

10. PLACE OF ISSUE : ........................................................….….

11. SEAL : ………………..………………………………………….…….

12. DATE : ............................ TIME : …..............................……

# T A B L E O F C O N T E N T S

##### VOLUME 1B

**Volume - 1A of this document is the Standard Bidding Document, Procurement of Works, DESIGN & BUILD CONTRACTS CIDA publication No. ICTAD/SBD/04First Edition – May 2003**

###### Volume 1A includes following sections.

Section I - Instructions to Bidders

Section III - Conditions of Contract

Section V - Specimen Forms

Revised on 06-05-2016

# T A B L E O F C O N T E N T S

##### VOLUME 1B

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|  | |  | From To |
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|  |  |  |
|  |  |  |

Revised on 01-06-2017

**CHECK LIST BEFORE SUBMISSION OF BIDS**

Bidders are advised to fill the following table:

|  |  |  |
| --- | --- | --- |
| **ITEM** | **REFERENCE** | **REMARKS** |
| Documentary evidence to establish eligibility of bidder. | 3.1 |  |
| Signatory to the BID |  |  |
| Evidence for authority for Signatory(ies)  enclosed? | 18 |  |
| Form of Bid |  |  |
| Addressed to the Employer? | 18 |  |
| Completed? | 18 |  |
| Signed? | 18 |  |
| Bid Security |  |  |
| Addressed to the Employer? | 16 |  |
| Format as required? | 16 |  |
| Issuing Agency as specified? | 16 |  |
| Validity as mentioned in the schedule | 16 |  |
| Qualification Information |  |  |
| All relevant information completed? | 4 |  |
| Signed? | 4 |  |
| Addendum |  |  |
| Contents of the addendum (if any) taken in to account? | 10 |  |
| BID package |  |  |
| All the documents given in ITB Clause 12  Enclosed in the original and copy? | 12 |  |
| ITB Clause 19 followed before Sealing the  Bid Package? | 19 |  |
| Copy of VAT registration certificate | 13.3 |  |
| Bio data of engineers / technical officers |  |  |
| Certified Financial statement for last 5years and Bank Balance |  |  |
| Evidence of credit facilities available |  |  |

Revised on 06-05-2016

VOLUME 1A

Standard Bidding Document, Procurement of works ICTAD/SBD/04First Edition (Reprinted), - May 2003Published by Construction Industry Development Authority (CIDA) is applicable in respect of this contract. Any changes to these clauses are indicated in Schedules

**ICTAD/SBD/04First Edition (Reprinted), - May 2003** is not provided with this Bidding document, and it is available for purchasing at CIDA, Wejerama Mawatha, Colombo 7.

Revised on 06-05-2016

VOLUME 1B

**1. INVITATION FOR BIDS**

**GOVERNMENT OF THE DEMOCRATIC SOCIALIST REPUBLIC**

# OF SRI LANKA

**MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION**

# NATIONAL WATER SUPPLY AND DRAINAGE BOARD

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEME**

**CONTRACT No. : ……………………………….**

**Form of Invitation for Bids**

1. The Chairman, Cabinet Appointed Procurement Committee, Ministry of City Planning, Water Supply and Higher Education, 35, ‘Lakdiya Medura”, New Parliament Road, Pellawatta, Battaramulla Sri Lanka on behalf of the National Water Supply and Drainage Board (NWSDB) invites sealed bids from eligible and qualified bidders for ………………………………………………….. Water Supply Scheme.
2. Bids should be submitted on the forms available from…………….. up to……. on a payment of non-refundable tender fee of Rupees ……………………..
3. The eligible bidders shall comply with the following qualification criteria.

Eligibility Qualifications of the Bidders

1. Bidder shall have Registration with CIDA in the field of …………… in Grade……….. or above at the time of submission of the Bid.
2. The Bidders who are Individual Firm or Joint Venture should have been designed and completed at least 2 (two) projects with a contract value not less than Rs.**.......... million** each during the last 10 (ten) years, out of which 1 (one) should have been water supply project. Acceptable certificate of completion from the client is required for all 02 (two) projects.

Percentage of work done is taken based on the percentage of work mentioned in the Joint Venture agreements.

1. The scope of work of at least one(01) water supply project undertaken by the bidder should have included, inter alia, the following requirements:-
2. Construction of ………… m3/day or larger capacity water treatment plant including Intake, sludge treatment and pumping stations, control system. *(at least 50% of capacity)*
3. Supplying or procuring and laying of at least 10 km of Water Transmission/ Distribution pipe lines having diameters not less than ………….. mm diameter. *(one step below the diameter specified)*
4. Construction of Water Tower, having minimum of 500 m3 capacity.
5. Design of process and Water Treatment, ground reservoirs.
6. Design of …….. m3/day or large capacity water treatment plant including intake, sludge treatment and control systems (at least 50% of the capacity)

Revised on 06-02-2019

1. Design of at least 10 km of water Transmission/Distribution pipelines having diameters not less than ……….. mm diameter (one step below the diameter specified)
2. Design of water tower having minimum of 500 m3 capacity.
3. Design of pumping stations and pumps.

Bidders who do not possess design experience in similar projects specified as above (d) to (h) in required capacities may enter into a Joint Venture with a Design consultancy firm with experience in water treatment, water supply and distribution design.

1. Financial capability should not be less than Rs.**...............** million [*40% of average annual financial value of the Engineer’s estimate]*as working capital including Rs. ………. in liquid cash (3-4 months)
2. Bidders may obtain further information, in respect and acquire the bidding documents from ;

Assistant General Manager (Tenders & Contracts),

National Water Supply & Drainage Board,

Galle Road,

Ratmalana, Sri Lanka

Email address: agmtenders@waterboard.lk

Tel./Fax : 094-1-2635885

1. A complete set of bidding documents may be purchased by interested bidders on submission of a written application to the above office, and upon payment of a non-refundable fee of LKR 20,000.00 + VAT in cash or Bank draft.
2. A site inspection will be held on……………at …………………. followed by a pre-Bid meeting
3. All bids must be accompanied by a bid security of Rs. …………………. or an equivalent amount in a freely convertible currency.
4. Sealed bids may be delivered to Procurement Division, Ministry of City Planning and Water Supply, “Lakdiya Madura”, No. 35, Sunil Mawatha, Palawatta, Battaramulla, Sri Lanka.

The inner and outer envelopes shall be addressed to:

**Chairman, Cabinet Appointed Procurement Committee,**

**Procurement Division**

**Ministry of City Planning, Water Supply and Higher Education,**

**35, ‘LakDiya Medura”, New Parliament Road  
Pellawatta  
Battaramulla  
Sri Lanka**

Revised on 06-02-2019

and bear the name of the contract as follows.

Tender for “**Plant & Design-Build Contract for Civil and M&E Works,**

**…………… Water Supply Project”**

Provide the following warning statement

**Do Not Open Before the Official Tender Opening**

1. The deadline for submission of bids will be ……… on……….. and will be opened soon after the closing. Late Bids will be rejected
2. Bids which are received late will be rejected.
3. The construction period is. …………… days.
4. Bidders or their authorized representatives are requested to be present at the opening of bids.

**Chairman**

**NATIONAL WATER SUPPLY AND DRAINAGE BOARD**

**GOVERNMENT OF THE DEMOCRATIC SOCIALIST REPUBLICOF SRI LANKA**

**MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION**

# NATIONAL WATER SUPPLY AND DRAINAGE BOARD

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**CONTRACT No. : ……………………………….**

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Water Supply Scheme.

1. Bids should be submitted on the forms available from…………….. up to……. on a payment of non-refundable tender fee of Rupees ……………………..
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Revised on 06-02-2019

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Galle Road,

Ratmalana, Sri Lanka

Email address: agmtenders@waterboard.lk

Tel./Fax : 094-1-2635885

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**Ministry of City Planning, Water Supply and Higher Education,  
35, ‘Lakdiya Medura”, New Parliament Road  
Pellawatta  
Battaramulla  
Sri Lanka.**

Revised on 06-02-2019

and bear the name of the contract as follows.

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**Chairman**

**NATIONAL WATER SUPPLY AND DRAINAGE BOARD**

**GOVERNMENT OF THE DEMOCRATIC SOCIALIST REPUBLICOF SRI LANKA**

**MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION**

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6. Design of …….. m3/day or large capacity water treatment plant including intake, sludge treatment and control systems (at least 50% of the capacity)

Revised on 06-02-2019

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2. A site inspection will be held on……………at …………………. followed by a pre-Bid meeting
3. All bids must be accompanied by a bid security of Rs. …………………. or an equivalent amount in a freely convertible currency.
4. Sealed bids may be delivered to Assistant General Manager (Tenders &Contracts), NWSDB, Galle Road, Ratmalana, Sri Lanka.

The inner and outer envelopes shall be addressed to:

**Chairman, Department Procurement Committee,**

**National Water Supply & Drainage Board,**

**Galle Road,**

**Ratmalana,**

**Sri Lanka**.

and bear the name of the contract as follows.

Tender for “**Plant & Design-Build Contract for Civil and M&E Works,**

**…………… Water Supply Project”**

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1. The deadline for submission of bids will be ……… on……….. and will be opened soon after the closing. Late Bids will be rejected
2. Bids which are received late will be rejected.
3. The construction period is. …………… days.
4. Bidders or their authorized representatives are requested to be present at the opening of bids.

**Chairman**

**NATIONAL WATER SUPPLY AND DRAINAGE BOARD**

**2. BIDDING DATA**

The Bidding Data is a part of Instructions to Bidders and should be read in conjunction with the Instructions to Bidders.

If there is a discrepancy found in the Instructions to Bidders and the Bidding Data, the Content in the Bidding Data shall supersede the Content in the Instructions to Bidders.

Revised on 06-02-2019

*(Note: What is typed in italic letters are guide lines to prepare the Bidding Data and they shall be removed after preparation of the Bidding Data.)*

**Bidding Data**

*(Please note that the clause numbers given here under are that of Instruction to Bidder)*

**Instructions to Bidders Sub-Clause**

|  |  |  |
| --- | --- | --- |
| **Item** | **Sub-Clause** | Entry |
| **Employer’s name and address** | 1.1.& 9.1 | The Employer is  Name : National Water Supply and Drainage Board  Address: Galle Road,  Ratmalana |
| **Scope of Works** | 1,1 | The Works consists of  ……………………………………………………………..  ……………………………………………………………..  ……………………………………………………………..  Located at  ……………………………………………………………….  ……………………………………………………………… |
| **Time for Completion** | 1.2 | The Time for Completion for the whole of Works shall be …………. days. |
| **Delay damages for the Works** | 1.2 | The delay damages for the whole of the Works shall be ……………………..per Day.  The maximum amount of delay damages for the whole of the Works shall be10% percent of the Initial Contract Price. |
| **Defects Notification Period** | 1.2 | Defects Notification Period is…………..Days from Employer’s Taking over |
| Source of funds | 2.1 | The source of funds is………………………………… |
| **CIDA registration required** | 3.1 | The registration required CIDA  Specialty …………………………………………….  ……………………………………………..  Grade ……………………………………………. |
| **NCSL**  **Membership** | 3.2 | Delete the clause |

Revised on 06-05-2016

|  |  |  |
| --- | --- | --- |
| **Eligible bidders** | 3.4 | Foreign bidders are not allowed to bid. |

|  |  |  |
| --- | --- | --- |
| **Qualification Information** | 3.1, 3.2, 4.1 | The following information shall be provided in Section VIII:   * CIDA registration   Registration number \_\_\_\_\_\_\_\_  Grade \_\_\_\_\_\_\_\_  Specialty \_\_\_\_\_\_\_\_  Expiry date \_\_\_\_\_\_\_\_   * VAT registration number \_\_\_\_\_ * Attach Work program (Format given in Schedule B6 & B7) * Attach legal status (Sole proprietor, Partnership, Company etc.) (Schedule A1) * Attach authentication for signatory * 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 five years; (Schedule A4) * Construction equipment; (Schedule A6) * Staffing; (Schedule B4 & B5) * Attach Work plan and methods; * Any other |
| **Average annual volume of construction work performed in last five** | 4.3(a) | Delete the clause and replace by the following.  Average annual volume of construction work is Rs…………   1. *If contract period is less than one year, the value of the Engineers estimate,* 2. *If contract period is more than one year, 1.5 times annual value of the proposed work \*1*   *\*1Annual Value of proposed work,*  *= 12 x Engineer’s estimate*  *Contract duration in months* |
| **Experience** | 4.3 (b) | Delete the clause and replace by the following. |
|  |  | The scope of work of at least one(01) water supply project undertaken by the bidder should have included, inter alia, the following requirements:-   1. Construction of ………… m3/day or larger capacity water treatment plant including Intake, sludge treatment and pumping stations, control system. *(at least 50% of capacity)* 2. Supplying or procuring and laying of at least 10 km of Water Transmission/ Distribution pipe lines having diameters not less than ………….. mm diameter. *(one step below the diameter specified)*   Revised on 06-05-2016   1. Construction of Water Tower, having minimum of 500 m3 capacity. 2. Design of process and Water Treatment, ground reservoirs. 3. Design of …….. m3/day or large capacity water treatment plant including intake, sludge treatment and control systems (at least 50% of the capacity) 4. Design of at least 10 km of water Transmission/Distribution pipelines having diameters not less than ……….. mm diameter (one step below the diameter specified) 5. Design of water tower having minimum of 500 m3 capacity. 6. Design of pumping stations and pumps.   Bidders who do not possess design experience in similar projects specified as above (d) to (h) in required capacities may enter into a Joint Venture with a Design consultancy firm with experience in water treatment, water supply and distribution design. |
| **Essential equipment** | 4.3(c) | **Essential Equipment**  \* Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed shall be as given in Appendix ……………..  (Bidder shall include any additional equipment, plant, etc.  to the Appendix 3 depending on his construction  methodology) |
| **Financial capability** | 4.3(g) | Financial capability should not be less than Rs.**...............** million [*40% of average annual financial value of the Engineer’s estimate]*as working capital including Rs. ………. in liquid cash (3-4 months) |
| **Bid price** | 13.3 | VAT component shall not be included in the rates. The amount written in the Form of Bid shall be without VAT. However VAT component shall be shown separately at the end of the price schedule summary. |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Contract is subjected to price adjustment for fluctuation of prices** | 13.4 | The Contract is subject to price adjustment in accordance with Clause 13.7 of the Conditions of Contract. |
|  | 13.5 | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. This rate is applicable for all extra works to complete the works in the Contract. |
| **Bid validity period** | 15.1 | The Bid shall be valid up to …………….. |
| **Amount of Bid security** | 16.1 | The amount of Bid security shall be Sri Lanka Rupees ……………………………… |
| **Validity of Bid security** | 16.2 | Substitute by the following.  The Bid security shall be valid up to \_\_\_\_\_**(**119 days)  Bid Security shall be valid up to ……………… *(give a date)*  Delete text in Clause 16.2 and add the following  Bid Security (unconditional) which is encashable on demand equivalent to the sum stated in clause 16.1 Bidding Data, shall be furnished in one of the following forms. Bid Security shall be as per the format given in the Bidding Document.     1. Bank Guarantee issued by a reputed bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka. 2. Sri Lanka rupee cash deposit to the National Water Supply and Drainage Board, (The original receipt for such deposit shall be attached to the original tender document). 3. A certified cheque issued by a reputed Bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka, in favour of National Water Supply and Drainage Board. 4. A Bank guarantee issued by a Bank based in another country but the security or guarantee “confirmed” by a Bank operating in Sri Lanka approved by the Central Bank of Sri Lanka.   **The term “confirmed” in relation to bank guarantee issued by a Bank based in another country means that the “confirmed” bank held liable for paying the respective guaranteed amount at the request of first demand by the beneficiary.**  Revised on 29-04-2019 |
| **Pre-Bid meeting** | 17.1 | Pre Bid meeting will be held ………………………………  ………………………………………………………………  ………………………………………….  Date time \_\_\_\_\_\_\_\_\_\_\_\_ |
| **Sealing and marking of Bids** | 19.2  19.3  19.4  19.5 (a)  19.5 (b) | The following information also shall be included in the inner covers of envelope marked as “Envelope 1- Preliminary Information”:   * 1. Schedule, “Annual turn-over Information”;   2. Schedule “Adequacy of Working capital”;   3. Schedule, “ Design experience in last five Years;   4. Schedule, “ Construction experience in last five Years”;   (v) Schedule, “ Major items of construction equipment proposed”;  The following information also shall be included in the inner covers of envelope marked as “Envelope 2- Design/Technical Proposal”:   * 1. Schedule, “ Team composition and Task assignment”;   2. Curriculum vitae of key staff;   3. Schedule, “ Time Schedule for key staff”;   4. Work program (Design related activities);   5. Work program (Construction related activities);   The following information also shall be included in the inner covers of envelope marked as “Envelope 3- Financial Proposal”:   1. Day work rates schedule; 2. Schedule, “Overhead and profit percentage for Provisional Sum activities”; 3. Schedule, “Input percentages for price adjustments”.   The Employer’s address for the purpose of Bid submission is  **Chairman, Cabinet Appointed Procurement Committee,**  **Procurement Division**  **Ministry of City Planning, Water Supply and Higher Education, “Lakdiya Madura”,**  **No. 35, Sunil Mawatha,**  **Palawatta,**  **Battaramulla.**  **Sri Lanka**  Contract name: …………………………………………  …………………………………………………………….  ……………………………  Contract No. ………………………………………..  Revised on 16-09-2014 |
| **Deadline for submission of Bids** | 20.1 | The deadline for submission of Bids shall be \_\_\_\_\_\_\_\_\_\_\_ |
| Evaluation and comparison of Bids | 27.0 | For evaluation and comparison of Bids option A is selected. |
|  | 27.1**\*** | Not relevant |
| **Correction of errors** | (28.1) c | Sub clause 28.1 (c) not modified. |
| **Correction of errors** | (28.1) d | Sub clause 28.1 (d) is applicable. |
| **Award of Contract** | (29.2) | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. Contractor shall adjust all BOQ Rates deducting the discounted amount and shall endorse with the Contractor’s Signature. This rate is applicable for all extra works to complete the works in the Contract. |
| **Amount of Performance Security** | 32.1 | The amount of Performance Security is 5% of the Initial Contract Price and valid up to the issuance of final acceptance certificate.  And issued by an agency stipulated under Clause 4.2 in the Contract Data. |
| **Percentage of**  **retention** | 34.1 | Five (05) % of the Initial Contract Sum.  When Retention amount reaches 5% of Initial Contract Price, upon the issue of the Taking-Over Certificate on submission of unconditional, on demand guarantee issued by a commercial bank operating in Sri Lanka approved the Central Bank of Sri Lanka and acceptable to the Employer. This Guarantee shall be valid until 28 days beyond the Defects notification period. |
| **Minimum amount of Interim Payment Certificates** | 34.2 | Not applicable mild stone payment as agreed. |
| **Adjudicator proposed by Employer** | (35.1) | The Adjudicator proposed by the Employer is :  Adjudicator shall be appointed when need arises. |

Revised on 29-04-2019

Revised on 06-02-2019

Revised on 16-09-2014

**Bidding Data**

*(Please note that the clause numbers given here under are that of Instruction to Bidder)*

**Instructions to Bidders Sub-Clause**

|  |  |  |
| --- | --- | --- |
| **Item** | **Sub-Clause** | Entry |
| **Employer’s name and address** | 1.1.& 9.1 | The Employer is  Name : National Water Supply and Drainage Board  Address: Galle Road,  Ratmalana |
| **Scope of Works** | 1,1 | The Works consists of  ……………………………………………………………..  ……………………………………………………………..  ……………………………………………………………..  Located at  ……………………………………………………………….  ……………………………………………………………… |
| **Time for Completion** | 1.2 | The Time for Completion for the whole of Works shall be …………. days. |
| **Delay damages for the Works** | 1.2 | The delay damages for the whole of the Works shall be ……………………..per Day.  The maximum amount of delay damages for the whole of the Works shall be10% percent of the Initial Contract Price. |
| **Defects Notification Period** | 1.2 | Defects Notification Period is…………..Days from Employer’s Taking over |
| Source of funds | 2.1 | The source of funds is………………………………… |
| **CIDA registration required** | 3.1 | The registration required CIDA  Specialty …………………………………………….  ……………………………………………..  Grade ……………………………………………. |
| **NCSL**  **Membership** | 3.2 | Delete the clause |

Revised on 06-05-2016

|  |  |  |
| --- | --- | --- |
| **Eligible bidders** | 3.4 | Foreign bidders are not allowed to bid. |

|  |  |  |
| --- | --- | --- |
| **Qualification Information** | 3.1, 3.2, 4.1 | The following information shall be provided in Section VIII:   * CIDA registration   Registration number \_\_\_\_\_\_\_\_  Grade \_\_\_\_\_\_\_\_  Specialty \_\_\_\_\_\_\_\_  Expiry date \_\_\_\_\_\_\_\_   * VAT registration number \_\_\_\_\_ * Attach construction program (Format given in Appendix ………) * Attach legal status (Sole proprietor, Partnership, Company etc.) …………….. * Attach authentication for signatory * 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 five years; (Appendix ……………) * Construction equipment; (Appendix …………) * Staffing; (Appendix …………) * Attach Work plan and methods; * Any other |
| **Average annual volume of construction work performed in last five** | 4.3(a) | Delete the clause and replace by the following.  Average annual volume of construction work is Rs…………   1. *If contract period is less than one year, the value of the Engineers estimate,* 2. *If contract period is more than one year, 1.5 times annual value of the proposed work \*1*   *\*1Annual Value of proposed work,*  *= 12 x Engineer’s estimate*  *Contract duration in months* |
| **Experience** | 4.3 (b) | Delete the clause and replace by the following. |
|  |  | The scope of work of at least one(01) water supply project undertaken by the bidder should have included, inter alia, the following requirements:-   1. Construction of ………… m3/day or larger capacity water treatment plant including Intake, sludge treatment and pumping stations, control system. *(at least 50% of capacity)* 2. Supplying or procuring and laying of at least 10 km of Water Transmission/ Distribution pipe lines having diameters not less than ………….. mm diameter. *(one step below the diameter specified)*   Revised on 06-05-2016   1. Construction of Water Tower, having minimum of 500 m3 capacity. 2. Design of process and Water Treatment, ground reservoirs. 3. Design of …….. m3/day or large capacity water treatment plant including intake, sludge treatment and control systems (at least 50% of the capacity) 4. Design of at least 10 km of water Transmission/Distribution pipelines having diameters not less than ……….. mm diameter (one step below the diameter specified) 5. Design of water tower having minimum of 500 m3 capacity. 6. Design of pumping stations and pumps.   Bidders who do not possess design experience in similar projects specified as above (d) to (h) in required capacities may enter into a Joint Venture with a Design consultancy firm with experience in water treatment, water supply and distribution design. |
| **Essential equipment** | 4.3(c) | **Essential Equipment**  \* Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed shall be as given in Appendix ……………..  (Bidder shall include any additional equipment, plant, etc.  to the Appendix 3 depending on his construction  methodology) |
| **Liquid assets and/or credit facilities required** | 4.3(g) | Financial capability should not be less than Rs.**...............** million [*40% of average annual financial value of the Engineer’s estimate]*as working capital including Rs. ………. in liquid cash (3-4 months) |
| **Bid price** | 13.3 | VAT component shall not be included in the rates. The amount written in the Form of Bid shall be without VAT. However VAT component shall be shown separately at the end of the price schedule summary. |

|  |  |  |
| --- | --- | --- |
| **Contract is subjected to price adjustment for fluctuation of prices** | 13.4 | The Contract is subject to price adjustment in accordance with Clause 13.7 of the Conditions of Contract. |
|  | 13.5 | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. This rate is applicable for all extra works to complete the works in the Contract. |
| **Bid validity period** | 15.1 | The Bid shall be valid up to …………….. |
| **Amount of Bid security** | 16.1 | The amount of Bid security shall be Sri Lanka Rupees ……………………………… |
| **Validity of Bid security** | 16.2 | Substitute by the following.  The Bid security shall be valid up to \_\_\_\_\_**(**119 days)  Bid Security shall be valid up to ……………… *(give a date)*  Delete text in Clause 17.2 and add the following  Bid Security (unconditional) which is encashable on demand equivalent to the sum stated in clause 17.1 Bidding Data, shall be furnished in one of the following forms. Bid Security shall be as per the format given in the Bidding Document.     1. Bank Guarantee issued by a reputed bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka. 2. Sri Lanka rupee cash deposit to the National Water Supply and Drainage Board, (The original receipt for such deposit shall be attached to the original tender document). 3. A certified cheque issued by a reputed Bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka, in favour of National Water Supply and Drainage Board. 4. A Bank guarantee issued by a Bank based in another country but the security or guarantee “confirmed” by a Bank operating in Sri Lanka approved by the Central Bank of Sri Lanka.   **The term “confirmed” in relation to bank guarantee issued by a Bank based in another country means that the “confirmed” bank held liable for paying the respective guaranteed amount at the request of first demand by the beneficiary.**  Revised on 29-04-2019 |
| **Pre-Bid meeting** | 17.1 | Pre Bid meeting will be held ………………………………  ………………………………………………………………  ………………………………………….  Date time \_\_\_\_\_\_\_\_\_\_\_\_ |
| **Sealing and marking of Bids** | 19.2  19.3  19.4  19.5 (a)  19.5 (b) | The following information also shall be included in the inner covers of envelope marked as “Envelope 1- Preliminary Information”:   1. Schedule, “Annual turn-over Information”; 2. Schedule “Adequacy of Working capital”; 3. Schedule, “ Design experience in last five Years; 4. Schedule, “ Construction experience in last five Years”; 5. Schedule, “ Major items of construction equipment proposed”;   The following information also shall be included in the inner covers of envelope marked as “Envelope 2- Design/Technical Proposal”:   1. Schedule, “ Team composition and Task assignment”; 2. Curriculum vitae of key staff; 3. Schedule, “ Time Schedule for key staff”; 4. Work program (Design related activities); 5. Work program (Construction related activities);   The following information also shall be included in the inner covers of envelope marked as “Envelope 3- Financial Proposal”:   1. Day work rates schedule; 2. Schedule, “Overhead and profit percentage for Provisional Sum activities”; 3. Schedule, “Input percentages for price adjustments”.   The Employer’s address for the purpose of Bid submission is  **Chairman, Ministry Procurement Committee,**  **Ministry of City Planning, Water Supply and Higher Education, “Lakdiya Madura”,**  **No. 35, Sunil Mawatha,**  **Palawatta,**  **Battaramulla.**  **Sri Lanka**  Contract name: …………………………………………  …………………………………………………………….  ……………………………  Contract No.  ………………………………………………………….. |
| **Deadline for submission of Bids** | 20.1 | The deadline for submission of Bids shall be \_\_\_\_\_\_\_\_\_\_\_ |
| Evaluation and comparison of Bids | 27.0 | For evaluation and comparison of Bids option A is selected. |
|  | 27.1**\*** | Not relevant |
| **Correction of errors** | (28.1) c | Sub clause 28.1 (c) not modified. |
| **Correction of errors** | (28.1) d | Sub clause 28.1 (d) is applicable. |
| **Award of Contract** | 29.2 | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. Contractor shall adjust all BOQ Rates deducting the discounted amount and shall endorse with the Contractor’s Signature. This rate is applicable for all extra works to complete the works in the Contract. |
| **Amount of Performance Security** | 32.1 | The amount of Performance Security is 5% of the Initial Contract Price and valid up to the issuance of final acceptance certificate.  And issued by an agency stipulated under Clause 4.2 in the Contract Data. |
| **Percentage of**  **retention** | 34.1 | Five (05) % of the Initial Contract Sum.  When Retention amount reaches 5% of Initial Contract Price, upon the issue of the Taking-Over Certificate on submission of unconditional, on demand guarantee issued by a commercial bank operating in Sri Lanka approved the Central Bank of Sri Lanka and acceptable to the Employer. This Guarantee shall be valid until 28 days beyond the Defects notification period |
| **Minimum amount of Interim Payment Certificates** | 34.2 | Not applicable mild stone payment as agreed. |
| **Adjudicator proposed by Employer** | (35.1) | The Adjudicator proposed by the Employer is :  Adjudicator shall be appointed when need arises. |

Revised on 29-04-2019

Revised on 06-02-2019

Revised on 16-09-2014

Revised on 16-09-2014

**Bidding Data**

*(Please note that the clause numbers given here under are that of Instruction to Bidder)*

**Instructions to Bidders Sub-Clause**

|  |  |  |
| --- | --- | --- |
| **Item** | **Sub-Clause** | Entry |
| **Employer’s name and address** | 1.1.& 9.1 | The Employer is  Name : National Water Supply and Drainage Board  Address: Galle Road,  Ratmalana |
| **Scope of Works** | 1,1 | The Works consists of  ……………………………………………………………..  ……………………………………………………………..  ……………………………………………………………..  Located at  ……………………………………………………………….  ……………………………………………………………… |
| **Time for Completion** | 1.2 | The Time for Completion for the whole of Works shall be …………. days. |
| **Delay damages for the Works** | 1.2 | The delay damages for the whole of the Works shall be ……………………..per Day.  The maximum amount of delay damages for the whole of the Works shall be10% percent of the Initial Contract Price. |
| **Defects Notification Period** | 1.2 | Defects Notification Period is…………..Days from Employer’s Taking over |
| Source of funds | 2.1 | The source of funds is………………………………… |
| **CIDA registration required** | 3.1 | The registration required CIDA  Specialty …………………………………………….  ……………………………………………..  Grade ……………………………………………. |
| **NCSL**  **Membership** | 3.2 | Delete the clause |

Revised on 06-05-2016

|  |  |  |
| --- | --- | --- |
| **Eligible bidders** | 3.4 | Foreign bidders are not allowed to bid. |

Revised on 06-05-2016

|  |  |  |
| --- | --- | --- |
| **Qualification Information** | 3.1, 3.2, 4.1 | The following information shall be provided in Section VIII:   * CIDA registration   Registration number \_\_\_\_\_\_\_\_  Grade \_\_\_\_\_\_\_\_  Specialty \_\_\_\_\_\_\_\_  Expiry date \_\_\_\_\_\_\_\_   * VAT registration number \_\_\_\_\_ * Attach construction program (Format given in Appendix ………) * Attach legal status (Sole proprietor, Partnership, Company etc.) …………….. * Attach authentication for signatory * 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 five years; (Appendix ……………) * Construction equipment; (Appendix …………) * Staffing; (Appendix …………) * Attach Work plan and methods; * Any other |
| **Average annual volume of construction work performed in last five** | 4.3(a) | Delete the clause and replace by the following.  Average annual volume of construction work is Rs…………   1. *If contract period is less than one year, the value of the Engineers estimate,* 2. *If contract period is more than one year, 1.5 times annual value of the proposed work \*1*   *\*1Annual Value of proposed work,*  *= 12 x Engineer’s estimate*  *Contract duration in months* |
| **Experience** | 4.3 (b) | Delete the clause and replace by the following. |
|  |  | The scope of work of at least one(01) water supply project undertaken by the bidder should have included, inter alia, the following requirements:-   * + - 1. Construction of ………… m3/day or larger capacity water treatment plant including Intake, sludge treatment and pumping stations, control system. *(at least 50% of capacity)*       2. Supplying or procuring and laying of at least 10 km of Water Transmission/ Distribution pipe lines having diameters not less than ………….. mm diameter. *(one step below the diameter specified)*       3. Construction of Water Tower, having minimum of 500 m3 capacity.       4. Design of process and Water Treatment, ground reservoirs.       5. Design of …….. m3/day or large capacity water treatment plant including intake, sludge treatment and control systems (at least 50% of the capacity)       6. Design of at least 10 km of water Transmission/Distribution pipelines having diameters not less than ……….. mm diameter (one step below the diameter specified)       7. Design of water tower having minimum of 500 m3 capacity.       8. Design of pumping stations and pumps.   Bidders who do not possess design experience in similar projects specified as above (d) to (h) in required capacities may enter into a Joint Venture with a Design consultancy firm with experience in water treatment, water supply and distribution design. |
| **Essential equipment** | 4.3(c) | **Essential Equipment**  \* Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed shall be as given in Appendix ……………..  (Bidder shall include any additional equipment, plant, etc.  to the Appendix 3 depending on his construction  methodology) |
| **Liquid assets and/or credit facilities required** | 4.3(g) | Financial capability should not be less than Rs.**...............** million [*40% of average annual financial value of the Engineer’s estimate]*as working capital including Rs. ………. in liquid cash (3-4 months) |
| **Bid price** | 13.3 | VAT component shall not be included in the rates. The amount written in the Form of Bid shall be without VAT. However VAT component shall be shown separately at the end of the price schedule summary. |
| **Contract is subjected to price adjustment for fluctuation of prices** | 13.4 | The Contract is subject to price adjustment in accordance with Clause 13.7 of the Conditions of Contract. |

|  |  |  |
| --- | --- | --- |
|  | 13.5 | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. This rate is applicable for all extra works to complete the works in the Contract. |
| **Bid validity period** | 15.1 | The Bid shall be valid up to …………….. |
| **Amount of Bid security** | 16.1 | The amount of Bid security shall be Sri Lanka Rupees ……………………………… |
| **Validity of Bid security** | 16.2 | Substitute by the following.  The Bid security shall be valid up to \_\_\_\_\_**(**119 days)  Bid Security shall be valid up to ……………… *(give a date)*  Delete text in Clause 17.2 and add the following  Bid Security (unconditional) which is encashable on demand equivalent to the sum stated in clause 17.1 Bidding Data, shall be furnished in one of the following forms. Bid Security shall be as per the format given in the Bidding Document.     1. Bank Guarantee issued by a reputed bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka. 2. Sri Lanka rupee cash deposit to the National Water Supply and Drainage Board, (The original receipt for such deposit shall be attached to the original tender document). 3. A certified cheque issued by a reputed Bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka, in favour of National Water Supply and Drainage Board. 4. A Bank guarantee issued by a Bank based in another country but the security or guarantee “confirmed” by a Bank operating in Sri Lanka approved by the Central Bank of Sri Lanka.   **The term “confirmed” in relation to bank guarantee issued by a Bank based in another country means that the “confirmed” bank held liable for paying the respective guaranteed amount at the request of first demand by the beneficiary.** |
| **Pre-Bid meeting** | 17.1 | Pre Bid meeting will be held ………………………………  ………………………………………………………………  ………………………………………….  Date time \_\_\_\_\_\_\_\_\_\_\_\_  Revised on 29-04-2019 |
| **Sealing and marking of Bids** | 19.2  19.3  19.4  19.5 (a)  19.5 (b) | The following information also shall be included in the inner covers of envelope marked as “Envelope 1- Preliminary Information”:   1. Schedule, “Annual turn-over Information”;   (ii) Schedule “Adequacy of Working capital”;  (iii) Schedule, “Design experience in last five Years;   1. Schedule, “Construction experience in last five Years”; 2. Schedule, “Major items of construction equipment proposed”;   The following information also shall be included in the inner covers of envelope marked as “Envelope 2- Design/Technical Proposal”:   * 1. Schedule, “ Team composition and Task assignment”;   2. Curriculum vitae of key staff;   3. Schedule, “ Time Schedule for key staff”;   4. Work program (Design related activities);   5. Work program (Construction related activities);   The following information also shall be included in the inner covers of envelope marked as “Envelope 3- Financial Proposal”:   1. Daywork rates schedule; 2. Schedule, “Overhead and profit percentage for Provisional Sum activities”; 3. Schedule, “Input percentages for price adjustments”.   The Employer’s address for the purpose of Bid submission is  Chairman,  Department Procurement Committee,  National Water Supply & Drainage Board,  Galle Road, Ratmalana  Contract name: …………………………………………  …………………………………………………………….  ……………………………  Contract No. ……………………………………………….. |
| **Deadline for submission of Bids** | 20.1 | The deadline for submission of Bids shall be \_\_\_\_\_\_\_\_\_\_\_ |
| Evaluation and comparison of Bids | 27.0 | For evaluation and comparison of Bids option A is selected. |
|  | 27.1**\*** | Not relevant |
| **Correction of errors** | (28.1) c | Sub clause 28.1 (c) not modified. |
| **Correction of errors** | (28.1) d | Sub clause 28.1 (d) is applicable. |
| **Award of Contract** | 29.2 | If a Bidder has given a discount of his bid price, the discount shall be distributed to each and every item in the Bills of Quantities by adjusting the rates in the Bills of Quantities by the percentage of discount offered. Contractor shall adjust all BOQ Rates deducting the discounted amount and shall endorse with the Contractor’s Signature. This rate is applicable for all extra works to complete the works in the Contract. |
| **Amount of Performance Security** | 32.1 | The amount of Performance Security is 5% of the Initial Contract Price and valid up to the issuance of final acceptance certificate.  And issued by an agency stipulated under Clause 4.2 in the Contract Data. |
| **Percentage of**  **retention** | 34.1 | Five (05) % of the Initial Contract Sum.  When Retention amount reaches 5% of Initial Contract Price, upon the issue of the Taking-Over Certificate on submission of unconditional, on demand guarantee issued by a commercial bank operating in Sri Lanka approved the Central Bank of Sri Lanka and acceptable to the Employer. This Guarantee shall be valid until 28 days beyond the Defects notification period |
| **Minimum amount of Interim Payment Certificates** | 34.2 | Not applicable mild stone payment as agreed. |
| **Adjudicator proposed by Employer** | (35.1) | The Adjudicator proposed by the Employer is :  Adjudicator shall be appointed when need arises. |

Revised on 29-04-2019

Revised on 16-09-2014

**4. CONTRACT DATA**

The Contract Data is a part of General Conditions of Contract and should be read in conjunction with the General Conditions of Contract.

If there is a discrepancy found in the General Conditions of Contract and the Contract Data, the Content in the Contract Data shall supersede the Content in the General Conditions of Contract.

Revised on 06-02-2019

*(Note: What is given in italic letters are guide lines to prepare the Contract Data and they shall be removed offer preparation of the Contract Data.)*

**Contract Data**

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

|  |  |
| --- | --- |
| **Sub-Clause**  **1.1.2.2** | Employer is:  Name : National Water Supply and Drainage Board  Address:Galle Road,  Ratmalana  Authorized Representative:The Chairman,  National Water Supply& Drainage Board  Galle Road, Ratmalana |
| **Sub-Clause**  **1.1.2.4** | Engineer is:General Manager,  Address:National Water Supply and Drainage Board,  Galle Road, Ratmalana.  **Engineer's Representative :** ……………………. |
| **Sub-Clause**  **1.1.5.6** | Sections of Works : …………………………………………………… ……………………………………………………………………….  (to be completed) |
| **Sub-Clause 1.6 Contract Agreement** | **Replace the text of clause 1.6 with the following:**  The Contractor shall enter into and execute the contract agreement to be prepared by the Employer in the form annexed to these conditions with such modification as may be necessary within 28 days of the receipt of the letter of acceptance. The stamp duty and any registration fees shall be payable by the Contractor. |
| **Sub-Clause 1.12 Confidential Detail** | Additional sub-clause:  “The Contractor shall treat the details of the contract as private and confidential, except to the extent necessary to carry out its obligations under it. The Contractor shall not publish, permit to be published or disclose any particulars of the Contract in any trade or technical paper or elsewhere without the prior consent in writing of the Employer” |
| **Sub-Clause**  **2.1** | The right of access to, and possession is amended and shall be 14Days from Letter of Acceptance. |

Revised on 30-12-2014

|  |  |
| --- | --- |
| Sub-Clause 3.1 | Engineer’s Duties and Authority |
| 3.1.1 | Add sub clause |
|  | Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13.3 and shall notify the Contractor accordingly, with a copy to the Employer. |
| Sub-Clause 4.1 **Contractor’s General Obligations** | Add to the clause  Contractor shall “Carryout detail investigations including sub surface and hydrological investigation” prior to commencement of designs. |
| **Sub-Clause 4.2** | Performance Security  The Performance Security shall be 5% of the Initial Contract Price. |
|  | And issued by an agency stipulated below using the Form for Performance Security included in Section 11, Standard Forms  (a) Bank guarantee from Bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka.  (b) Fixed deposit or a pass book of a bank operating in Sri Lanka, deposits made in the name of the National Water Supply and Drainage Board.  (c) Sri Lanka rupee cash deposit to the National Water Supply and Drainage Board, (The original receipt for such deposit shall be attached to the original tender document). |

|  |  |
| --- | --- |
|  | (d) Certified cheque issued by a Bank operating in Sri Lanka in favour of National Water Supply and Drainage Board.  (e) A Bank guarantee issued by a Bank based in another country but the security or guarantee “confirmed” by a Bank operating in Sri Lanka approved by the Central Bank of Sri Lanka.    Revised on 15-08-2016  (f) A letter of credit issued by a foreign Bank, but “confirmed” by a Bank operating in Sri Lanka, approved by the Central Bank of Sri Lanka.  Note: However, the requirement of confirmation of performance guarantees issued by a bank based in another country, by a bank operating in Sri Lanka is not necessary, if the entity that issues the guarantee is an Export Credit Agency of any foreign government or a reputed International Financier acceptable to the Central Bank of Sri Lanka.  **The term “confirmed” in relation to bank guarantee issued by a bank based in another country means that the “confirmed” bank held liable for paying the respective guaranteed amount at the request of first demand by the beneficiary.** |
| **Sub-Clause 4.4**  **Sub Contracting** | Add to clause  The contractor shall not sub contract the work in excess of 50% of the total contract price. |
| **Sub-Clause 4.10**  **Unforeseeable Sub-Surface Conditions** | Insert the following.  Notwithstanding anything in the clause in Part 1,  It is the contractors responsibility to carry out all detailed investigations sufficiently on sub surface conditions at the contractor’s cost prior to detailed designs and constructions. |
| **Sub-Clause 5** | **Change the heading “Design” to “Detailed Investigations & Designs”** |
| **Sub Clause 5.1**  **General Design Obligations** | Add to clause  The contractor shall carry out and be responsible for the detail investigations including sub surface, hydrological and geological investigations and design of the works. |
| **Sub-Clause 6.3**  **Labour laws** | Add to the clause  The Contractor shall indemnify and keep indemnified the Employer against all claims made under the all labour laws of the Democratic Socialists Republic of Sri Lanka and any statutory amendments thereto or modification thereof. |

|  |  |
| --- | --- |
| **Sub-Clause 6.8** | **Contractor’s Personnel**  Schedule of Key Personnel shall be in accordance with the tables given below: |
|  | The Bidder must demonstrate that it has the personnel for the key positions that meet the following requirements:  Revised on 15-08-2016 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No** | Position | **Qualifications** | **Total Work Experience [years]** | **Minimum Number Required** | **Experience In Similar Work [years]** |
| 1 | Chief Engineer (Design) | Chartered Engineer and PG Dip/M.Eng  in Env. Eng/ Sanitary Eng. | 15 |  | 10 |
| 2 | Snr. Design Engineer  (Treatment Process/Hydraulic Design) | Chartered Engineer and  PG Dip/  M.Eng in Env. Eng/Sanitary Eng | 12 |  | 08 |
| 3 | Snr. Design Engineer (Civil/Structural Design) | Chartered Engineer and  PG Dip/M. Eng in Structural Eng.& Design | 12 |  | 08 |
| 4 | Snr. Design Engineer  (Electro-Mechanical) | Chartered Engineer and  PG Dip/M.Eng | 12 |  | 08 |
| 5 | Snr. Design Engineer  (Water Supply & Civil) | Chartered Engineer and  PG Dip/M.Eng in Env. Eng/ Sanitary Eng | 12 |  | 08 |
| 6 | Quantity Surveyor | BSc (QS)/  Technical membership of Institute of Quantity Surveyors  (Sri Lanka) | 10 |  | 06 |
| 7 | Engineering Assistant | NDT or equivalent | 10 |  | 06 |
| 8 | Draughtsman | National Certificate in Engineering Draughtsman  (full time 1 year) /  Draughtsman Apprentice Certificate (one year full time) conducted by the Department of Education and 3 months certificate course in AutoCAD | 10 |  | 06 |

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section VIII (b)Schedules.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Construction Team**   |  |  |  | | --- | --- | --- | | **No.** | Position | **Total Work & Similar Work Experience**  **[years]** | | 1 | Contractor’s Representative/ Project Manager | Should be a Chartered Civil Engineer / Mechanical Engineer. Should have served as a Contractor’s Representative for at least one project of similar nature, size and magnitude and successfully completed them**.** He should have supervised and coordinated, design, construction and installation teams engaged on these works and should have a minimum experience of 15 years and 8 years on similar works. | |
|  | **Construction & Installation Team** |
|  | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **No.** | Position | **Qualificati-ons** | **Total Work Experience [years]** | **Minimum Number**  **required** | **Experience In Similar Work [years]** | | 1 | Chief Engineer (Construction & Installation) | Chartered Engineer | 12 |  | 08 | | 2 | Senior Site Engineer | Chartered Engineer | 10 |  | 06 | | 3 | Site Engineer (Civil) |  | 05 |  | 02 | | 4 | Site Engineer (Electro-Mechanical) |  | 05 |  | 02 | | 5 | Engineering Assistant (Civil) | NDT or equivalent | 05 |  | 03 | | 6 | Engineering Assistant (Electro-Mechanical) | NDT or equivalent | 05 |  | 03 | |
|  |  |
|  | The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section VIII (b)Schedules. |

|  |  |
| --- | --- |
|  | *In the event of non-deployment of designated key personnel, a deduction equivalent to one month salary proposed by the Engineer for the position shall be deducted from the contractor’s monthly payment.*  *Further, failure by the successful bidder to employ key personnel having the specified qualifications and experiences will result in stoppage of work or suspension of interim payments until compliance with the requirements.* |
|  |  |
| **Sub-Clause 7.2**  **Inspection** | Add the following paragraph at the end;  The Employer requires the goods to be supplied under this contract shall conform to the requirements. The Contractor shall obtain the certificates of Inspection for the specific requirement of this contract document carried out by one of the inspection agencies mentioned in the Sub Clause 7.2.1.5 hereof, acceptable to the Employer. All cost of such inspection should be included in the lump sum contract price. |
|  | 7.2.1 Testing and Inspection by Inspection Agencies |
|  | 7.2.1.1 The Employer or his representative shall have the right to inspect and/or to test the Goods for their conformity to the Contract. The Technical Specifications and Employer’s Requirement shall specify what inspections and tests the Employer requires, not specified any where and where they are to be conducted. The Employer shall notify the Contractor in writing of the identity of any representatives retained for these purposes.  7.2.1.2 The inspections and tests may be conducted on the premises of the Supplier or his subcontractor(s), at point of delivery and/or at the Good's final destination. Where Inspection and Testing are conducted on the premises of the Contractor or its subcontractor(s), all facilities and assistance including access to drawings, documents and production data shall be furnished to the inspectors at no cost to the Employer.  7.2.1.3 Should any inspected or tested Goods fail to conform to the specifications, the Employer may reject them and the Contractor shall either replace the rejected Goods or make all alterations necessary to meet specification requirements free of charge to the Employer.  7.2.1.4 The Employer's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival at site shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Employer or its representative prior to the delivery of Goods or Goods' shipment from the country of origin, in case of importing. |

|  |  |
| --- | --- |
|  | 7.2.1.5 The Employer requires the goods to be supplied under this contract shall conform to the requirements given in the specifications. The Contractor shall obtain the Certificates of Inspection for the specific requirement of this contract document carried out by one of the following inspection agencies acceptable to the Employer. All cost of such Inspections should be included in the lump sum price of the contract. |
|  | 1. M/s Lloyds Register,  Lloyds Register Industrial Division,  Register House, 29 Wallesley Road,  Croydon DRO-2AJ, U.K.  2. M/s Crown Agents,  Quality assurance & Inspection Service  Townend House, Walsall WSI INT  U.K.  3. M/s Societe Generale de Surveillance S.A.,  1, Place des Alpes,  Case Postale 898, CH-1211 Geneva 1,  Switzerland.  4. Bureau of Veritas,  Cedex 44,  92077 Paris Le Defense,  France. |
|  | Nomination Inspection Agency shall carryout inspection and testing during manufacturing process, after manufacturing and at any time prior to shipping and shall confirm that goods are in conformity with specifications included in the contract document. He shall submit his Inspection report to the Employer including all items given in the Terms of Reference (TOR) for the Nominated Inspection Agency, which is included in the contract document. |
|  | 7.2.1.6 Nothing in clause 7 shall in any way release the Contractor from any warranty or other obligations under this Contract.  7.2.1.7 The Contractor shall obtain the approval of the Employer to ship the goods to be imported for the Works or to deliver such materials and plant to the site. Applications for such approval to ship shall be accompanied by manufacturer’s test certificates and certificates of inspection prescribed in the Contract or agreed with the Employer. Application shall be made so as to give the Employer a reasonable time to deal with such applications. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 7.2.2 **Pre-shipment Inspection by NWSDB** | | | |
|  | Pre-shipment Inspection shall be in accordance with clause 6.3.9 of Employer’s Requirement. | | | |
|  |  | | | |
|  |  | | | |
| **Sub-Clause 7.3**  **Testing** | Add following paragraph at the end. | | | |
| **Sub-Clause 7.3.1** | The Employer’s right to inspect, test and, where necessary, reject the Goods after the Goods' arrival in the Employer’s country shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Engineer prior to the Goods' shipment from the country of origin.  In the case of imported equipment/material, the tests should be carried out by an inspection agency approved by the Employer and the copy of the certificate issued by the inspection agency with respect to quantity, quality and loading including all items given in the TOR for the pre-shipment inspection for the Nominated Inspection Agency should be forwarded to the Employer. The cost of inspection will be borne by the Contractor. | | | |
| **Sub-Clause 8.1**  **Commencement of Work 8.1** | Start Date: The Start Date is amended and shall be 14 Days from the issue of the Letter of Acceptance | | | |
| **Sub-Clause 8.2** | Time for Completion  **The Time for Completion for the whole of Works shall be**……. days | | | |
| **Sub-Clause 8.5**  **Delays caused by Authorities** | | Add to the Clause.  Contractor should carefully study the procedures followed by granting approval for Road damages by Road Development Authority or Provincial Road Development Authority, any Local Government Authorities obtaining Electricity Supply and Telecommunication facilities from Ceylon Electricity Board and Telecommunication Authorities respectively. Water Supply Connections from the National Water Supply & Drainage Board or any Local Authority, therefore, sufficient allowance should be kept in work programmes for works connected with them and costing of these works. | | |
| **Sub-Clause 8.7** | | Delay Damages The Delay Damages for the whole of the Works shall be Rs.……………per Day.  The maximum amount of Delay Damages for the whole of the Works shall be10% of the Initial Contract Price. | | |
| **Sub-Clause 9.1**  **Contractor’s Obligation** | | All materials, labour, electricity, water, chemicals, fuel, Testing equipment and any other required materials, skilled and other labourer and etc. for the proper completion of tests shall be provided by the contractor at Contractor’s cost and shall be included in the lump sum contract price. | | |
| **Sub-Clause 11.1** | | Defects Notification Period Defects Notification Period is: …… Days from Taking-over Certificate. | | |
|  | |  | | |
| **Sub-Clause 12.1** | | Tests After Completion Sub paragraphs (a), and (b) shall be replaced by the following:   1. The Employers shall not provide all electricity, equipment, fuel, instrument, labour and materials necessary to carried out tests 2. Tests after completion shall be carried out by the contractor with the presence of Employer’s Representative | | |
|  | |  | | |
| **Sub-Clause 13.7** | | Adjustments for Changes in Cost Contract is/is not subjected to price adjustment for fluctuation of prices | | |
|  | |  | | |
| **Sub-Clause 14.1** | | Contract Price The Sub-Clause 14.1 is applicable without any modification.  The Works described below is to be paid according to quantity supplied or work done:   1. ………………………………………………………………. 2. ……………………………………………………………… 3. ………………………………………………………………. | | |
|  | |  | | |
| **Sub-Clause 14.4**  **Sub Clause 14.7** | | **Issue of Interim Payment Certificates**  Shall be in accordance with Clause 34.2 in Bidding Data.  **Payment of Retention**  Add to clause  On reaching the limit of retention stated in Contract Data 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. | | |
| **Sub-Clause**  **18.2** | | **Third Party Insurance**  Add the following sub clause The minimum insurance covers shall be : | | |
|  | | **(a)** |  | The minimum cover for insurance of the Works and of Plant and Materials is 115% of the Initial Contract Price. |
|  | |  |  | The maximum deductible for insurance of the Works and of Plant and Materials are 5% of the each claim. |
|  | | (b) |  | The minimum cover for loss or damage to Equipment is the replacement cost of equipment |
|  | |  |  | The maximum deductible for insurance of Equipment is 5% of the replacement cost of the equipment |
|  | | (c) |  | The minimum cover for insurance of other property (other than the Site)is to cover the building and property adjacent to the site and reinstatement of ………………….. |
|  | |  |  | The maximum deductible for insurance of other property (other than the Site) is 5% of the respective insured value. |

|  |  |  |  |
| --- | --- | --- | --- |
|  | (d) |  | The minimum cover for personal injury or death,  For third party and employees of the Employer and other persons engaged by the Employer in the Works is Rs 1,000,000 per event, Number of events are unlimited |
|  | (e) |  | Minimum cover for loss of business and loss of revenue is  Rs. 1,000,000.00 No. of events unlimited. |
|  | (f) |  | The minimum cover for personal injury or death, |
|  |  |  | for the Contractor's workmen is Rs 1,000,000 per person, number of persons are unlimited. |
|  |  |  | Contractor's employees other than workmen is Rs 1,000,000 per person, Number of persons are unlimited. |
|  |  |  | Employer’s Employees and Consultant’s Employees is Rs.1,000,000/= per person. Number of persons is unlimited. |

|  |  |
| --- | --- |
| **Sub-Clause 18.4** | **Professional Indemnity Insurance**  This Amount of insurance shall be 25% of contract price |
| Sub-Clause 19.2 & 19.4 | **Failure to Agree Dispute Adjudicator**  The appointing entity for appointing the Adjudicator is the Institute for Construction Industry Development Authority (CIDA) |
| **Sub-Clause 19.5**  **Arbitration** | Delete the text of the clause and substitute the following.   1. The Employer and the contractor shall make every effort to resolve amicably by direct, informal, negotiation, any disagreement or dispute arising between them under or in connection with the contract. If amicable settlement cannot be reached then all disputed issues shall be settled by Arbitration as per the Arbitration Act No. 11 of 1995.   Arbitration shall be proceed with the UNCITRAL rules.  The arbitration shall be conducted in accordance with the local Arbitration Procedures and shall be held at such place and time in Sri Lanka as the arbitrators may determine. The decision of the majority of arbitrators shall be final and binding upon the parties hereto and the expenses of the arbitration shall be paid as may be determined by the arbitrators.   1. Pending the award in any arbitration proceedings hereunder, 2. this Contract and the rights and obligations of the Parties shall remain in full force and effect and 3. 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. 4. 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 arbitrators shall be equally shared by the Parties initially.   **Composition of the Arbitral Tribunal :**  The arbitral tribunal shall consist of three arbitrator who shall be appointed in the manner provided in the Selection Procedure as given below.  Revised on 06-05-2016  **Selection Procedure :**  Either Party shall nominate one arbitrator. These two arbitrators jointly select the third arbitrator who shall act as the Chairman.  **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. |
|  |  |
|  |  |
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#### SECTION 5 A - BIDDING FORMS

**5.1 Eligibility Documents**

**5.2 Technical Proposal**

**5.3 Commercial Submittals**

**Table of Forms**

**5.1 Qualification Documents**

**Form ELI – 1 Bidder’s Information Sheet**

**Form ELI – 2 Joint Venture Information Sheet**

**Form LIT- 1 Pending Litigation**

**Form LIT- 2 Pending Litigation of Nominated Subcontractor**

**Form EXP – 1 General Construction Experience**

**Form EXP – 2(a) Experience in Specific Constructionrelated to works proposed under the**

**contract**

**Form EXP – 2 (b) Experience in Specific Construction Key Activities**

**Form EXP – 2 (c) Experience in Specific Design related to works proposed under the**

**contract**

**5.2 Technical Proposal**

**Form TEC – 1 Personnel / Staff Proposed for the Project**

**Form TEC – 2 Resume of Key Personnel Proposed for the Project**

**Form TEC – 3 Construction plant & Equipment Proposed for the Project**

**Form TEC – 4 Proposed Site Organization**

**Form TEC – 5 Proposed Nominated Sub - Contractors**

**Form TEC – 6 Method Statements**

**Form TEC – 7 Mobilization Schedules**

**Form TEC – 8 Construction Schedule**

**Form TEC – 9 Schedule of Plant, Equipment and Materials proposed to be incorporated to the works**

**Form TEC – 10 Proposed Water Treatment Process outline Design**

**Form TEC – 11 Proposed Intake Outline Designs**

**Form TEC – 12 Schedule of Recommended Spare Parts**

**Form TEC – 13 Schedule of Mandatory Spare Parts**

**Form TEC – 13A Schedule of Tools**

**Form TEC – 14 Details of Design Partner of the JV**

**Form TEC – 15 Details of equipment supplied/installed**

**5.3 Commercial Submittals**

**Form FIN – 1 Financial Situation**

**Form FIN – 2 Annual Turnover Data**

**Form FIN – 3 Main Current Contract Commitments / Work in Progress**

**Form FIN – 4 Financial Resources**

**Note**:

1. If necessary, additional sheets may be added to the forms. Each page of each form should be clearly marked in the right top corner as follows: Form TEC - 1, page 1; Form TEC - I, page 2, etc…

1. Some of the forms will require attachments. Such attachments should be clearly marked as follows: Attachment 1 to Form TEC - 1, Attachment 2 to Form TEC - 1, etc…

**FORM ELI - 1**

# *Bidder’s Information Sheet*

*Where the Bidder proposes to use subcontractors for critical components of the works, or for work contents in excess of 10 percent of the value of the whole works, the following information should also be supplied for the specialist subcontractor(s).*

|  |  |  |
| --- | --- | --- |
|  | Name of firm / Bidder’s legal Name : | |
|  | In case of JV, legal name of each partner | |
|  | Head office address | |
|  | Local office address (if any) | |
|  | Bidder’s Authorized representative (Name, Address, Telephone, Fax, e-mail) | |
|  | Telephone | Contact |
|  | Facsimile | E-mail |
|  | Place of incorporation / registration | Year of incorporation / registration |
|  | Main lines of business | |
|  |  | |
|  | 1. Since: | |
|  | 2. Since: | |
|  | 3. Since: | |
|  | 4. Since: | |

Attached are copies of the following original documents;

a/ In a case of single entity, articles of incorporation or constitution of the legal entity named above

b/ Authorization to represent the firm of JV named in above

c/ In case of JV, letter of intent to form JV or JV agreement

**FORM ELI - 2**

**Joint Venture Information Sheet**

*A copy of the joint venture agreement as in the forms given in the bidding document must be attached to Form ELI-2. In case the joint venture agreement or letter of Intent to form JV is not acceptable to NWSDB, the joint venture may be requested to modify the agreement accordingly. Failure to submit a modified Joint venture agreement within twenty one days upon receipt by the Bidder of the request for modification will disqualify the Bidder.*

Each member of a JV must fill in this form

|  |  |
| --- | --- |
| JV / Specialist Subcontractor Information | |
| **Bidder’s legal name** |  |
| **JV Partner’s legal name** |  |
| **JV Partner’s country of constitution** |  |
| **JV Partner’s year of constitution** |  |
| **JV Partner’s legal address in country of constitution** |  |
| **JV Partner’s authorized representative information**  **(name, address, telephone numbers, fax numbers, e-mail address)** |  |
| **Attached are copies of the following original documents.**   * 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 3.1 and 3.2. * 2. Authorization to represent the firm named above, in accordance with ITB 5.2 (b). * 3. In the case of government-owned entity, documents establishing legal and financial autonomy and   compliance with commercial law, in accordance with ITB 3.4. | |

*Name of the Bidder / Joint Venture partner if applicable*……………………

**FORM LIT - 1**

**Pending Litigation**

Each Bidder or member of a JV must fill in this form

|  |  |  |  |
| --- | --- | --- | --- |
| Pending Litigation | | | |
| **No pending litigation in accordance with Criteria 2.2 of Section 4 (Evaluation and Qualification Criteria)**  **Pending litigation in accordance with Criteria 2.2 of Section 4 (Evaluation and Qualification Criteria)** | | | |
| **Year** | **Matter in Dispute** | **Value of Pending Claim in US$ Equivalent** | **Value of Pending Claim as a Percentage of Net Worth** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*Name of the Bidder / Joint Venture partner if applicable*……………………

**FORM LIT - 2**

**Pending Litigation of Nominated Subcontractor**

All Nominated Subcontractors must fill in this form.

|  |
| --- |
| Name of Nominated Subcontractor : |

|  |  |  |  |
| --- | --- | --- | --- |
| Pending Litigation | | | |
| **No pending litigation in accordance with Criteria 2.2 of Section 4 (Evaluation and Qualification Criteria)**  **Pending litigation in accordance with Criteria 2.2 of Section 4 (Evaluation and Qualification Criteria)** | | | |
| **Year** | **Matter in Dispute** | **Value of Pending Claim in US$ Equivalent** | **Value of Pending Claim as a Percentage of Net Worth** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*Name of the Bidder / Joint Venture partner if applicable*……………………

Form EXP – 1

General Construction Experience

Each Bidder or member of a JV must fill in this form

| **General Construction Experience** | | | | |
| --- | --- | --- | --- | --- |
| **Starting**  **Month**  **Year** | **Ending**  **Month**  **Year** | **Years** | **Contract Identification and Name**  **Name and Address of Employer**  **Brief Description of the Works Executed by the Bidder** | **Role of Bidder** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

*Name of the Bidder/ Joint Venture Partner ……………………………………………..*

*Information to be provided by the bidder should be supported by documentary evidence with certified Letters from employers and or consultants.*

Form EXP – 2(a)

Specific Construction Experience related to works

proposed under the contract.

Fill up one (1) form per contract.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contract of Similar Size and Nature** | | | |
| **Contract No . . . . . . of . . . . . .** | **Contract Identification** |  | |
| **Award Date** |  | **Completion Date** |  |
| **Role in Contract** | * **Contractor** | * **Management Contractor** | * **Subcontractor** |
| **Total Contract Amount** | **US$** | | |
| **If partner in a JV or subcontractor, specify participation of total contract amount** | **Percent of Total** | **Amount** | |
| **Employer’s Name**  **Address**  **Telephone/Fax Number E-mail** |  | | |
| **Description of the similarity in accordance with Criteria 2.4.2(a) of Section 3** | | | |
| Participation as contractor, management contractor, or subcontractor, in at least **one** contract within the last **Ten (10)year**s, with a value of at least **4.0Million U.S Dollars** that have been successfully or are substantially completed and that are similar to the proposed construction works. The similarity shall be based on the physical size, complexity, methods, technology or other characteristics as described in Section 5 (Employer’s Requirements) |  | | |

*Information to be provided by the bidder should be supported by documentary evidence with certified Letters from employers and or consultants.*

*Name of the Bidder / Joint Venture partner if applicable*……………………Form EXP - 2(b)

Specific Construction Experience in Key Activities

Fill up one (1) form per contract

|  |  |  |  |
| --- | --- | --- | --- |
| **Contract with Similar Key Activities** | | | |
| **Contract No . . . . . . of . . . . . .** | **Contract Identification** |  | |
| **Award Date** |  | **Completion Date** |  |
| **Role in Contract** | * **Contractor** | * **Management Contractor** | * **Subcontractor** |
| **Total Contract Amount** | **US$** | | |
| **If partner in a JV or subcontractor, specify participation of total contract amount** | **Percent of Total** | **Amount** | |
| **Employer’s Name**  **Address**  **Telephone Number**  **Fax Number**  **E-mail** |  | | |
| **Description of the key activities in accordance with Criteria 2.4.2(b) of Section 3** | | | |
| For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum construction, operation and handover experience in the following key activities: |  | | |
| Construction operation and handover of raw and treated water pumping systems of **04**ML/day capacity, including over **10** km of transmission pumping mains for 0ne (1) scheme. |  | | |
| Construction operation and handover of water treatment plants using processes defined in Employer’s Requirements of **4.0**ML/day capacity for 01scheme |  | | |

*Information to be provided by the bidder should be supported by documentary evidence with certified Letters from employers and or consultants.*

*Name of the Bidder / Joint Venture partner if applicable*……………………

Form EXP – 2(c)

Specific Design Experience related to Works

proposed under the contract

Fill up one (1) form per contract

|  |  |  |  |
| --- | --- | --- | --- |
| **Contract with Similar Key Activities** | | | |
| **Contract No . . . . . . of . . . . . .** | **Contract Identification** |  | |
| **Award Date** |  | **Completion Date** |  |
| **Role in Contract** | * **Contractor** | * **Management Contractor** | * **Subcontractor** |
| **Total Contract Amount** | **US$** | | |
| **If partner in a JV or subcontractor, specify participation of total contract amount** | **Percent of Total** | **Amount** | |
| **Employer’s Name**  **Address**  **Telephone Number**  **Fax Number**  **E-mail** |  | | |
| **Description of the key activities in accordance with Criteria 2.4.2(c) of Section 3** | | | |
| For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum Design experience of the bidder or the proposed design team in the following key activities: |  | | |
| Design of raw and treated water pumping systems of **08** ML/day capacity, including over **15** km of transmission pumping mains for 1 (one) scheme. |  | | |
| Design of water treatment plants using processes defined in Employer’s Requirements of **8.0**ML/day capacity for 01 scheme. |  | | |

*Note:-*

*In the case where a firm or JV proposes to use a consultant for the detailed design and this consultant is to be a sub-contractor, the design experience of the consultant will be permitted to be evaluated as if the consultant was a proposed JV partner. No consulting firms and individual consultants who were engaged in the Project under Consultancy Services Package for Project Management or Consultancy Services Package for Design and Supervision may be permitted to work with or for the bidder.*

*Information to be provided by the bidder should be supported by documentary evidence with certified Letters from employers and or consultants.*

**FORM TEC - 1**

**Personnel / Staff Proposed for the Project**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

*Bidders should provide at least two names of suitably qualified personnel to meet the requirements specified in Section 4 Evaluation & Qualification Criteria). The data on their experience should be supplied using TEC – 2 form for each candidate.*

|  |  |
| --- | --- |
| 1. | Title of position\* |
|  | Name |
| 2. | Title of position\* |
|  | Name |
| 3. | Title of position\* |
|  | Name |
| 4. | Title of position\* |
|  | Name |

\* As listed in Section 4 (Evaluation and Qualification Criteria)

Note : If local staff are proposed, please give details

**FORM TEC - 2**

**Resume of Key Personnel Proposed for the Project**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

|  |  |  |
| --- | --- | --- |
| Position | | Candidate  **** Prime **** Alternate |
| *Candidate information* | 1. Name of candidate | 2. Date of birth |
|  | 3. Professional qualifications | |
|  |  | |
| *Present employment* | 4. Name of employer | |
|  | Address of employer | |
|  |  | |
|  | Telephone | Contact (manager / personnel officer) |
|  | Facsimile | Telex |
|  | Job title of candidate | Years with present employer |

*Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.*

|  |  |  |
| --- | --- | --- |
| *From* | *To* | *Company / Project / Position / Relevant technical and management experience* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**FORM TEC - 3**

**Construction Plant & Equipment Proposed for the Project**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

*The Bidder will provide adequate information to demonstrate clearly that it has the capability to meet the requirements for each and all items of equipment listed in the Instructions to Bidders. A separate Form TEC-3 will be prepared for each item of equipment proposed by the Bidder. For each item of equipment, the Bidder should attach a copy of ownership certificate or lease agreement.*

|  |  |  |
| --- | --- | --- |
| Item of equipment | | |
| *Equipment information* | 1. Name of manufacturer | 2. Model and power rating |
|  | 3. Capacity | 4. Year of manufacture |
| *Current status* | 5. Current location | |
|  | 6. Details of current commitments | |
|  |  | |
| *Source* | 7. Indicate source of the equipment   Owned  Rented  Leased  Specially manufactured | |

*Omit the following information for equipment owned by the Bidder or partner.*

|  |  |  |
| --- | --- | --- |
| *Owner* | 8. Name of owner | |
|  | 9. Address of owner | |
|  |  | |
|  | Telephone | Contact name and title |
|  | Facsimile | Telex |
| *Agreements* | Details of rental / lease / manufacture agreements specific to the Project | |
|  |  | |
|  |  | |

**FORM TEC - 4**

**Proposed Site Organization**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

A. The Bidder is required to prepare an Organizational Chart showing the main members of the proposed project design and management teams, together with charts or tables of responsibility.

B. The Bidder is required to prepare a narrative description of the site organization chart and its key functions and systems. The organization chart should indicate where each member is to be stationed during the design stage and during the construction stage.

C. The Bidder is required to prepare a description of the relationship between the Head Office and the Site Management1

|  |
| --- |
| 1 *Indicate clearly which responsibility and what authority will be delegated to site management.* |

**FORM TEC - 5**

**Proposed Nominated Sub-contractors**

|  |  |  |  |
| --- | --- | --- | --- |
| *Section of Works* | *Approximate Value*1 | *Name(s) & Address(es) of Subcontractors* | *Description & Location of Similar Works Previously Executed* |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |
| 4. |  |  |  |
| 5. |  |  |  |
| 6. |  |  |  |

|  |
| --- |
| 1 *Value in US$ equivalent.* |

Note : If local sub contractors are proposed, please give details

**FORM TEC - 6**

**Method statements**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

The Bidder is required to prepare a method statement not **exceeding 20 pages** including charts and tables, which describes the approaches to be adopted in the designs, construction, commissioning and hand over of the works.

The method statement shall include an outline of the training to be offered within the provisional sum allocated.

**FORM TEC - 7**

**Mobilization Schedules**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

The Bidder is required to prepare a mobilization schedule in the form of a bar chart which indicates the proposed dates of mobilization of staff, machinery and workers.

Also the mobilization schedule should include the mobilization of nominated Sub Contractors with proposed data, staff, machinery and workers etc.

**FORM TEC - 8**

**Construction Schedule**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

The Bidder is required to prepare a construction schedule which lists principal activities and indicates start dates, finish dates, milestones and durations of all activities.

*The schedule should be prepared using MS Project or Primavera software and take the form of a Gantt chart covering the entire project implementation period.*

This schedule should include resource scheduling too.

**Form TEC – 9**

**Schedule of Plant, Equipment and Materials proposed to be incorporated to the works**

The bidder is required to prepare a schedule showing utilization of materials, plant and equipment for each structure of work. The bidder should include in the schedule of procurement or supply of materials, plant and equipment including pipes, fittings, specials, pumps & motors, chemical equipment, chlorinators, automation equipment, power supply, Generators etc. with the time of shipping, delivery at site and incorporation to work.

**Form TEC – 10**

**Proposed Water Treatment Process outline Design**

Bidder should submit a treatment plant outline report with the bid.

**Guideline for Outline Design**

The purpose of outline design is to evaluate the Bidder’s design ability and to judge who will suggest a favourable condition to the Employer.

The Bidder is therefore required to submit outline design report as followings:

1. Scope of outline design

Outline design report shall consist of the following components;

Site survey result

Design Criteria preparation

Water treatment process design

Water treatment plant site layout plan

Water treatment plant hydraulic profile plan

Sludge disposal and backwashed water treatment process

Pipe network layout plan

Pipe hydraulic profile plan

Treatment plant automation outline design

Chemical dosing/disinfection systems

Etc.

2. The bidder shall submit 5 (five) copies of outline design report

The outline design report should be made a report including required drawings, calculation sheet, and additional sheet and each part should be divided by coloured inter sheets.

The size of report shall be A4 size

A3 size of drawings is available, but shall be bound with report.

|  |  |  |
| --- | --- | --- |
| **Item** | **size** | **Remark** |
| **Report** | **A4** | **Bound with drawings and calculation sheets, etc.** |
| **Drawings** | **A3** | **Bound with report** |
| **Calculation sheet and etc.** | **A4** | **Bound with report** |

**Form TEC – 11**

**Proposed Intake Outline Designs**

Bidder should submit an intake design report based on the scope of outline design given below.

1. Scope of outline design

The outline design report shall consist of the following components,

Site survey results

Design criteria preparation

Intake structure

Intake site layout

Intake screening to remove debris, grit

Hydraulic design

Removal of grit, silts, debris methods

Installation of pumps, motors and other mechanical & electrical equipment

Surge protection (Hydraulic and Electrical)

Piping system

Gantry/ lifting arrangements

2. Bidder shall submit 5 (five) copies of outline design report

The outline design report should be made a report including required drawings, calculations sheets, details of pumps, motors, M&E equipment.

Each part of report should be separated with a coloured sheets.

The size of report shall be A4 size.

The size of drawing sheet shall be A3 size and shall be bound with the report

|  |  |  |
| --- | --- | --- |
| **Item** | **Size** | **Remarks** |
| **Report** | **A4** | **Bound with drawings and calculation sheets, etc.** |
| **Drawings** | **A3** | **Bound with report** |
| **Calculation sheets, etc.** | **A4** | **Bound with report** |

**Form TEC – 12**

**Schedules of Recommended Spare Parts**

Please refer the section 8.3 Scope of Work and Performance Requirement

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Form TEC - 13** | |  | |  | |  |  |  |  | | |  |  | | |
| **Schedule of Mandatory Spares** | | | | | |  |  |  |  | | |  |  | | |
| **Item No.** | **Description** | | | | | **Unit** | **Qty** | **Rate** | | | **Amount** | | | |
|  |  |  | |  | |  |  | **Local  SL Rs.** | | **Foreign US $** | **Local  SL Rs.** | | | **Foreign US $** |
| 1 | **Treated Water, Raw Water and Backwash Water Pumps:** | | | | |  |  |  | |  |  | | |  |
|  | Impellor | | - | | For each type and size of type pump installed | Nr | 1 |  | |  |  | | |  |
|  | Wear Rings (Impellor and Housing) | | - | | For each type and size of type pump installed | Nr | 2 |  | |  |  | | |  |
|  | Bearings, gaskets, bushes, sleeves, ‘O’ rings, packing or seals for each type and size provided. | | | | | Sets | 4 |  | |  |  | | |  |
| 2 | **Submersible Pumps, Screen Wash Pump and Sump Pumps** | | | | |  |  |  | |  |  | | |  |
|  | Pump Set | - | | Each type and size of type pump installed | | Set | 1 |  | |  |  | | |  |
|  | Impellor / wear rings | - | | Each type and size of type pump installed | | Set | 1 |  | |  |  | | |  |
|  | Bearings, cable entry glands and packing and seals for each type and size of pump installed | | | | | Sets | 4 |  | |  |  | | |  |
| 3 | **Progressive Cavity Pumps:** | | | | |  |  |  | |  |  | | |  |
|  | Stators for each size and type on site | | | | | Spare | 2 |  | |  |  | | |  |
|  | Rotor for each size and type on site | | | | | Spare | 2 |  | |  |  | | |  |
|  | Bearings, gaskets, bushes, sleeves, ‘O’ rings, packing or seals, drive bells for each type and size provided. | | | | | Sets | 4 |  | |  |  | | |  |
| 4 | **Sludge Pumps** | | | | |  |  |  | |  |  | | |  |
|  | Pump Set | | - | | Each type and size of type pump installed | Nr | 1 |  | |  |  | | |  |
|  | Impellor / wear rings | | - | | Each type and size of type pump installed | Nr | 1 |  | |  |  | | |  |
| 5 | **Electric Motors** | | | | |  |  |  | |  |  | | |  |
|  | Bearings and brushes and brush gear (as applicable) for each type and size supplied | | | | | Set | 1 |  | |  |  | | |  |
| 6 | **Each Incoming Panel** | | | | |  |  |  | |  |  | | |  |
|  | All Contactors spares, All relays, Timers, Auto Transformer, All rectifiers | | | | | Set | 1 |  | |  |  | | |  |
| **Total C/F** | | | | | | | | | |  |  | | |  |

Note : If any of these spare parts are not required based on the design, indicate them in the relevant items.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | | | |  |  |  |
| 7 | **Each starter Panel** | | | | |  |  |  |  |  |  |
|  | All Contactors spares, All relays, All Timers, Auto Transformer | | | | | Set | 1 |  |  |  |  |
| 8 | **Each VSD starter Panel** | | | | |  |  |  |  |  |  |
|  | All Contactors spares, All relays, Timers, Auto Transformer, All rectifiers, All Control card, All power cards, set of IGBT's | | | | | Set | 1 |  |  |  |  |
| 9 | **General Mechanical Plant etc** | | | | |  |  |  |  |  |  |
|  | Seals | - | | Seals for each type and size provided. | | Set | 1 |  |  |  |  |
|  | Wearings Sleeves | - | | For each type and size provided. | | Set | 1 |  |  |  |  |
|  | Bushes | - | | For each type and size provided. | | Set | 1 |  |  |  |  |
|  | Bearings | - | | For each type and size provided. | | Set | 1 |  |  |  |  |
| 10 | **Transformers (If Supplied)** | | | | |  |  |  |  |  |  |
|  | **Each type of Oil immersed type transformers** | | | | |  |  |  |  |  |  |
|  | Bushing of each type with conductor and terminal | | | | | Set | 1 |  |  |  |  |
|  | Complete set of gaskets for one bank of transformer | | | | | Set | 1 |  |  |  |  |
|  | Set of bursting plates with gaskets | | | | | Set | 6 |  |  |  |  |
|  | Set of dial type thermometers with gaskets | | | | | Set | 1 |  |  |  |  |
|  | Set of oil level gauges with gaskets | | | | | Set | 1 |  |  |  |  |
|  | **Each type of Dry Type Transformers** | | | | |  |  |  |  |  |  |
|  | Bushing of each type with conductor and terminal | | | | | Set | 1 |  |  |  |  |
|  | Complete set of gaskets for one bank of transformer if required | | | | | Set | 1 |  |  |  |  |
|  | Set of dial type winding thermometers with necessary associated parts | | | | | Set | 1 |  |  |  |  |
| 11 | **Valves:** | | | | |  |  |  |  |  |  |
|  | Valve of each size and type installed | | | | | Spare | 1 |  |  |  |  |
|  | Butterfly Valves | | - | | Renewable seals for five valves of each size of valve provided. | Qty |  |  |  |  |  |
|  | Gate Valves | | - | | Sufficient gland packing or seal for 25% of all valves. | Qty |  |  |  |  |  |
|  | Reflux Valves | | - | | Renewable elements for five valves of each size of valve used. | Qty |  |  |  |  |  |
|  | Valve Actuators | | - | | Actuators for each type actuator provided three over hual kits for each type and size of actuator | Qty |  |  |  |  |  |
|  | Chemical Valves | | - | | Renewable elements for five valves of each size of valve used. | Qty |  |  |  |  |  |
| **Total C/F** | | | | | | | | |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | |  |  |  |
| 12 | **Each soft starter Panel** |  |  |  |  |  |  |
|  | Control card, power card, thyrister kit, key pad etc. | Set | 1 |  |  |  |  |
| 13 | **Fine Screens** |  |  |  |  |  |  |
|  | Net (Sufficient for 2 Overhauls) | Qty |  |  |  |  |  |
|  | Sprocket | Set | 1 |  |  |  |  |
|  | Antifriction Bearings | Set | 1 |  |  |  |  |
|  | Pins/ Accessories for the Frame and Joints | Sets | 5 |  |  |  |  |
|  | Motor | Nr | 1 |  |  |  |  |
|  | Gear Reducer | Nr | 1 |  |  |  |  |
|  | Overhaul Kit for Gear Reducer and Screen | Nr | 1 |  |  |  |  |
|  | Chain (Full Length) | Nr | 1 |  |  |  |  |
| 14 | **Pipe Joints** |  |  |  |  |  |  |
|  | One spare for each size and type of coupling installed and for sets jointing materials for each type and size than flanged joints | Qty |  |  |  |  |  |
| 15 | **Small Bore Rigid and Flexible Pipes** |  |  |  |  |  |  |
|  | Lengths each type of rigid pipe work | Nr | 2 |  |  |  |  |
|  | Flexible Pipe (Standard Coil) | Nr | 1 |  |  |  |  |
|  | Flexible Pipe Fittings for Repairs | Set | 1 |  |  |  |  |
| 16 | **Chemical Metering Pumps** |  |  |  |  |  |  |
|  | Pump for each type provided (complete with motor, gearbox, heads, etc) | Set | 1 |  |  |  |  |
|  | Manufacture's complete overhaul kit inclusive of diaphragm and one complete replacement pump head for each size and type provided | Sets | 10 |  |  |  |  |
| **Total C/F** | | | | |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | |  |  |  |
| 17 | **Chlorinators** | | |  |  |  |  |  |  |
|  | Chlorination System Overhaul Sets | **-** | Spare Sensor, Heater, PRV, Manifold Valve, Liquid Trap, Vaccum Regulator, Chlorine Strainer, Chlorine heater, Lead gaskets and two glass sight tubes of each type/ range. | Sets | 4 |  |  |  |  |
|  | Electronic module, display, load cell for the chlorine scales | | | Nr | 1 |  |  |  |  |
|  | Ejector, diffuser for each system | | | Nr | 1 |  |  |  |  |
|  | Spare Booster pump for water supply | | | Nr | 1 |  |  |  |  |
|  | Spare Booster Pump for Water Supply | | | Nr | 4 |  |  |  |  |
|  | Cylinder emergency repair kit | | | Nr | 4 |  |  |  |  |
|  | Chlorine testing ammonia, one tube of thread lubricant, thre sets of special tools or wrenches and one vent screen | | | Qty |  |  |  |  |  |
|  | Set of extra gaskets, lubricants, strainers, O-rings, filters and spare parts normally supplied | | | Qty |  |  |  |  |  |
|  | One Year's supply of all necessary reagents, charts, pH test papers, lubricants and other expendable items necessary for the operation and calibration of the chlorination system | | | Qty |  |  |  |  |  |
| 18 | **Chemical Mixers (For each installations)** | | |  |  |  |  |  |  |
|  | Oil Seals, Bearings for motor and bearings for reduction gears | | | Set | 1 |  |  |  |  |
| 19 | **Pressure Gauges** | | |  |  |  |  |  |  |
|  | Pressure Gauges | **-** | For each type fitted to the main works pumps | Nr | 2 |  |  |  |  |
|  | Pressure Gauges | **-** | For each other application | Nr | 1 |  |  |  |  |
| **Total C/F** | | | | | | |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | |  |  |  |
| 20 | **Screw Conveyors and Chemical Feeders:** | | |  |  |  |  |  |  |
|  | One manufacturer’s overhaul kit for each type provided. | | | Kit | 1 |  |  |  |  |
| 21 | **Clarifiers:** | | |  |  |  |  |  |  |
|  | Set Replacement Blades (If applicable) | | | Nr | 1 |  |  |  |  |
|  | Manufacturer’s overhaul kit for the main drives and flocculators as applicable. | | | Nr | 1 |  |  |  |  |
| 22 | **Filter Nozzles** | | |  |  |  |  |  |  |
|  | Spare Filter Nozzles | - | % of the total number installed | Qty | 5% |  |  |  |  |
| 23 | **Filter Timers** | | |  |  |  |  |  |  |
|  | Timer for each type and size, maintenance kit for filter control desk | | | Nr | 1 |  |  |  |  |
| 24 | **Instruments (of each type)** | | |  |  |  |  |  |  |
|  | PLC Module Supplied | | | Nr | 1 |  |  |  |  |
|  | Wireless Modules and Receivers | | | Nr | 1 |  |  |  |  |
|  | Level Sensors of each type | | | Nr | 1 |  |  |  |  |
|  | Flow Meter Electronic Modules | | |  |  |  |  |  |  |
|  | Pressure Sensor Modules | | | Nr | 2 |  |  |  |  |
|  | Water Quality Sensors | | | Nr | 1 |  |  |  |  |
| 25 | **pH Measuring Device** | | |  |  |  |  |  |  |
|  | Complete Spare Sensor | | | Nr | 1 |  |  |  |  |
|  | Calibration solutions for two years of operation | | | Qty |  |  |  |  |  |
| 26 | **Switchgear and Controls:** | | |  |  |  |  |  |  |
|  | Set of electric spares for each type | | | Nr | 1 |  |  |  |  |
| 27 | **Compressors:** | | |  |  |  |  |  |  |
|  | Manufacturer’s complete overhaul kit for surge system and pneumatic system. | | | Nr | 1 |  |  |  |  |
| **Total C/F** | | | | | | |  |  |  |
| **Total B/F** | | | | | | |  |  |  |
| 28 | **Air Blowers:** | | |  |  |  |  |  |  |
|  | Manufacturer’s complete overhaul kit for each type provided. | | | Nr | 1 |  |  |  |  |
| 29 | **Sight Glasses:** | | |  |  |  |  |  |  |
|  | Spare sight glasses for each type provided (e.g. surge vessel, fuel tank, air/water vessels, etc). | | | Nr | 2 |  |  |  |  |
| 30 | **Generators** | | |  |  |  |  |  |  |
|  | **For each type of Generators supply the following spares** | | |  |  |  |  |  |  |
| 30.1 | Consumable Spares for Engine for 5000 hours operation | | |  |  |  |  |  |  |
|  | Oil Filters | | | Nr | 5 |  |  |  |  |
|  | Air Filters | | | Nr | 6 |  |  |  |  |
|  | Diesel Filters | | | Nr | 5 |  |  |  |  |
| 30.2 | Consumable Spares for Alternator for 5000 hours operation | | |  |  |  |  |  |  |
|  | AVR for Alternator | | | Nr | 1 |  |  |  |  |
|  | Positive Case Rectifiers for Alternator | | | Nr | 3 |  |  |  |  |
|  | Rotating Rectifier Assembly for Alternator | | | Nr | 1 |  |  |  |  |
|  | Negative Rectifiers for Alternator | | | Nr | 3 |  |  |  |  |
| 30.3 | Spares for the Control Panel | | |  |  |  |  |  |  |
|  | Indicator Bulbs | | | Nr | 30 |  |  |  |  |
|  | Fuses | | | Nr | 30 |  |  |  |  |
|  | Control Relay | | | Nr | 3 |  |  |  |  |
|  | Electronic Sensing Relay | | | Nr | 1 |  |  |  |  |
|  | Starting Switch | | | Nr | 1 |  |  |  |  |
| **Total Amount** | | | | | | |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Form TEC - 13A** | | | | | | | | | |
| **Schedule of Tools** | |  |  |  |  | |  |  | |
| **Item No.** | **Description** | **Unit** | **Qty** | **Rate** | | | **Amount** | | |
|  | 15mm rope pulley blocks, lifting rope, shackles, eyes, etc (one each of single, double and treble arrays). | Set | 3 | **Local  SL Rs.** | | **Foreign US $** | **Local  SL Rs.** | | **Foreign US $** |
|  | Suitable pipe and valve slings | Nr | 4 |  | |  |  | |  |
|  | Fitters’ portable chain block of capacity two-tonne | Nr | 1 |  | |  |  | |  |
|  | Complete set of oxy-acetylene cutting equipment including two sets of cylinders | Set | 1 |  | |  |  | |  |
|  | Gas blow lamp and fittings for cutting and welding | Set | 1 |  | |  |  | |  |
|  | Electric welding equipment | Set | 1 |  | |  |  | |  |
|  | Multi purpose extractors | Set | 1 |  | |  |  | |  |
|  | Hand lamps (40 watts) with extension leads | Nr | 3 |  | |  |  | |  |
|  | 4 - 20 ma current injection standard | Nr | 1 |  | |  |  | |  |
|  | **Hand Tools - 02 Sets of each of the following** |  |  |  | |  |  | |  |
|  | 300 mm Steels hacksaw Frame | Nr | 1 |  | |  |  | |  |
|  | High Speed all hard cutting Blades 18 teeth per inch | Nrs | 50 |  | |  |  | |  |
|  | High Speed all hard cutting Blades 24 teeth per inch | Nrs | 50 |  | |  |  | |  |
|  | Wire Scratch Brush for General Use | Nrs | 2 |  | |  |  | |  |
|  | 250mm Flat Bastard Files with Handles | Nrs | 2 |  | |  |  | |  |
|  | 250mm Round Bastard Files with Handles | Nrs | 2 |  | |  |  | |  |
|  | Engineers Ball Pein Hammer 450 Grames | Nr. | 1 |  | |  |  | |  |
|  | Engineers Ball Pein Hammer 1Kg | Nr. | 1 |  | |  |  | |  |
|  | 600mm Stillson Pattern Pipe Wrench | Nrs | 2 |  | |  |  | |  |
|  | Chain Pipe Wrench Capacity 25 - 150mm | Nrs | 2 |  | |  |  | |  |
|  | Foot Print Adjustable Pipe Tongs 75mm Capacity | Nrs | 2 |  | |  |  | |  |
|  | Combination Pliers 200mm with Pipe Grip, Side and Joint Cutters | Nr. | 1 |  | |  |  | |  |
|  | Screwdrivers 100mm Long with Plastic Handle and Flared Tip | Nr. | 1 |  | |  |  | |  |
|  | Screwdrivers 200mm Long with Plastic Handle and Flared Tip | Nr. | 1 |  | |  |  | |  |
|  | Screwdrivers 200mm Long with Plastic Handle and Star Tip | Nr. | 1 |  | |  |  | |  |
|  | 500ml Capacity Pump Action Oil Can | Nr. | 1 |  | |  |  | |  |
| **Total C/F** | | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | | |
|  | Adjustable Wrench 15o off set 300mm long with 35mm Capacity | Nr. | 1 |  |  |  |  |
|  | Adjustable Wrench 250mm long with 25mm Capacity | Nrs | 2 |  |  |  |  |
|  | Steel Tape 3m Retractable with Locking Device | Nr. | 1 |  |  |  |  |
|  | High Pressure Water House 150 psi | m | 15 |  |  |  |  |
|  | Bearing Puller 12" | Nr. | 1 |  |  |  |  |
|  | Bearing Puller 8" | Nr. | 1 |  |  |  |  |
|  | Puller Three Jaw | Nr. | 1 |  |  |  |  |
|  | Chain Lift 05 Ton | Nr. | 1 |  |  |  |  |
|  | Chain Lift 03 Ton | Nr. | 1 |  |  |  |  |
|  | Hydraulic Jack 25 ton | Nr. | 1 |  |  |  |  |
|  | Angel Grinder 9" | Nr. | 1 |  |  |  |  |
|  | Electric Hammer Drill Machine 1/2" | Nr. | 1 |  |  |  |  |
|  | Engineering Fitters' Taps and Dies | Nr. | 1 |  |  |  |  |
|  | Portable Vacuum Cleaner 230V | Nr. | 1 |  |  |  |  |
|  | Crimping Tools Kit | Nr. | 1 |  |  |  |  |
|  | Manual Pipe Threading Machine 3" | Nos | 2 |  |  |  |  |
|  | Manual Pipe Threading Machine 2" | Nos | 2 |  |  |  |  |
|  | Pipe Vice 6' | Nos | 2 |  |  |  |  |
|  | Pipe Wrench 24" | Nos | 2 |  |  |  |  |
|  | Pipe Wrench 14" | Nos | 2 |  |  |  |  |
|  | Pipe Wrench 10" | Nos | 2 |  |  |  |  |
|  | Clamp on Meter (Pointer Type) 600V | Nr. | 1 |  |  |  |  |
|  | Bench Drill Machine (Heavy Duty) 1" | Nr. | 1 |  |  |  |  |
|  | Filter Belt Wrench Vertical Socket Type | Nr. | 1 |  |  |  |  |
|  | Hydrometer to Check Battery Sp Gravity | Nr. | 1 |  |  |  |  |
|  | Ratchet Monkey Jack 3 Ton | Nr. | 1 |  |  |  |  |
|  | Numbering Punch Set | Nr. | 1 |  |  |  |  |
|  | Hammer 02 Labs | Nr. | 1 |  |  |  |  |
|  | Hammer 04 Labs | Nr. | 1 |  |  |  |  |
|  | Supplementary Kit Containing Items Such as Micormeters, rev-counters, Feeler Gauges, Torque Wrenches | Nr. | 1 |  |  |  |  |
| **Total C/F** | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | | | |
|  | **Mechanical Hand Tools - 04 Complete Sets of the following** |  | |  |  |  |  |  |
|  | Ring Spanners Size 6mm - 36mm | Set | | 1 |  |  |  |  |
|  | Open end Wrench Spanners Size 6mm - 36mm | Set | | 1 |  |  |  |  |
|  | LNK Spanners Size 3mm - 36 mm | Set | | 1 |  |  |  |  |
|  | Box Ring Spanners Size 3 - 36 mm | Set | | 1 |  |  |  |  |
|  | Torque Wrench Unit Size 12 - 36 mm | Set | | 1 |  |  |  |  |
|  | Pliers Small, Middle and Large | Set | | 2 |  |  |  |  |
|  | Scale Measuring Units | Set | | 3 |  |  |  |  |
|  | **Electrical Hand Tools - 04 Complete Sets of the Following** |  | |  |  |  |  |  |
|  | Electronic Digital Clip-on Multimeter for AVO AC Measuring with Sensor and Adapter to measure temperature, complete with connection wires and leather case. | Nr. | | 1 |  |  |  |  |
|  | Battery Operated analog type earth resistance tester and insulation resistance tester | Nr. | | 1 |  |  |  |  |
|  | Pliers, Flat-Nose, 160mm | Nr. | | 1 |  |  |  |  |
|  | Pliers, Round-Nose, 160mm | Nr. | | 1 |  |  |  |  |
|  | Auto-Grip Plier 8" | Nr. | | 1 |  |  |  |  |
|  | Insulation Stripper, Auto-Mechanical, Multi Wire Section Type | Nr. | | 1 |  |  |  |  |
|  | Forceps, 150mm | Nr. | | 1 |  |  |  |  |
|  | Screwdriver, 0.5 x 3.0 x 75mm insulated up to 1000 V | Nr. | | 1 |  |  |  |  |
|  | Screwdriver, 0.8 x 5.5 x125mm insulated up to 1000 V | Nr. | | 1 |  |  |  |  |
|  | Screwdriver, 1.0 x 7.0 x150mm insulated up to 1000 V | Nr. | | 1 |  |  |  |  |
|  | Screwdriver for Cross-Point, Size 1, Insulated up to 1000V | Nr. | | 1 |  |  |  |  |
| **Total C/F** | | | | | | | | |
| **Total B/F** | | | | | | | | |
|  | Screwdriver for Cross-Point, Size 2, Insulated up to 1000V | Nr. | 1 | |  |  |  |  |
|  | Screwdriver for Cross-Point, Size 3, Insulated up to 1000V | Nr. | 1 | |  |  |  |  |
|  | Hammer, 200grams | Nr. | 1 | |  |  |  |  |
|  | Knife, Stainless (For Electricians) | Nr. | 1 | |  |  |  |  |
|  | Files (06 Pcs. Flat, Circular, Semi-Circular, Two Sizes each) | Set | 1 | |  |  |  |  |
|  | Insulating Gloves | Pair | 1 | |  |  |  |  |
|  | Insulating Tape | Rolls | 10 | |  |  |  |  |
|  | Analog-Multimeter for Direct and Alternating Voltage and Current, Ranges as follows: | Nr. | 1 | |  |  |  |  |
|  | DC : 0-120 mV … 1000V |  |  | |  |  |  |  |
|  | AC : 0-3 … 1000V |  |  | |  |  |  |  |
|  | Direct Current : 0-60 mA … 30 A |  |  | |  |  |  |  |
|  | Alternating Current : 0-60 mA … 30 A |  |  | |  |  |  |  |
|  | Alternating Current : 0-0.05 W …1MW |  |  | |  |  |  |  |
|  | Accuracy Class : 1.5 = / 2.5~ |  |  | |  |  |  |  |
|  | Digital-multimeter, measuring ranges and accessories same as above | Nr. | 1 | |  |  |  |  |
|  | Tachometer (One Mechanical, One Electrical) | Nos | 2 | |  |  |  |  |
|  | Soldering - Iron, 16Wm with 1 Kg Solder (60% Sn) and Desk Holder | Nr. | 1 | |  |  |  |  |
|  | Soldering - Iron, 50Wm with 1 Kg Solder (60% Sn) and Desk Holder | Nr. | 1 | |  |  |  |  |
|  | Electrical Handhold-Drilling Machine 230 VAC, 800W, Electronic Speed Control, Reversible, Complete with accessories and Plastic Carrying Case | Nr. | 1 | |  |  |  |  |
|  | Drills 1mm up to 15mm, HSS quality, complete in metal Box | Set | 1 | |  |  |  |  |
| **Total Amount** | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Form TEC - 13B** | | | | | | | | | | | |
| **Schedule of Laboratory Equipment** | | |  |  |  | |  |  | |  | |
| **Item No.** | **Description** | | **Unit** | **Qty** | **Rate** | | | **Amount** |
| **Local  SL Rs.** | **Foreign US $** | | **Local  SL Rs.** | **Foreign US $** | |
| 1 | Laboratory Nephelometric Turbid meter, having an accuracy and reproducibility within +/- 2% of full scale, sensitivity better than +/-0.5% of full scale and a response time of less than one second. The turbid meter shall be capable of operating in the following ranges: 0-1 NTU, 0-10 NTU, 0-100 NTU and 0-1000 NTU. It is to be complete with “standard” turbid solutions of known turbidity values and two spare test cells. The turbid meter shall be complete with twenty spare vials with secondary turbidity standards within the working range 0-750 NTU. | | Set | 1 |  |  | |  |  | |
| 2 | Laboratory pH meter with digital display, self test switch, slope control for temperature compensation and calibration facility for use with buffer solutions. The meter is to be supplied with two combination electrodes, holders, stand assembly and buffer kit (pH 4, 7 and 9,2). | | Set | 1 |  |  | |  |  | |
| 3 | Laboratory Conductivity meter with automatic temperature compensation, multi-range capability with overall range of 0 –200 ms cm-1. Digital display and self test switch. The meter will be supplied with one (1) conductivity probe, probe holder and stand assembly. | | Set | 1 |  |  | |  |  | |
| 4 | Laboratory Spectrophotometer (Hach DR2000 or equivalent) for the colorimetric determination of colour, aluminium, ammonia and residual chlorine. The instrument will be capable of operating at the necessary wavelengths for the above tests and be self-calibrating. The unit will be supplied with all necessary reagents required to carry out the above tests (sufficient for 500 determinations). The unit is to be provided with three (3) matched pairs of glass cells and with a full operating manual which includes the required analytical test procedures. | | Set | 1 |  |  | |  |  | |
| 5 | Laboratory Jar Tester with six (6) stainless steel stirring paddles, each of adjustable height and having a separate speed adjustment continuously variable over the range 10-250 rpm. A tachometer for speed indication, centrally located and a floc illuminator shall be supplied. Twelve (12) beakers to suit the Laboratory Jar Tester shall be supplied. | | Set | 1 |  |  | |  |  | |
| 6 | Precision Analytical Balance, top pan type with digital readout, auto tare facility and an accuracy of 0.01 grams. The weighing capacity of the balance shall be 1.2 kg. | | Set | 1 |  |  | |  |  | |
| 7 | Precision Analytical Balance, stainless steel pan, enclosed weighing unit, with digital readout, auto tare facility and an accuracy of 0.0001 grams. The weighing capacity of the balance shall be 100g. | | Set | 1 |  |  | |  |  | |
| **Total C/F** | | | | | | | | | | |
| **Total B/F** | | | | | | | | | | | | |
| 8 | | Laboratory heater/stirrer unit with a minimum square base dimension of 200 mm, mounted on a stainless steel base and fitted with insulated feet, temperature and speed regulators and indicator lights. Assorted magnetic stirrer bars. | Set | 1 |  |  | |  |  | | | |
| 9 | | Refrigerator with a minimum capacity of 60 litres with top freezer compartment, a minimum of three (3) adjustable shelves, interior light, temperature adjustment and thermometer. | Nr | 1 |  |  | |  |  | | | |
| 10 | | Laboratory Oven of bench-top type with thermostatic control and temperature range up to 150°C. | Nr | 1 |  |  | |  |  | | | |
| 11 | | Laboratory glass still with electric element heater, automatic safety cut out facility and glass sleeved condenser capable of producing a minimum of 3-5 litres per hour. A spare heating element shall be provided. | Set | 1 |  |  | |  |  | | | |
| 12 | | Laboratory stainless steel sinks with hot and cold water supplies with integral draining area. | Sum | Item |  |  | |  |  | | | |
| 13 | | Titration equipment, two (2) stands and clamp for holding glass burettes with four (4) white ceramic tiles for observing colour change during titration procedure. | Sum | Item |  |  | |  |  | | | |
| 14 | | **Glassware As a minimum, the following shall be provided:** |  |  |  |  | |  |  | | | |
|  | | Class B 50 ml glass burettes; | Nr | 3 |  |  | |  |  | | | |
|  | | 250 ml Pyrex glass beakers; | Nr | 6 |  |  | |  |  | | | |
|  | | 250 ml Pyrex conical flasks; | Nr | 6 |  |  | |  |  | | | |
|  | | 500 ml Buchner flask with side arm, ceramic funnel (60 mm diameter.) and bung; | Nr | 1 |  |  | |  |  | | | |
|  | | 1 litre volumetric flask with stopper; | Nr | 1 |  |  | |  |  | | | |
|  | | 500 ml volumetric flask with stopper; | Nr | 1 |  |  | |  |  | | | |
|  | | 250 ml volumetric flasks with stoppers; | Nr | 3 |  |  | |  |  | | | |
|  | | 100 ml volumetric flasks with stoppers; | Nr | 3 |  |  | |  |  | | | |
|  | | Assorted pipettes: 0.5, 1, 2, 5, 10, 25 ml; | Sum | Item |  |  | |  |  | | | |
| **Total C/F** | | | | | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | | |
|  | Glass funnels to hold filter papers; | Nr | 3 |  |  |  |  |
|  | Assorted Pyrex Petri dishes for dried solids determinations; | Sum | Item |  |  |  |  |
|  | Assorted glass rods; | Sum | Item |  |  |  |  |
|  | Pyrex weighing boat. | Nrs | 3 |  |  |  |  |
|  | Dropping Bottles for Indicators 100ml | Nrs | 5 |  |  |  |  |
|  | Erlenmeyer Flasks 250ml. | Nrs | 6 |  |  |  |  |
| 15 | **Miscellaneous Items** |  |  |  |  |  |  |
|  | 25 litre Plastic storage bottle for distilled water; | Nr | 1 |  |  |  |  |
|  | Protective plastic gloves; | Box | 3 |  |  |  |  |
|  | Safety spectacles; | Pair | 3 |  |  |  |  |
|  | 250 ml Polyethylene wash bottles; | Nr | 2 |  |  |  |  |
|  | Pipette fillers (safety bulb type); | Nr | 2 |  |  |  |  |
|  | Thermometer, lab grade – (20 to 110 deg. C); | Nr | 1 |  |  |  |  |
|  | Assorted plastic graduated syringes (2, 5, 10, 20 ml); | Sum | Item |  |  |  |  |
|  | Galss Filter Funnels (120mm Diameter) | Nrs | 10 |  |  |  |  |
|  | Galss Filter Funnels (75mm Diameter) | Nrs | 5 |  |  |  |  |
|  | Whatman No 4. Filter papers (150mm diameter); | Box | 2 |  |  |  |  |
|  | Whatman GFC filters (60 mm diameter); | Box | 2 |  |  |  |  |
|  | Membrane Filters ( 0.45 micron), 47 mm diameter; | Box | 2 |  |  |  |  |
|  | 1 litre Plastic Sample bottles for collection of samples from sample taps; | Nr | 6 |  |  |  |  |
|  | Vacuum eductor for attachment to water supply for suspended solids determination using Buchner flask & funnel; | Nr | 1 |  |  |  |  |
|  | Stainless steel tweezers; | Pair | 1 |  |  |  |  |
|  | Assorted brushes for cleaning glassware; | Sum | Item |  |  |  |  |
| **Total C/F** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total B/F** | | | | | | | |
|  |  |  |  |  |  |  |  |
|  | Stopwatch | Nr | 1 |  |  |  |  |
|  | First aid kit (Contents as specified in Clause 2.11.1.12 (e)); | Nr | 1 |  |  |  |  |
|  | Eye wash bottles; | Nr | 2 |  |  |  |  |
|  | Protective laboratory coats or aprons. | Nr | 2 |  |  |  |  |
| 16 | **Laboratory Chemicals** |  |  |  |  |  |  |
|  | 1 litre 5N sulphuric acid (to be used as 0.02N solution for alkalinity determination); | Sum | Item |  |  |  |  |
|  | 1 litre 5N hydrochloric acid; | Sum | Item |  |  |  |  |
|  | 500 ml 50% hydrochloric acid; | Sum | Item |  |  |  |  |
|  | 500g Sodium hydroxide pellets; | Sum | Item |  |  |  |  |
|  | 100 ml screened methyl orange indicator; | Sum | Item |  |  |  |  |
|  | 100 ml screened methyl red indicator; |  |  |  |  |  |  |
|  | 100 ml Potassium Chromate indicator; |  |  |  |  |  |  |
|  | 100 ml Silver Nitrate 05g; |  |  |  |  |  |  |
|  | 100 ml Eriochrome Black T indicator; |  |  |  |  |  |  |
|  | 100 ml stock aluminium standard solution; | Sum | Item |  |  |  |  |
|  | 500 ml stock Ammonia (nitrogen) standard solution; | Sum | Item |  |  |  |  |
|  | 1 litre platinum-cobalt standard for colour determination. (stock solution 500Pt-Co units). | Sum | Item |  |  |  |  |
| **Total Amount** | | | | | | | |

**Form TEC – 14**

**Details of Design Partner of the JV**

|  |  |  |
| --- | --- | --- |
| 1. | Name of firm | |
| 2. | Head office address | |
| 3. | Local office address (if any) | |
| 4. | Design Partner’s Authorized representative (Name, Address, Telephone, Fax, e-mail) | |
| 5. | Telephone | Contact |
| 6. | Facsimile | E-mail |
| 7. | Place of incorporation / registration | Year of incorporation / registration |
| 8. | Main areas of Designs | |
|  | 1. Since: | |
|  | 2. Since: | |
|  | 3. Since: | |
|  | 1. Since: | |
| 9. | Details in Design Experience | |

**Form TEC – 15**

**Details of Equipments supplied/installed**

*All the equipments supplied/installed under this contract shall be from manufactures having ISO certification for manufacturing of relevant items and shall have local agent in Sri Lanka.*

*Bidder/contractor shall be provide following details of the each and every equipment supplied/installed under this contract in the format given below.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Facility** | **Equipment** | **Name of the Supplier** | **Country of Origin** | **Local agent in Sri Lanka** |
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**Details of equipment supplied/Installed - 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Facility | Equipment | Basic specification suggested | Approximate power rating | Qty | | |
| Duty | Standby | Total |
|  |  |  |  |  |  |  |
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**FORM FIN – 1**

**Financial Situation**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

*Bidders, including each partner of a joint venture, should provide financial information to demonstrate that they meet the qualification requirements. Each Bidder or partner of a joint venture must fill in this form. If necessary, use separate sheets to provide complete banker information. A copy each of the audited balance sheet for the last three years should be attached.*

|  |  |  |
| --- | --- | --- |
| *Banker* | Name of banker | |
|  | Address of banker | |
|  |  | |
|  | Telephone | Contact name and title |
|  | Facsimile | Telex |

**Financial performance for the last 3 years**

*Summarize actual assets and liabilities based on the audited financial statements in US$ equivalent (at the rates of exchange current at the end of each year) for the previous three years.*

*If the business has not been in operation for three years following schedule shall be submitted for the period that the business has*

*been in operation together with the aforesaid financial statements.*

*Bidders whose financial capability is marginally less to undertake this bid may show credit facilities available to them from*

*a Banks.*

|  |  |  |  |
| --- | --- | --- | --- |
| Year | xxxx | xxxx | xxxx |
| Turnover from Contracting |  |  |  |
| Fixed Assets (FA) |  |  |  |
| Current Assets (CA) |  |  |  |
| Current Liabilities (CL) |  |  |  |
| Long Term Liabilities (LL) |  |  |  |
| Net Worth =Total Assets – Total Liabilities |  |  |  |
| Current Ratio = Current Assets Current Liability |  |  |  |
| Liquidity Ratio = Current Assets(except stock)Current Liability |  |  |  |
| Gearing Ratio = Debt Capital x 100 Total Capital Employed |  |  |  |
| Turnover x 100  Total Operating Assets |  |  |  |
| Net Profit x 100  Total Assets |  |  |  |

**FORM FIN - 2**

**Annual Turnover Data**

**(Design and Construction)**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

*All individual firms and all partners of a joint venture are requested to complete the information in this form. The information supplied should be the annual turnover of the Bidder (or each member of a joint venture), in terms of the amounts billed to clients for each year for work in progress or completed, converted to US$ at the rate of exchange at the end of the period reported.*

*Use a separate sheet for each partner of a joint venture.*

*Total value of annual construction turnover, in terms of work billed to clients, in US$ equivalent, converted at the rate of exchange at the end of the period reported:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Annual turnover data (US$ equivalent) for the last five years (Supported by audited financial accounts)* | | | | | |
| *Partner* | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| *1. Lead partner* |  |  |  |  |  |
| *2. Partner* |  |  |  |  |  |
| *3. Partner* |  |  |  |  |  |
| *4. Partner* |  |  |  |  |  |
| *Totals* |  |  |  |  |  |

**FORM FIN - 3**

**Main Current Contract Commitments / Works in Progress**

|  |
| --- |
| Name of Bidder or partner of a joint venture |

*Bidders and each partner should provide information on their current commitments on all main contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for main contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.*

|  |  |  |  |
| --- | --- | --- | --- |
| *Name of contract* | Total Contract Value | *Value of outstanding work (US$ equivalent)* | *Estimated date of completion* |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |
| 4. |  |  |  |
| 5. |  |  |  |
| 6. |  |  |  |
| 7. |  |  |  |
| 8. |  |  |  |
| 9. |  |  |  |
| 10. |  |  |  |

Contact details (Address, Tel, Fax, email) of the Employers shall be given separately. Please note that the tender board may contact the relevant employers if necessary to verify the details.

**Form FIN – 4**

**Financial Resources**

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section 3 (Evaluation and Qualification Criteria)

|  |  |  |
| --- | --- | --- |
| **Financial Resources** | | |
| **No.** | **Source of financing** | **Amount (US$ equivalent)** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
|  |  |  |

Attach Audited financial statements for the last three years (for the individual applicant or each partner of a joint venture).

Firms owned by individuals, and partnerships, may submit their balance sheets certified by a registered accountant, and supported by copies of tax returns, if audits are not required by the laws of their countries of origin.

**Original supporting documents signed by the Bankers of the bidder, offering exclusive assistance for financing this contract should be attached where applicable.**

A general letter indicating the overdraft facilities available to the bidder will not be acceptable.

*Name of the Bidder/ Join Venture partner …………………………….*

#### SECTION -6

#### EMPLOYER’S REQUIREMENT

**6.1 Part 1 - General Requirements**

**6.2 Part 2 - Particular Scope of the Work**

**6.3 Part 3 - Performance Requirement**

**6.4Specifications**

**6.4.1 –General Specifications**

**6.4.2 -Civil Works**

**6.4.3 -M&E Works**

**6.5 Facilities for the Employer’s Representative**

**6.6 Appendices to Employer’s Requirement**

**EMPLOYER’S REQUIREMENTS – PART 1**

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# 

# Employers Requirement

**PART 1**

# 6.1 General Requirements

### *6.1.1 General Scope and Employer’s Bid Document Drawings*

*(Note: Particular scope of the works, basic date are given in part 2 of the Employers Requirement)*

#### *6.1.1.1 General Scope of Work*

The general scope of the Contract comprises:

1. The design, construction and completion of all civil engineering, building, rehabilitation, landscaping and demolition works as specified;
2. The design, manufacture, supply, installation, testing and commissioning of all mechanical and electrical plant and all other items necessary for a complete and functional installation at site as specified, including operating and maintenance manuals as build drawings, P&I diagrams etc.;
3. The testing and commissioning of the Works, including Test before completion, Tests on Completion and Tests after Completion;
4. The training of the NWSDB personnel for the operation and maintenance of the Works;
5. Carrying out all ancillary works necessary for the completion of the Works and thereafter operation and maintenance for 3 months period;
6. Supplying of lubricants and tools for routine maintenance;
7. Supplying of spare parts for all items of equipment including filter media and other accessories.
8. O&M capacity and facility improvements

The Contractor shall ascertain all local conditions relevant to the works and associated systems. The Contractor shall do and provide whatever is necessary to fulfil his obligations under the Contract and he shall also be responsible for all process licences and similar agreements, thereby assuming responsibility for the process design and performance warranties.

The Contractor shall be responsible for ensuring that his design complies with all relevant standards, codes of practice and by-laws including specifications included in the bidding document and the Construction Industry Training Authority (CIDA) Specifications for Building Works, Electrical and Mechanical Works and other related Works and for obtaining all consents and approvals. Any discrepancy between the specifications included in this bidding document and CIDA or any referred standards Specifications included in this bidding document. If there is any discrepancy between CIDA Specifications or any other Standards, referred in this Contract Documents, Specifications included in the Contract Document supersede the CIDA Specifications and any other Standards. Road Development Authority (RDA) approval shall be obtained for all pipe laying designs and works adjacent to or within the RDA defined road reserve.

All plant, equipment and material items supplied and/or installed under the Contract shall be well co-ordinated and be compatible with each other and, where applicable, with existing plant, to form integrated systems. In designing the Works the Contractor shall adopt layouts which will produce efficiency in operation and at the same time make reasonable allowance for optimising the use of available land to permit the future augmentation of water production facilities on the site.

Revised on 06-05-2016

Construction documents including drawings, designs and design calculations and the like shall be submitted by the Contractor as required by the Employer’s Requirements. The Contractor shall test, commission, operate and maintain all plant and equipment supplied and installed under the contract for a period of 3 months after commissioning and demonstrate to the Employer that they perform to the specified standards and drinking water quality and design requirements. All staff, labour, materials, chemicals consumables, electrical power costs shall be provided by the Contractor during the period of testing, commissioning and operation & maintenance period of 3 months after commissioning.

Rural Water Supply & Sanitation Programme within the District for those who are not directly benefited by the project. This will be implemented by the Employer under the contract and the Contractor shall promptly made disbursements to the designated party at the approved amounts by the Employer.

#### *6.1.1.2 Employer’s Bid Document /Drawings*

The conceptual drawings provided with the bid documents are intended to show the sites of the Works, existing water supply facilities if any, illustrations of the Employer’s Requirements shall supersede those drawings and Employer does not warrant that details of existing water supply facilities if any, comply with the necessary design codes or standards. Where the Contractor adopts any of the layouts, designs or details shown in such drawings he shall thereby take full responsibility for them and he shall provide sufficient calculations and other details to prove to his assumptions in the designs.

## *6.1.2 Programme of Works*

#### *6.1.2.1 Programme*

The programme of Work shall be divided into the following periods:

Period 1 - Investigation : Detail investigation on subsurface and hydro-logical;

Period 2 - Design: Design of the works including submission of design calculation, Construction Documents and construction drawings for review;

Period 3 - Manufacturing Period - Manufacture of all Plant to be supplied under the Contract including inspection and testing at the place of manufacture, manufacturing of pipes, fittings, valves, accessories, pumps, chemical dosing equipment, chlorinators, surge vessels and other treatment plant & M&E equipment and testing of those at manufacturers factory by NWSDB Engineers;

Period 4 - Civil Construction Period - Earthworks, construction of new civil and building works required accommodating the Plant and other ancillary works;

Period 5 - Delivery Period - Delivery of all Plant, pipes, treatment plant equipment, pumps from the manufacturer’s works to Site or into the Contractor’s storage depot and testing of those at manufacturers factory by the NWSDB Engineers;

Period 6 - Erection Period - Erection of Plant;

Period 7 - Commissioning Period - Putting Plant into operation, completion tests and making operational adjustments, proving the process and initial instruction and training;

Period 8 - Training and Maintenance Period;

The above periods may overlap as necessary except for the following constraints:

* Period 3 and subsequent periods shall not commence until the Contractor’s detailed construction designs and detailed drawings have been submitted for review and accepted by the Engineer.

#### *6.1.2.2 Operational Sites*

Sites that have works discharging water into supply or which in any way contribute to the operation of the supply system are referred to in the Particular Specification as Operational Sites. Clause 1.31 (Permit to Work System) apply to Operational Sites.

## *6.1.3 Applicability of Employer’s Requirements*

Section 6 of this document, the Employer’s Requirements, shall be applicable to each part of the Works as follows:

|  |  |
| --- | --- |
| **Description of Employer’s Requirements** | **Section of Works** |
| 6.1 Part 1 General Requirements  6.2 Part 2 Particular Scope of the Work   * 1. Part 3 Performance requirement   6.4 Specifications  6.5 Facilities for the Engineers Representative  6.6 Appendices to the Employer’s Requirement | General for all facilities.  Applicable to all facilities  Applicable to each facility.  Applicable to all facilities |

## 

## *6.1.4 Related Contracts*

The following contract is being considered as the project and involves work which may relate to or interface with this Contract:

* Contract No. ……………...……………………………….. for …………………………. ………………………………………………………………………………………………………………………………………………..

The Contractor shall liaise with the contractor working on the above contract and take account of their activities and programmes in planning and carrying out his own work.

## *6.1.5 Design*

#### *6.1.5.1 Design Responsibility*

The Contractor shall design the Works to be in accordance with the Employer’s Requirements which include the quality assurance systems specified in Clause 6.1.42. The design shall be based upon the proposals submitted with the Contractor’s Bid.

The Contractor’s design process shall include water quality analysis, water quantity analysis, topographical survey, geotechnical investigations and hydrological investigations as he considers necessary and to meet requirements of the Employer, treatment process design, conceptual designs, schematics, detailed designs including detailed design calculations (Hydraulic and Structural) and working drawings for the Works and all other studies, investigations, analyses and calculations necessary to achieve compliance with the Employer’s Requirements.

Designs, drawings and documents comprising the Contractor’s design of the Works all investigation reports, analysis based on investigation reports, water quality analysis, treatment process analysis, detailed design calculation, detailed drawings shall be submitted by the Contractor to the Engineer in electronic as well as hard copy format for his review. A copy each of the engineering software packages used in the designs shall also be submitted to the Engineer along with the design documents. Such copies shall be original licensed, two-user versions of the software, with the licences valid at least for the duration of the Contract Period. The Contractor shall provide at his cost any updates to the packages issued during this period.

Notwithstanding any acceptance by the Engineer of the Contractor’s Design and Construction Documents or any comment or lack of comment on matters submitted for the Engineer’s review, the Contractor shall be solely responsible for ensuring that the design, construction, performance and operation of the Works is in accordance with the Employer’s Requirements.

The Engineer may at any stage of design, construction or operation of the Works, prior to the issue of the Final Certificate, draw attention to non-compliance with the Employer’s Requirements.

The Design Office of Contractor shall be located closer to the Engineer’s Representative’s office and the key design team shall be available for subsequent clarifications / further designs whenever required until completion of project.

Acceptance, comment or lack of comment by the Engineer shall not relieve the Contractor of any of his obligations and responsibilities under the Contract.

Only Construction Documents including drawings that have been accepted by the Engineer shall be used by the Contractor in carrying out the Works.

#### *6.1.5.2 Criteria for Design Personnel*

#### (i) Contractor’s Representative

The Contractor’s Representative shall have appropriate qualifications and experience acceptable to the Engineer, and will undertake the co-ordination and progressing of all aspects of the project from commencement of the investigations and design through to final completion and commissioning of the Works. He shall be responsible for ensuring that the Works form a well engineered and integrated project complying with the requirements of the Employer’s Requirements.

#### (ii) Design Personnel

The Contractor shall nominate suitably qualified and experienced personnel acceptable to the Engineer to be responsible for each element of the works listed below. Personnel so nominated shall include those nominated in the Contractor’s Bid in the appropriate roles.

Contract shall provide at least 50% of the Design team shall be Sri Lankans and the Project Design Office shall be located in Sri Lanka. All designs shall be done in Sri Lanka and shall have the access to the Engineer at any time for checking or verification.

Revised on 28-01-2016

* Water treatment process design
* Hydraulic design
* Civil engineering design
* Structural design including foundations
* Mechanical design
* Electrical design
* Instrumentation and control design
* Architectural design
* Landscaping design
* Total plant commissioning

Once personnel nominated have been approved by the Engineer, no changes to these personnel shall be made unless and until approval has been obtained in writing from the Engineer for the new nominee, who shall be equivalent or superior to the previously approved nominee. Minimum Key requirements are given in Section 4 – Evaluation and Qualification Criteria.

### *6.1.5.3 Design Programme*

#### (i) Programme of Submissions

The Contractor will be required to submit all Investigation reports together with the Design Calculations and drawings in four copies to the Engineer. He shall submit a document demonstrating the process design and detailed design and relate these to the investigations carried out by him.

The Contractor will be required to submit his Construction Documents including designs to the Engineer in four copies. No construction work may commence on site until the Contractor’s proposals have been accepted by the Engineer. However it will be acceptable for Construction Documents including designs to be submitted separately to cover discrete packages of work allowing early acceptance and thus permitting construction work to proceed. Acceptable packages of work would include site works and foundations; civil works; mechanical and electrical plant and equipment for individual major treatment process units, pumping stations or reservoirs instrumentation & control and landscaping, etc.

For building designs the Contractor shall submit architect’s sketches and drawings showing preliminary designs, including information on the styles, finishes and detailing proposed for the various facilities. The drawings and sketches will be reviewed by the Engineer. Detailed design shall be carried out after the Engineer has advised acceptance of the preliminary architectural designs in writing.

The Contractor shall prepare a programme for submitting Construction Documents including designs to the Engineer. This should conform to the overall project implementation programme. The programme shall be submitted to the Engineer for approval. The programme shall provide for review of the Contractor’s submissions by the Engineer to be undertaken within the specified periods and in a logical sequence that will enable the development of the design to be reviewed from initial concepts to working construction drawings for the Works.

The Programme of Submissions shall clearly identify the dates of submission of the key elements of detail design and the final report.

No designs, drawings and documents will be accepted by the Engineer for review until the programme for their submission has been approved by him.

Following receipt of the Contractor’s programme for submissions, the Engineer will notify the Contractor as to which particular drawings must be submitted to the Engineer and classified as “accepted” prior to the commencement of manufacturing or construction of the sections of the Works to which they apply and which, if any, need not be submitted. As noted in the Conditions of Particular Application, manufacturing or construction must not commence until the relevant Construction Documents have been both classified as “accepted” by the Engineer and they have been reviewed by him. Any decision by the Engineer to waive the requirement for submission of any Construction Document for his review shall not exempt the Contractor from having to submit these Construction Documents to the Employer, if the Employer requires to review them.

#### Programme Periods for Review by Engineer

The programme shall allow at least 21 days for review of a submission by the Engineer and shall include reasonable provision for re-submission of items for review following comment by the Engineer and for the times for transmission of Construction Documents.

The programme shall allow for at least 14 days for review by the Engineer of items re-submitted by the Contractor.

These periods may be extended depending on the quantities of calculation & drawings to be reviewed.

## *6.1.6 Submission of Construction Documents*

### *6.1.6.1 Number of Copies*

The Contractor shall submit to the Engineer for review four hard copies as well as four electronic copies of all submissions. One of the electronic copies shall be in PDF format. Generally only one copy will be returned to the Contractor.

Following acceptance of a drawing by all parties the Contractor shall submit to the Engineer one original print on white paper and four paper print copies of all accepted drawings with the date of the Engineer’s acceptance marked on the original. In addition all drawings shall be provided on re-writable CDs as DXF files suitable for AutoCAD 2004. Four copies of accepted designs and documents shall also be submitted.

### *6.1.6.2 Document Format*

Designs and documents submitted by the Contractor for review shall include generally:

* contents list
* summary
* references including specification requirements, design codes of practice, manuals and supporting documents used, numbers and titles of drawings which are based on the design
* criteria, parameters, software and methods used
* test procedures, analyses and results
* calculations and schedules
* qualitative description and comments on results
* any other relevant information.

Designs and documents shall be presented on A4 size paper with every page numbered and bound in order between a transparent front cover and stiff back. The title of the submission shall be given on the front sheet beneath the title of Contract, Contractor’s name, title of works location, author’s reference, date, Contractor’s signature, and any other relevant information. Structural calculations should be checked by a structural Engineer qualified in M.I. Struct. Eng. or M.Eng. in Structural Engineering and Design or M.Sc in Structural Engineering and Designs or higher. Drawings submitted as part of the design or document shall be presented on A3 size paper ( unless otherwise requested by the Engineer to submit on A1 size paper) with every page numbered and bound in order between a transparent front cover and stiff back.

The Contractor shall bind in as appendices to the designs and documents English language copies or photocopies of any standard, code of practice, manual or other reference referred to in the designs and documents which have not otherwise been submitted.

### *6.1.6.3 Drawing Format*

Drawings submitted by the Contractor for review shall be based on previously submitted designs or documents. Interrelated drawings shall be submitted at the same time in a complete and self-sufficient set. Copies shall be collated into ordered bundles each with a list of contents.

All drawings provided by the Contractor shall be in the form of good quality reproductions and shall conform to the requirements of the relevant British Standards in respect of drawing size, presentation and use of symbols. Drawings shall be no smaller than A4 and no larger than A1 and be of micro filmable quality. All dimensions used on drawings shall be in metric units and all drawings shall be to scale and shall include a graphical scale to aid the use of photographic reproductions. Preferred scales are 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000, and 1:2000.

### *6.1.6.4 Drawing Numbering and Titling*

The Contractor shall use a reference numbering system for designs, drawings and documents so that each number used is unique. The numbering and title information on designs, drawings and documents shall be designed so that management, transmittal and communication of drawings can be carried out expeditiously using a computer aided data base system.

All drawings shall bear the following information:-

* Employer’s name and name of the Project
* Contract Title
* Contract Number
* Drawing Title, including names of facility and site
* Drawing Number
* Revision Schedule
* Scale
* Date
* Designed by
* Checked and approved by (Contractor)
* Recommended by (Engineer’s Representative or his authorized subordinating Engineer)
* Approved by (Engineer/Engineer’s Representative)

The Contractor shall maintain a drawing register listing all drawings prepared as part of the Contract.

The drawing register shall incorporate a revision number. Wherever a change is made to the drawing the revision number, the date of the change, full details of the change and person responsible for the change shall be recorded on the register. The first issue of a revised drawing shall indicate, preferably by the use of “clouds”, where on the drawing the revision has been made. The first revision of the drawing shall be designed as revision 1. At monthly intervals until all design is complete the Contractor shall submit a copy of the current drawing register to the Engineer for his information. A final copy of the register shall be supplied to the Employer on completion of the Contract.

### *6.1.6.5 Submission of Sub-Contractor’s Drawings for Review*

Before submission, the Contractor shall verify all drawings and documents prepared by subcontractors and manufacturers to ensure their compliance with the Employer’s Requirements. Such drawings shall be clearly identified as being checked by the Contractor. All drawings not so checked and noted will be rejected by the Engineer and returned to the Contractor without further comment. Subcontractor’s drawings and documents shall be numbered in accordance with the Contractor’s system acceptable to the Engineer.

### *6.1.6.6 Checking*

All submissions shall have been checked and approved first by the Contractor and shall be stamped and signed to confirm that the checking has been carried out. Checking shall be carried out by a Chartered Engineer experienced in the type of work involved. Structural calculations should be checked by a Structural Engineer having qualified in M.I Struct. Eng. or M. Eng. in Structural Engineering & Designs or M.Sc in Structural Engineering and Designs or higher, with sufficient experience in the type of work involved. Any submissions not so marked will be returned to the Contractor immediately.

## *6.1.7 Review of Submissions*

Items submitted for review by the Contractor and returned by the Engineer will be categorised as follows:

| **Category** | **Description** | |
| --- | --- | --- |
| Accepted | - | Subject to its compliance with the Employer’s Requirements and conformity with the overall design, the Engineer has no comment on the submission. |
| Accepted with reservations as marked | - | Subject to its compliance with Employer’s Requirements and conformity with the overall design, the Engineer has some comments on the submission, but they are not such as to necessitate formal re-submission. Where the Contractor makes changes to an item an updated issue shall be provided to the Engineer for record purposes. |
| Rejected | - | The Engineer will indicate the grounds for his not accepting the submission; the Contractor shall amend or revise the submission accordingly and re-submit the item for review. |

Acceptance by the Engineer of any drawing, structural design, method of work or any information regarding materials and equipment the Contractor proposes to furnish, shall not relieve the Contractor of his responsibility for any errors or omissions therein, and shall not be regarded as an assumption of risks or liability by the Employer, and the Contractor shall have no claim under the Contract on account of the failure or partial failure or inefficiency of any design, plan or method of work or material and equipment so accepted.

Such acceptance shall be considered to mean that the Employer has no objection to the Contractor using, upon his own full responsibility, the design, plan or method of work proposed or furnishing the materials and equipment proposed.

## *6.1.8 Detailed Design*

The design of the Works shall be based on the Contractor’s agreed technical proposals, including any modifications agreed prior to contract award. No variations to the details in the agreed technical proposal shall be permitted, except with the specific written authority of the Engineer.

The Contractor shall submit the following information but not be limited for review:

(a) General Design Information

(i) A process design report including basis of selecting the process with sufficient proofs, description and sizing of all process units, loading rates, chemical dosing, treatment plant losses, wash water rates, etc. Calculation and all investigation reports should be provided.

(ii) Process flow diagrams for the whole Plant showing chemical dosing arrangements, capacities, etc.

This shall incorporate an augmentation of information provided in the agreed technical proposal as appropriate

(iii) Hydraulic design calculations for the whole of the Plant from the source to the treated water reservoir including hydraulic profile drawings.

1. Hydraulic calculations for all transmission pipelines and pumping installations including NPSH calculations, maximum and minimum system curves by calculation of friction and fittings losses and by reference to hydraulic analyses and tests. All pumping systems should be designed to for the most economical maintenance and operational scenario with recourse to life-cycle cost analysis. The resulting system curve envelopes shall be used to determine pump duty requirements for the design flow ranges. Hydraulic calculations shall be carried out using the latest version of “WaterCAD” computer software a 2-user copy of which shall be submitted to the Engineer with the design document in accordance with Clause 6.1.5.1.

(v) Surge Analysis Reports – All transmission pipelines shall be checked for surge pressures using the surge module of “WaterCAD” computer software and necessary control measures determined. A 2-user copy of the Surge Analysis software shall be submitted to the Engineer with the design document in accordance with Clause 6.1.5.1.

(vi) Hydraulic Calculation for distribution pipe system including co-efficient, head losses, velocities, pressures for no flow conditions, average flow condition ands peak flow conditions. All detailed calculations should be submitted. One original of Licensed Version Software used for analysis should be handed over to the Engineer economic cost analysis for different diameters and different materials should be submitted. Software for analysis should be agreed with the Engineer.

(vii) A description of the control philosophy for the complete Works including details of Plant and Pump control functions in the auto/manual and duty/standby modes, filter wash control sequences, failure modes and chemical dosing control loop operation, etc.

(viii) Plant and instrumentation diagrams (P&ID) for each section of the Plant and Transmission Network together with full supporting schedules.

(b) Plant Working Drawings

Plant working drawings shall include but not be limited to:

(i) General arrangement drawings and sectional views, fully dimensioned and showing in detail all plant and ancillary equipment.

(ii) Dimensional assembly and erection drawings of each item of plant including, where applicable, drawings showing foundations and loads thereon, weight of the plant items, and kinds of materials and finishes. Thrusts imparted by hydraulic loading from pipe-work shall be included.

(iii) Working drawings of all chemical and engineering systems required, electrical and/or mechanical connections, showing the units of equipment in the proposed position for installation and the details of attachments and connections required with locations referred to each other and to the structure.

(iv) Single line power and control schematic diagrams including diagrams of connections for each type of electrical equipment together with a comprehensive wiring diagram showing all connections between the various items of the equipment and the safety devices (the terminal lettering shall correspond to the terminal marking to be used on the equipment). A schematic diagram shall be provided for each control cubicle. One schematic diagram covering a number of similar circuits is not acceptable. The diagrams shall include the followings:-

1. A schedule of apparatus which includes an explanation of any symbols or abbreviations.
2. All ferrule numbers.
3. Wire colours.
4. Terminal colours.
5. Details of the Electrical and ICA equipment as follows:-

* equipment nomenclature
* type of instrument, manufacture and duty
* calibrated range
* input and output signal levels
* count factor

(v) Working drawings for ventilation systems, and for drainage, sludge disposal, water supply, and waste water systems.

(vi) Plans of conduits, station pipe work, interconnecting pipe work and valves indicating manual and remote control devices, and diagrams of control systems and circuits.

(vii) Fabrication drawings for metalwork including platforms, floor plates and frames, hand railings, etc.

(viii) Diagrams and schematics showing flow paths and circuits, descriptions, dimensions and capacities of water treatment process units and piezometric levels corresponding to average and maximum flow rates and to different or alternative treatment processes, all to be accompanied by proof of computations.

(ix) Complete and detailed schedules listing all plant and ancillary equipment to be supplied by the Contractor.

(x) Equipment enclosure drawings shall include the following:-

1. Overall enclosure dimensions.
2. The position of all equipment mounted on or in the enclosure, the position and connections for incoming power/multi core cabling and for instrumentation tubing.
3. Individual compartment dimensions within a multi-compartment enclosure.
4. Foundation and fixing details.
5. Lifting details with eyebolt or lug positions.

(xi) Line diagrams of earthing arrangements.

(xii) Junction box layout drawings shall show details of individual junction box locations, cabling connections, terminal details and box identification.

(xiii) Basic symbolic instrument loop schematics (BS 1646: Parts 1 to 4 inclusive).

(xiv) Instrument installation drawings showing cabling, piping and mounting arrangements for the various instruments, with an itemised material list for each arrangement.

(xv) Any additional drawings required to cover all other plant elements not listed above.

(xvi) Pump characteristic curves.

(xvii) Pump test data sheets.

(xviii) Product Catalogues

Full details of all items of electrical equipment constituting an operating system and any mechanical units involved therein or necessary for the functioning of such system shall be submitted concurrently and shall include clear diagrams showing circuit functioning and necessary details for field erection.

Plant working drawings prepared by sub-contractors and manufacturers employed by the Contractor shall be checked by him for accuracy and compliance with the Contract before being submitted for review. A note shall appear on such working drawings indicating that the Contractor has made this check. Working drawings, not so checked and noted, will be rejected and returned to the Contractor without further examination for resubmission.

The writing, implementing, program entry, debugging and documentation of the software for any PLCs forms part of this Contract. The program shall be listed both mnemonically and in ladder diagram format and included in maintenance manuals along with manufacturer’s programming manuals.

(c) Civil and Building Works Drawings

Civil and Building works drawings shall include but not be limited to:

* Setting out drawings
* Layout drawings sectional views and yard piping
* Civil works and structural drawings
* Architectural and builder’s work drawings
* Building services drawings
* Drainage and other disposal systems drawings
* Roads and general site works drawings including landscaping, etc.
* Co-ordination drawings
* Piping ducts and all other civil works related for the all plants
* Bar bending schedules
* Any other drawings required to cover work included under civil works.

(d) Method Statements

Method statements for temporary and permanent works shall include, but not be limited to:

(i) Temporary excavations

(ii) All work to existing installations and structures (if any)

(iii) All diversions, connections, over pumping or alterations to existing structures and Plant.

(iv) All works including civil & Building Works, Roads, Site works and Landscaping etc.

(v) All plants and equipment and ancillary works

(vi) Any other works in connection with the project

Method Statements shall be submitted at least 21 days prior to commencement of the relevant activity.

(e) Testing Schedules

Proposals for testing which shall include but not be limited to:

(i) Schedule of Completion Tests.

(ii) Sampling proposals for Test before completion, Tests on Completion and Tests after Completion.

Testing schedules shall be submitted at least 8 weeks prior to the commencement of the Take-Over procedures.

## *6.1.9 Preliminary and Final Design Reports*

Within 4 weeks of the end of the design period the Contractor shall submit a preliminary design report incorporating all submissions and including all necessary process, detailed calculations of hydraulic, structural, electrical and mechanical calculations. The Contractor shall submit a final design report one week prior to the issue of the Taking-Over Certificate. This shall be based on the preliminary design report and contain any necessary updated or augmented information.

## *6.1.10 Operation and Maintenance Manuals and As-Built Drawings*

### *6.1.10.1 General*

The Contractor shall prepare complete sets of operation and maintenance manuals and as-built drawings for each facility. In the event of the Engineer rejecting all or part of any instruction manual or record drawing submitted, the Contractor shall amend them as necessary to meet the Engineer’s requirements.

The Contractor shall submit to the Engineer for review two complete draft sets of Operation and Maintenance Manuals and As-built drawings for each site. The Engineer will assess the suitability of the draft manuals and shall within 30 days of receipt of the manuals either:

1. notify the Contractor in writing that the manuals are suitable, or
2. notify the Contractor in writing any comments or directions for amendment.

Within 21 days of receipt of any such comments or directions the Contractor shall amend and resubmit the manuals.

Submission of the draft manuals and draft as-built drawings shall be pre-conditions to the issue of a Taking -Over Certificate.

Following approval to the draft manuals and drawings, the Contractor shall submit six copies of the final approved manuals to the Engineer to be distributed by the Employer, and three copies to each site. A lockable, glass fronted bookcase to house one set of manuals at each site shall be provided by the Contractor.

## *6.1.11 Operation and Maintenance Manuals*

At the commencement of the pre-commissioning tests, the Contractor shall provide for use by the Engineer copies of Operation and Maintenance Manuals for the treatment process and equipment used within the Works. At the end of the tests on completion and prior to the issue of a taking over certificate, the Contractor shall provide final Operation and Maintenance manuals for the Works.

The Employer will require one (01) softcopy and three (03), hard copies including original with colour prints of the Operation and Maintenance manuals to be provided written in English.

The instruction manuals shall cover the erection, setting to work, testing, commissioning, operation, control, maintenance, dismantling and repair of the works. The greatest importance is attached to completeness and clarity of presentation.

It is emphasised that a collection of standard pamphlets of a general nature unaccompanied by drawings and descriptive matter relating to plant as installed will not be acceptable. In particular, information supplied by sub-contractors and manufacturers employed by the

Contractor shall be co-ordinated into a comprehensive manual for each facility. Cross-referencing of descriptive matter, drawings and spare part lists must be complete. The manuals shall be in English. Illustrative descriptive publications may, at the discretion of the Engineer, be included in the English language only.

The text or accompanying diagrams shall in addition show the electrical wiring, handling and erection instructions. Draft manuals shall, during the testing and commissioning of the works, be carefully checked by the Contractor and updated and modified to ensure that they are fully descriptive and applicable to the final process plant as installed and as found to behave under operational conditions.

The draft manuals may include manufacturer’s standard literature but the Contractor shall fully supplement the literature by his own descriptive text and drawings.

The operation and maintenance manuals shall be bound within A4 plastic covers. All documentation forming part of the manuals shall be of uniform size, except where pull-out or folding charts are provided. All irrelevant literature shall be deleted by means of a single diagonal red line. Separate, site specific manuals shall be supplied for each facility. These shall contain all relevant and necessary information pertaining to the particular site.

The content of the Operation and Maintenance Manuals shall be in accordance with BS4899: Part 1 or equivalent. Presentation shall be in accordance with BS4884: Part 1 and Part 2 and BS4899: Part 2 or equivalent.

The manuals shall incorporate instructions, recommendations and advice for the operation of the entire process and the system as a whole covering the full range of flow and raw water conditions. They shall include all test results and test certificates including all those undertaken at works and on site. No section of the works will be certified by the Engineer as complete unless this requirement has been met.

If during the Contract Period, the Engineer finds that the manual requires modification or enlargement as a result of subsequent operational and maintenance experience in the works, the Contractor shall provide the approved modification for each manual.

The Operation and Maintenance Manuals shall include the following information as a minimum for all equipment and systems supplied or modified under this Contract:-

1. The extent of supply and general overview of the scheme.
2. Process description and process control philosophy.
3. General description of the plant and equipment supplied.
4. Health and safety statement/certificate/requirements and/or precautions.
5. Step by step operating instructions for the plant as a whole to include as a minimum:
   * manual, semi-automatic and automatic operation
   * start up and shutdown procedures
   * recovery from failure
6. Protective devices, stating all trip settings.
7. Schedules of settings for all adjustable or programmable devices (timers, switches etc).
8. Software details (program listing, I/O schedules, register listings etc). The writing, implementing, program entry, debugging and documentation of the software for any PLCs forms part of this Contract. The programs shall be listed both mnemonically and in ladder diagrams. Manufacturers’ programming manuals shall be provided in the maintenance manuals.
9. Plant failure trouble shooting chart.
10. Maintenance schedules including operators’ checklists and procedures for dismantling, checking, aligning, adjusting and re-assembling.
11. Lubricants, capacities and approved alternatives and lubrication schedules.
12. Plant management procedures.
13. A list of all recommended spare parts and consumables including suppliers’ part numbers. Indicate parts that are held in stock by the supplier and spares which the Contractor recommends be held by the Employer.
14. A schedule of serial numbers and rating plate data for all items supplied.
15. A component list with descriptions, suppliers’ names and addresses and part numbers.
16. Confirmation letter of undertaking for availability of their services by the local agent.
17. Edited individual equipment manufacturers’ manuals.
18. Performance curves and test certification.
19. Full set of “as built” mechanical, electrical, civil and structural drawings.
20. Water quality monitoring for raw water, treated water and water within the plant including sampling techniques and laboratory and reporting procedures.
21. Operational monitoring of the works performance.
22. A complete set of all commissioning data including: all factory and Site test measurements; chart recordings; calculations; final settings of any adjustable parameters.

The individual sections within a volume of the manuals shall be segregated by section dividers.

Each volume of the manuals shall bear the Contract title, Contract number and the volume number on the front cover and the spine.

Each volume shall contain a detailed index sheet.

Where engineering modifications are required, the site manual shall be marked up immediately and revised drawings issued.

## *6.1.12 Maintenance System and Assets Register*

The Contractor shall provide a computerised maintenance system and a computerised asset register. The maintenance system shall supplement the operations and maintenance manual and provide a comprehensive system for managing and controlling the yearly maintenance programme for the water works operation and maintenance staff. The system shall include all necessary software and hardware and suitable training of staff in its use shall be incorporated in the Contractor’s training programme.

The system shall include all maintenance tasks according to the operations and maintenance manual and the suppliers’ recommendations. Execution of tasks shall be arranged according to their frequency, i.e. daily, weekly, monthly, annually etc. The system shall provide for each task a maintenance task performance card (MTPC). Each MTPC shall include equipment identification, task description, frequency, manpower requirements, material requirements, tool requirements and safety requirements. The system shall be programmed to print out MTPCs a week ahead of the due date to enable the maintenance supervisor to make arrangements for execution of the work on the due date. The system shall also be capable of printing out maintenance programmes over periods of up to a year and of retaining records of all maintenance carried out. It shall be able to monitor maintenance tasks and identify corrective action needed; add or remove MTPCs as required; maintain and update historical data on maintenance; and control spare parts inventories and procurement.

The maintenance system shall be to the approval of the Engineer and shall be provided complete prior to completion of the Tests on Completion. It shall have sufficient space for expansion if required to include any further routine work.

The assets register shall provide a facility for recording all items of plant and equipment, buildings and other facilities constructed and installed under this Contract, and all items in existing works where these are modified or upgraded as part of this Contract. The system shall include the monetary value of each item. The Contractor shall set up the system, installing a full assets register covering the works under this Contract. Values shall be entered by the Contractor for items supplied, constructed or installed by him. For existing items the Employer will advise the appropriate values. The system shall be based on commonly-used software and shall be capable of being expanded and updated by the Employer to include other components under the project which are not part of this Contract.

The assets register system shall also be to the approval of the Engineer and shall be provided complete prior to completion of the Tests on Completion. It shall have sufficient space for expansion if required to include any further routine work. Training of the Employer’s staff is also to be included in the Contractor’s training programme.

## *6.1.13 As-Built Drawings*

As-built record drawings for plant and civil works shall cover the works as completed, incorporating all modifications carried out during manufacture or after testing at the Contractor’s or sub-contractors’ and manufacturers’ works and all modifications carried out in the course of the erection and commissioning and testing of plant and the construction of the civil works. These drawings shall be submitted for review by the Engineer. Notes and descriptive matter shall be in English.

Actual pump characteristic curves as tested shall be superimposed on system curves determined from actual site tests during commissioning.

The drawings shall include those provided by the Contractor during the design and manufacturing period together with drawings submitted by him with his Bid as appropriate. In addition, each item of plant, e.g. valves, motors, starters, cables, etc shall be shown on detailed general arrangement drawings clearly marking the position of the component parts. All parts shall be provided with a tag number and the numbers given shall correspond to the spare parts list, pamphlets and descriptive matter.

Comprehensive electrical circuit drawings shall be provided showing the relation of one electrical item of equipment to another.

The drawings shall be arranged in sets comprising dyeline positive transparencies (on plastic film) and prints bound in albums of approved size. Where drawings have been produced electronically, one original print and a CD copy shall be provided for each drawing. CD copies shall be compatible with AutoCAD 2010.

The record drawings shall be handed over to the Engineer (by delivery to addresses directed) with the following provisions:

* one set for the Engineer to deliver to the Employer comprising one copy of each of the prints
* one set for the Engineer to deliver to the Planning & Designs Section, Head Office comprising one transparency and one CD copy
* one set for the Engineer to deliver to the local Operational Staff comprising one transparency and two copies of each of the prints and one CD copy
* one set for retention by the Engineer comprising one transparency and one of each of the prints.

In addition to the foregoing, each item of electrical equipment shall be provided with schematic drawing and a wiring drawing.

The schematic drawing shall show the connections in a schematic form enabling the operation to be ascertained, while the wiring drawing shall show the individual components approximately in their relative physical positions, with the electrical connection shown exactly as wired, to enable a particular component or connection to be located on the actual equipment.

Every connection shall be numbered and the number given for a particular connection shall be the same on the schematic drawing, on the wiring drawing and as tagged on the actual equipment itself.

Where possible one print of each of the appropriate electrical equipment drawings and diagrams shall be provided in a purpose made pocket inside each cabinet.

The record drawings shall be handed over to the Engineer within three months after the issue of the Taking - Over Certificate.

In the event of the Contractor making any modifications to the Works after handing over the record drawings he shall provide amended drawings in the same numbers as stated above.

## *6.1.14 Spare Parts and Tools*

### *6.1.14.1 Spare Parts*

A priced list of spare parts required for five years of operation for each piece of equipment as recommended by the manufacturers and appropriate tools for maintenance work shall be listed in the schedule for recommended spare parts & tools. The Engineer in consultation with the Contractor shall order the required spare parts and tools from the recommended list.

The Contractor shall obtain assurances from all manufacturers and confirm in his offer that all items shown in the schedule will be readily available for a period of at least five years after the date of issue of the Certificate of Completion. (Performance Certificate)

The Contractor shall provide a detailed schedule in duplicate of all the spare parts supplied. Prior to completion of Tests on Completion all spare parts shall be checked against the schedule and against the recommended maintenance programme and the Contractor shall obtain a signature of ‘Take Over’ from a representative of the Employer and a copy of the signed schedule shall be submitted to the Engineer.

All spare parts supplied shall be new, and strictly interchangeable with the parts for which they are intended to be replacements, and shall be treated and packed for long storage under the climatic conditions prevailing at the site. Each spare part shall be clearly marked or labelled on the outside in its packing with its description and purpose, and when more than one spare is packed in a single case or other container, a general description of its contents shall be shown on the outside of such case or container and a detailed list enclosed. All cases, containers and other packages shall be marked and numbered in an approved manner for purposes of identification.

Tools for each different type of equipment shall be contained in a suitable box clearly marked or labelled with its description (e.g. ‘Digital multimeter’, ‘pH meter’). Each tool shall be identified and a list of tools shall be affixed to the inside of the box lid.

All cases, containers or other packages are liable to be opened for such examination as the Engineer may require and packings shall be designed to facilitate opening and thereafter repacking.

### *6.1.14.2 Mandatory Minimum Spares Requirement*

In addition to the spares described in the preceding Clause the Contractor shall provide the following as mandatory minimum requirements for the works in each facility. An item for mandatory spares shall be in the Schedule of Prices together with a detailed list of the mandatory spare parts to be supplied by the Contractor as given in the Form TEC 13 Contractor shall provide all mandatory spare parts and other spare parts whether they are priced or not by the Contractor. If no price is included in Form TEC 13, it is deemed that price of that particular item is covered by the other items.

The Contractor shall provide the Engineer with schedules of relevant equipment and spare parts demonstrating that the spares provided comply with the minimum requirements.

The Engineer will determine the amount to be deducted from the Contract price in respect of the Contractor’s failure to deliver all the spare parts defined by this Clause.

### *6.1.14.3 Tee keys and Keys*

Upon completion of the Tests on Completion, or at such earlier time as the Contractor and the Engineer agree, the Contractor shall provide a set of three tee-keys for each type of valve or penstock cap at each site.

At this time, he shall also deliver to the Engineer, two complete sets of labelled keys (substantial rings and brass engraved tags) for all the plant and instrument panel locks supplied at each site, together with the works doors and cupboard keys and any other operating tools necessary to enable the works’ staff to control the process, (initially under the Contractor’s supervision and training).

The Contractor shall also supply with the keys two wall mounted glass fronted timber cabinets for each site with a brass hook for each key and matching engraved and mounted brass labels. The cabinets shall be mounted by the Contractor in approved locations.

### *6.1.14.4 Spare Filter Media*

The level of the media in all filters shall be checked after commissioning and topped up as necessary. The Contractor shall also provide sufficient spare filter media for all the filters at each site to enable the NWSDB to replenish them to their originally specified level at the end of the maintenance period and during the next three years. The final quantity so provided shall be based on the quantity used during the first year and shall be in addition to the spare stock specified.

The spare filter media shall be delivered to site in un-ruptured bags and placed in the site stores by the Contractor. Any damaged bags shall be rejected by the Engineer and replaced with full bags by the Contractor.

### *6.1.14.5 Spare Parts Storage in Works*

The Contractor shall supply with the spare parts for the works in each facility, adjustable storage racks, shelves and individual plastic referenced storage bins. Spare parts for the raw water pumping stations shall be kept at the treatment plants. The Contractor shall provide shelves or racks in the store room, arrange the spares, reference each item in the locations, reference each bin and provide a full complete indexed and cross indexed stores system. A master index shall be provided for all items with description, reference to the maker’s part reference store number, recommended stock level and current stock level entries.

The cost of setting up the storage system and all costs associated with indexing the spares supplied shall be included in the prices for the supply of plant.

Each set of tools shall be supplied with the equipment with which it is associated.

With the tools the Contractor shall provide for each facility :

* three sets of 15mm rope pulley blocks, lifting rope, shackles, eyes, etc (one each of single, double and treble arrays)
* four suitable pipe and valve slings
* one fitters’ portable chain block of capacity two-tonne
* one set of engineering fitters’ taps and dies
* one set of pipe fitters’ dies (up to 150mm)
* one complete set of oxy-acetylene cutting equipment including two sets of cylinders
* gas blow lamp and fittings for cutting and welding
* one set electric welding equipment
* fitters’ electric drill and accessories (portable, 500 watt)
* one set of multi purpose extractors
* three hand lamps with extension leads
* a supplementary and comprehensive tool kit containing items such as micrometers, rev-counters, feeler gauges, torque wrenches
* two digital electronic multimeters (Avo or equivalent)
* 4-20 ma current injection standard
* frequency meter
* two clamp-on ammeters.

In addition to the foregoing, emergency tools and operating tools shall be supplied at each site, housed in a cabinet which will remain unlocked at all times.

The Contractor shall provide with the schedule of prices a detailed schedule of the tools and lubricants to be supplied. This schedule shall be updated as necessary and provided in duplicate prior to issue of the Taking Over Certificate.

### *6.1.14.6 Lubricants*

A supply of the recommended lubricants sufficient for a period of one year’s running shall be supplied and stored at the principal site in each facility. This does not relieve the Contractor of the responsibility of ensuring that all grease lubricators have been filled and that all nipples are greased before starting up the plant.

Lubricants shall be equivalent to those reasonably obtainable in Sri Lanka.

## *6.1.15 Training of Employer’s Personnel*

The Contractor shall train personnel assigned by the Employer in accordance with an approved training programme.

Training of the Employer’s personnel shall aim at achieving optimum operation of the Works including maximum efficiency of Plant, minimum use of chemicals, minimum loss of water, and minimum numbers of operational staff. The Employer’s personnel shall be trained in all processes involved including operation of Plant, water quality tests, control of chemicals, routine and periodical maintenance of every item of equipment and Plant, and in all other subjects as may be required for satisfactory operation and maintenance of the Works including the regular cleaning and maintenance of the buildings and grounds.

The Contractor shall provide the on-site services of suitably qualified training supervisors who have considerable experience in the use of the equipment and processes required for the Contract and have experience as technical trainers. The curriculum vitae of each proposed training supervisor shall be submitted by the Contractor for the Engineer’s approval at least 6 weeks prior to the training supervisors commencing their duties at the sites. The training shall encompass the operation of existing works where there are interfaces between new and existing works.

Employer shall make available required operational personnel to the Contractor for training prior to commissioning and site testing.

The Contractor shall train the Employer’s personnel in accordance with the Employers directions and on the information supplied in the Operation and Maintenance Manuals provided under the Contract. The content of the manuals shall be fully explained and demonstrated on the actual plant items to which they refer.

The Contractor shall provide the Employer with separate training programmes to cover the in-house training of treatment works managers, operations personnel and maintenance personnel. Training shall be designed for the individual needs of these groups. Each set of training programmes shall be supplied to the Engineer 6 weeks prior to commencement of training to enable the Employer to make the necessary arrangements for his personnel to attend.

Training shall commence at an appropriate time prior to commissioning and site testing and shall be programmed so that, at the date of Taking-Over, the Employer’s personnel can be entrusted with the operation and maintenance of the Works, under the control and supervision of the Contractor.

The Contractor shall continue with the training of the Employer’s personnel from the issue of the Taking-Over for the whole of the Works, so that upon issue of the Certificate of Maintenance the Employer’s personnel will be able to operate and maintain the Plant and the Works efficiently without the Contractor’s supervision.

The staff to be provided by the Contractor for the operation and training shall include, but not be limited to, an approved fully qualified and experienced water treatment engineer who will be required to be resident in Sri Lanka and actively involved full time in work on all facilities constructed for at least 12 weeks during the twelve month period to the end of the Contract period during which the Contractor will be responsible for the supervision of the staff and the training of Employer’s personnel.

Overseas Training for not less than two weeks duration per each NWSDB Engineer/Officer on Water Treatment Process Design, Planning & Designs of Water Treatment Plants, Water Supply Schemes, SCADA System, automation and other related works for NWSDB Engineers and other relevant officers for on the job training in a South Asian Country. Number of officers shall not be less than five. Contractor shall provide cost of training and all necessary facilities and other minor expenses and arrange all Visa, permits and such other things.

## *6.1.16 Site Establishment*

### *6.1.16.1 Water Supply*

The Contractor shall provide for his own use suitable supplies of potable water for drinking, washing, sanitation and general cleaning in addition to any required for the construction, testing and commissioning of the Works.

All water for drinking shall, if necessary, be filtered and disinfected by the Contractor to meet the Sri Lankan/WHO standards for drinking water.

### *6.1.16.2 Electricity Supply*

The Contractor shall install, operate, maintain, pay for and subsequently remove sufficient temporary supplies of electricity for air-conditioning, lighting and ventilation of all offices, stores, laboratories and other temporary buildings used by the Contractor and by the Engineer in addition to any supplies he may require in connection with the construction, of the Works.

The fixed electrical installation within all site offices and other facilities provided by the Contractor shall be tested prior to the energising of the supply. Where site offices remain on site for twelve months or more, inspection and re-testing shall be carried out by the Contractor at twelve month intervals.

Portable electrical appliances provided by the Contractor for use within site offices shall be tested and labelled prior to delivery to site. Inspection and re-testing shall be carried out by the Contractor at six month intervals.

Records of maintenance, including test results, must be recorded by the Contractor in a proper manner, and the records and test results available for inspection at site.

### *6.1.16.3 Contractor’s Accommodation*

The Contractor shall erect, construct, maintain and subsequently remove all temporary offices, sanitary conveniences, stores, workshops, compounds, parking areas and the like as are necessary to ensure that he is able to conduct and supervise the Contract efficiently. The siting and layout of the Contractor’s accommodation shall be to the general approval of the Engineer. No labour camps will be permitted within the boundaries of the Permanent Works Sites and accordingly the Contractor shall not establish any camp or temporary living accommodation for his staff within or adjacent to the Works Site, and shall clear any unauthorised squatters or unofficial camps from the site.

### *6.1.16.4 Hygiene Requirements*

Before commencing work on the Site the Contractor shall ensure that all his employees are instructed in the necessity for the prevention of pollution. The Contractor shall immediately dismiss and remove from the Site any employee or representative of the Contractor who has been polluting or fouling the Sites or any of the water supply installations and shall take appropriate remedial measures to prevent a repetition of the occurrence and to disinfect the areas concerned all to the satisfaction of the Engineer.

The Contractor shall not employ upon the Site, or on periodic visits thereto, persons who are known to have any disease which could be water-borne or water related who is suffering from an illness associated with looseness of the bowels or who are carriers of typhoid bacillus or other potential pathogenic organisms or who are otherwise unsuited on medical grounds to be employed in or around water supply installations.

The Contractor shall if and when required to do so, arrange for his employees to be examined and tested in a manner approved by the Employer’s Medical Officer and the Engineer.

He shall immediately remove from the Site any such employees who as a result of such examination and testing may in the opinion of the Medical Officer or the Engineer constitute a danger to water supplies or who refuse to undergo an examination.

### *6.1.16.5 Contractor’s Toilet and First Aid Facilities*

The Contractor shall set up, maintain and clean daily toilet and washing facilities for use by his employees. This shall include the provision of adequate supplies of towels, soap and the like.

The Contractor shall provide complete first-aid facilities for his staff until the issue of the Certificate of Completion. The first aid facilities shall be accommodation in a clean and tidy office, held in a dust proof cupboard stocked to the satisfaction of the Engineer and regularly replenished. They shall include an adequate supply of sterile bandages, disinfectants, spray disinfectants, plasters, scissors, etc.

The toilet and first aid facilities shall be fully available within one week of commencement of work on site.

The Contractor’s waste disposal methods and areas or tip shall be approved by the Engineer. No sullage or wastes or sewage shall be disposed of or dumped within the Site.

Any water connections, pipe runs and drainage pipework provided by the Contractor shall be to the approval of the Engineer.

### *6.1.16.6 Site Materials Laboratory*

The Contractor shall provide, maintain and subsequently remove a site laboratory for soil and concrete quality control. The laboratory shall be equipped with apparatus and competent technicians sufficient for carrying out tests required for verifying the compliance of materials and workmanship with the Employer’s Requirements. The location of the laboratory and the apparatus and personnel for this shall be subject to the general approval of the Engineer.

The laboratory shall be equipped for routine monitoring of aggregates, site quality control, and specimen and sample manufacture and curing. At the completion of the works, the laboratory shall be removed and the Site cleared and reinstated.

Each laboratory shall have facilities that include at least:

* a full set of metric fine and coarse aggregate sieves complete with a matching electric vibrator
* three concrete thermometers
* thermostatically controlled drying oven capable of maintaining a temperature of 120oC for drying out aggregates
* balance weighing up to 7kgm and accurate to 0.01gm complete with a set of weights
* scales weighing up to 220kg and accurate to 1gm to complete with a set of weights
* apparatus (with consumables and spares) for the measurement of the moisture content of aggregates
* two slump cones with tampers
* apparatus for sand-replacement method of field density determination
* liquid limit device and tools to BS1377 including polished glass plate 200mm square x 10mm thick, 4 No 140mm diameter evaporating dish and 2 spatulas
* CBR dual purpose, field and laboratory apparatus complete with dial gauges, proving ring and vehicle mounting bracket
* one Schmidt hammer
* cast steel, 150mm concrete cube moulds with base plates in sufficient numbers and 2 tampers
* report forms, stationary, etc as directed
* concrete cube curing tanks
* shelved cupboards and aluminium trays 200mm x 50mm deep
* tables, chairs, worktops, shovels, brushes, water and drainage, etc as required.

All laboratory equipment shall be subject to the Engineer’s approval prior to ordering.

If the Contractor considers the foregoing minimum facilities are insufficient for the purposes of this Contract, the Contractor shall provide at his own cost, such additional facilities as he considers are necessary to ensure adequate quality control on the Contract. In particular, the Contractor shall ensure that sufficient items of field testing equipment are provided so that field testing can be carried out whenever required on any site where soil or concrete work is in progress. In addition the Contractor shall be responsible for transporting samples for laboratory testing to the laboratories from sites distant from the laboratories.

Contractor shall provide an accredited laboratory with the approval of the Employer for the testing facilities which cannot be performed at the site material Laboratory. All such sampling; transport and testing shall be done by the contractor as directed by the Engineer at the approved laboratory.

The Contractor shall provide approved technicians to work in the laboratory under the direction of the Engineer. These personnel may be required to carry out work related to the Project in addition to that required under this Contract.

## *6.1.17 Geotechnical and Other Information*

Geological and/or geotechnical information given in this document or made available for inspection and any other information provided is given to assist the Contractor at the time of Bidding. The Employer gives no warranty as to the accuracy or sufficiency of this information. The Contractor shall be responsible for the interpretation of the data.

A copy of the factual reports of geotechnical investigations for each facility will be made available for inspection during the bidding period at the Employer’s Colombo office. One set of the reports will be provided to the Contractor after Contract award.

The Contractor shall undertake at his own expense such further geotechnical investigations as may be necessary for him to design the works, including providing supporting information to validate his design assumptions. A copy of the results of all such investigations shall be provided to the Engineer.

## *6.1.18 Datum Levels, Setting Out and Surveys*

The Contractor shall check and confirm the surveys before using them or establish his own bench mark and base line data. The Contractor shall be entirely responsible for all levels and settings used by him in the Works.

## *6.1.19 Liaison with Others*

The Contractor shall be responsible for liaison with all relevant authorities including but not limited to water resources authorities, power authorities, local municipalities and ministries and for obtaining all approvals and consents necessary for executing the Works.

The Contractor shall, in consultation with the Engineer, arrange his construction programme so as to minimise inconvenience to the Employer, other government departments, other contractors and the public.

## *6.1.20 Amenities to be Preserved*

The Contractor shall cause the least possible interference with existing amenities and facilities, whether natural or man made. No trees shall be felled except as authorised by the Engineer and clearance of the Site shall generally be kept to the minimum necessary for the Works and Temporary Works. Before starting work on any site, the Contractor shall divert around the perimeter of the site any minor watercourses crossing the site which are necessary for the continuation of agriculture outside the boundaries of the site.

The Contractor shall at all times ensure that he does not cause any damage to or pollution of any existing installations and he shall take positive steps to minimise any inconvenience to the inhabitants of local communities. He shall at all times respect local traditions, religious sites and periods and the life style of the people, and shall deal promptly with any complaints by owners or occupiers.

The Contractor shall ensure that any recorded archaeological and heritage sites are protected. Where disturbance is unavoidable, this will proceed in consultation with archaeologists and only after permission has been obtained from the concerned local authority. In the event of discovery of previously undetected sites, relevant authorities will be consulted before further disturbance.

## *6.1.21 Advertisement Board*

The Contractor shall not, except with the written authority of the Engineer, exhibit or permit to be exhibited on the site any advertisement board. Any such advertisement may also be subject to the approval of the Engineer before it is put up and it shall be removed if the Engineer so demands.

## *6.1.22 Works to be Kept Clear of Water*

The Contractor shall keep the works well drained until the Engineer certifies that the whole of the Works is substantially complete and shall ensure that so far as is practicable all work is carried out in the dry. Excavated areas shall be kept well drained and free from standing water.

The Contractor shall construct, operate and maintain all temporary dams, watercourses and other works of all kinds, including pumping and well-point dewatering plant, which may be necessary to exclude water from the Works while construction is in progress. Such temporary works and plant shall not be removed without the approval of the Engineer.

Notwithstanding any approval by the Engineer of the Contractor’s arrangements for the exclusion of water, the Contractor shall be responsible for the sufficiency thereof and for keeping the Works safe at all times particularly during any floods and for making good at his own expense any damage to the Works including any that may be attributable to floods. Any loss of production or additional costs of any kind that may result from flooding shall be at the Contractor’s own risk.

## *6.1.23 Environmental Protection and Landscaping*

### *6.1.23.1 Discharge of Water into Existing Streams*

The Contractor shall make provision for the discharge or disposal from the Works and Temporary Works of all water and waste products however arising. The methods of disposal shall be to the satisfaction of the Engineer and of any authority or person having an interest in any land or watercourse over or in which water and waste products may be so discharged. The requirements of this Clause shall not limit any of the Contractor’s obligations or liabilities.

### *6.1.23.2 Erosion and Sediment Control*

The Contractor will undertake the following erosion and sedimentation control measures during the construction phase of the project.

Development of Drains and Dikes: catch and diversion drains shall be laid to ensure runoff from the construction works is directed into existing watercourses. All drains constructed will have a parabolic or trapezoidal cross-section. Interceptor dikes made of compacted material will be laid to convey water to stable outlets at non-erosive velocities. Dikes will have

minimum ridge height of 0.5 m, minimum top width of 0.8m and maximum side slopes 2:1 (horizontal to vertical).

Development of Banks: Sedimentation basins shall be constructed off-stream to remove sediment-laden runoff. The basins shall be located at points where the terrain provides maximum storage benefits. Desilting will be done when the capacity of the basin has been reduced by 30%. Effluent turbidity shall not exceed 200 ppm of suspended solids.

Removal of vegetation and topsoil: Clearing shall be restricted to only those areas where the commencement of work is imminent. Clearing of areas not immediately required for the works shall be carried out at a later time to suit the requirements of the construction program.

Stockpile construction and maintenance: Smooth and free draining stockpiles of removed topsoil shall be constructed with batter slopes not exceeding 1.5:1, and height limited to two metres. Compaction of the stockpile will be done by equipment necessary for the hauling, placing and spreading of the topsoil material. All topsoil stockpiles will be ripped to ensure the retention of moisture and the promotion of re growth.

Resurfacing: a disturbed area that will be left exposed more than 30 days and not subject to any construction will receive temporary seeding. Following initial disturbance or rough grading, all critical areas subject to erosion (for example steep slopes) will receive temporary seeding in combination with straw or another suitable material.

### *6.1.23.3 River Bank and Bed Protection*

The Contractor shall undertake adequate protection measures to maintain the existing configuration and bed profile of all existing waterways being utilized for any beneficial purposes including flood control and navigation. These measures will include paving riverbanks and other stabilization measures as required to minimize disturbance to the natural bed configuration.

### *6.1.23.4 Dust Control*

The Contractor shall prevent the blowing of dust and dirt generated by construction activities or vehicular traffic, over or onto adjacent or nearby developed areas. Dust control will consist of the following activities as appropriate:

* Stabilization with temporary vegetation
* Sprinkling with water from water carts until the surface is sufficiently wetted to suppress dust.

The Contractor shall take particular care when using abrasive, grinding and cutting tools and air blasting equipment to ensure that resulting dust and other particles do not cause injury or damage. Personnel involved in such work shall be provided with protective clothing, breathing apparatus and other devices as appropriate. The Contractor shall ensure that other persons do not enter areas where they may be affected by such activities.

The Contractor shall minimise the amounts of dust or other particles entering existing buildings, water treatment plant structures and plant areas and shall remove any such material and make good any associated damage before completing work in the areas affected.

### *6.1.23.5 Noise and Vibration Control*

* The Contractor shall avoid the use of heavy noise and vibration making diesel powered construction equipment for land preparation and clearing purposes.
* The Contractor shall ensure that engine noise control devices on construction equipment will be adequately maintained.
* The contractor will provide all the construction workers with adequate hearing protection such as ear plugs or ear muffs in areas with noise levels exceeding 80 dBA.
* The Contractor will undertake adequate measures to minimize or eliminate odour, noise, vibration, dust and smoke to levels that do not cause any nuisance, trouble, damage or health problems in the nearby community.

### *6.1.23.6 Air Pollution Control*

The Contractor shall minimise the generation of smoke, dust, vapours and noxious fumes from construction and other equipment by only using equipment which is in good condition and well maintained at all times during work under the Contract. Suitable ventilation shall be provided for any underground construction site.

Burning of Materials - The Contractor shall not undertake any large scale burning of materials that result in production of toxic and noxious gases and fumes or other emissions which pose health hazard and nuisance to workers on the construction site and neighbouring community.

Fugitive dust emission from vehicular traffic shall be controlled by limiting the speed of haul trucks and application of water to haul roads. Regular maintenance of all ventilators and air contaminant control equipment, respiratory devices and monitoring instruments shall be carried out.

The Contractor shall provide for the use of protective respiratory devices when the air quality exceeds local or international standards, or the following threshold limit values (TLVs):

* Carbon Monoxide = 29 mg/m3
* Nitrogen Dioxide = 6 mg/m3
* Particulate (Inert or Nuisance Dust = 10 mg/m3
* Sulphur Dioxide = 5 mg/m3

### *6.1.23.7 Hazardous and Solid Waste Management*

The Contractor shall provide rubbish collection bins at the site to avoid the proliferation of litter and construction waste and the potential for the escape of material off site.

The Contractor shall ensure safe disposal of all construction waste and garbage from all sections of the construction site in accordance with local regulations.

The Contractor shall ensure the refuelling of heavy construction machinery is undertaken using a service vehicle to minimize risk of pollution, with appropriate procedures for disposal of surplus materials.

The Contractor shall ensure that all chemicals are stored in appropriate chemical storage facilities such as storage tanks for bulk chemical and fuels and delivery containers for other chemicals. Suitable materials and coatings will be used for storage tank construction, based on the properties of each substance being stored. All chemical storage and chemical feed areas will be surrounded by kerbing to contain any leaks and spills that do occur. The kerbed areas will be sized to hold the full contents of the largest single tank with the provision of a sump to allow pump out of any contained liquid.

### *6.1.23.8 Landscaping*

The Contractor shall landscape the following areas at each work site:

(a) At new work sites: all areas within the site boundaries, with the exception of areas covered by structures, roads and other permanent features or works;

(b) At existing works sites: all areas disturbed by the Works,

Landscaping shall consist predominantly of providing suitably shaped final ground surfaces and the planting and establishment of grass and shrubs or small trees and retaining walls, drains. Landscaping shall be carried out in accordance with the requirements of the Technical Specification.

## *6.1.24 Underground Cables and Services*

All available data and information on existing underground cables and services will be provided by the Employer. However the Contractor shall be responsible for determining the locations of any underground cables or services at the Site of the Works and for taking precautions to prevent damage or interruption to such cables or services. Any damages occurred to such cables or pipelines or services shall be repaired as required by the respective owner at the Contractor’s Cost. Any compensations for third party due to absence of such services due to the damage to such cables or pipelines or services shall be borne by the Contractor. Before commencing any excavation the Contractor shall make all necessary enquiries of relevant authorities and organisations and shall ascertain whether any power or telephone cables, or other service pipes have already been constructed in such area and shall thereafter carry out the excavations in such manner and sequence as the Engineer directs.

If during the excavation, the Contractor’s workmen uncover any cables or service pipes, work shall be stopped immediately, and the matter reported to the Engineer and work shall not be recommenced until the Engineer has issued his instructions on the procedures to be followed.

The Contractor shall be responsible for safeguarding by means of temporary or permanent supports or other means as may be directed or approved by the Engineer, all pipes, cables and other things which would be liable to suffer damage if such precautionary measures were not taken.

## *6.1.25 Samples*

The Contractor shall submit to the Engineer as he may require samples of all materials and goods which he proposes to use or employ in or for the Works. Contractor shall carry out all necessary tests of such samples. Such samples, if approved, will be retained by the Engineer and no materials or goods of which samples have been submitted, shall be used in the permanent Works unless and until such samples shall have been approved in writing by the Engineer.

## *6.1.26 Submission of Materials for Testing*

It shall be the Contractor’s responsibility to ascertain from the Engineer which materials and articles are required for testing, and to ensure that they are submitted, sufficiently far in advance as to avoid delay in the Works.

## *6.1.27 Photographs*

The Contractor shall arrange monthly for colour digital photographs to be taken showing the progress of the Works as ordered by the Engineer and shall provide the Engineer with four sets of prints and a digital copy of each photograph. The prints shall be on matt paper unmounted and of a size not less than 165mm x 215mm. All prints shall be handed over to the Engineer. The Contractor shall ensure that no use is made by him of any electronic copy or print without permission from the Employer. The Contractor shall also ensure that no unauthorised photography is allowed on site. The Engineer and the Engineer’s Representative are permitted to take photographs on site.

## *6.1.28 Progress Reports and Meetings*

The Contractor shall submit to the Engineer during the first week of each month a progress report in such form that actual progress to the end of the preceding month may be compared with the Contractor’s programme for the Works.

From time to time the Engineer will call meetings in his office or at the Contractor’s office or at the Site, as he deems necessary for the purpose of control of the Contract. Authorised and responsible representatives of the Contractor shall attend such meetings.

## *6.1.29 Other Contractors*

The Contractor shall co-operate with all other contractors and subcontractors who may be engaged in work on the Site.

The Contractor shall give the Engineer timely notice of and keep him continually informed upon all matters involving co-ordination with other contractors employed by the Employer or other public authorities or other interested parties, and the Contractor shall co-operate with such persons for the proper execution of their work concurrently with his own.

## *6.1.30 Safety*

### *6.1.30.1 Safety Responsibility*

The Contractor shall be solely responsible for the safe conduct of the Works. He shall ensure that all operations are carried out safely and that any person he makes responsible for the safe conduct of any part of the operations carries out his duties in a proper manner.

Contractor shall have a full time Safety Officer and Third Party Damage Officer.

### *6.1.30.2 Contractor’s Safety Procedures*

Before commencing work on any site, the Contractor shall prepare a site safety plan for that site for approval by the Engineer. The Contractor and any other persons engaged on work for this Contract shall be required to comply with the safety plan. A copy of the safety plan shall be supplied to the Contractor’s Representative at that site and it shall be the Contractor’s Representative’s responsibility to ensure that all persons under his control read and follow the safety plan.

The Contractor shall also institute a safety training program on site upon commencing work to train all the workers in environmental, health and safety matters, including accident prevention, safe chemical and equipment handling practices in accordance with labour laws and their maintenance and upkeep. Detailed procedures and plans of action shall be laid out to combat emergency situations, including the location and proper use of the emergency equipment, procedures for raising alarm and proper response actions for each foreseeable emergency situation.

The Contractor shall ensure that all personnel working on the site wear appropriate clothing and safety equipment, including enclosed footwear and protective headgear, and where appropriate protective goggles, gloves, steel-capped boots and other items.

The Contractor shall institute safety procedures for work in confined spaces as follows:

* checking all confined spaces (e.g. tanks, sumps, vessels, sewers, excavations) for toxic, flammable or explosive gases, or lack of oxygen, and ventilation of these spaces as required before entry and during occupancy.
* use of adequate ventilation systems or air-supplied respirators for work in underground and confined work areas.
* stationing of observers or assistants outside of confined spaces to watch over the safety of personnel working inside these areas.

### *6.1.30.3 Fire Hazard (Naked Lights)*

No naked light shall be used by the Contractor on or about the Site otherwise than in the open air without the permission in writing of the Engineer. If in the Engineer’s opinion the use of naked lights may cause a fire hazard, the Contractor shall at no extra cost to the Employer take such additional precautions and provide such additional fire fighting equipment (including breathing apparatus) as the Engineer considers necessary. The term “naked light” shall be deemed to include electric arcs and oxy-acetylene or other flames used in welding or cutting metals.

### *6.1.30.4 Work in the Vicinity of Electrical Equipment*

Any permanent fencing or other safeguards required to be erected around electrical equipment shall be completed as far as practicable before connection is made to the electricity supply, but where this is not practicable the Engineer may permit the use of temporary fencing or other safeguards.

If work in the vicinity of electrical equipment is to be carried out after connection has been made to the electricity supply the Contractor shall put into operation a “Permit to Work” system to the approval of the Engineer.

### *6.1.30.5 Portable Electrical Equipment*

Any person using portable electric tools or equipment is classed as a “Duty Holder” and must therefore be “Competent” and appointed in writing. All hand held portable tools must operate at a voltage not exceeding 240 volts AC and the source of the voltage must be centre tapped to earth. This does not apply to domestic cleaners etc. and to Class 2 domestic appliances, and approved test equipment.

All hand lamps must operate at a voltage not exceeding 50 volts AC between conductors and be fed from a circuit which is isolated from the supply mains and from earth by means such as an isolating transformer.

Before any new portable electric tool is put into service, it must be examined, tested and certified safe for use by an authorised person. This includes any equipment that may be hired by the Contractor from a specialised tool hire company. Where portable electric tools remain on site for an extended period, they must be inspected on each occasion before use, and they must be tested and marked accordingly at no more than three monthly intervals.

Prior notice shall be given of the intention to use transportable equipment on supplies exceeding 240 volts and the use of such equipment shall be at the discretion of the Engineer. Only electrically trained personnel shall install temporary generators for supplying fixed or temporary installations.

Electrical welding equipment shall not be connected to the site electricity supply and the Contractor shall provide all of the necessary portable generating equipment as may be required to carry out such electrical welding for the Works.

### *6.1.30.6 Electrical/ICA Test Equipment*

All test equipment used by the Contractor at the Contract Works Site to test the electrical/ICA work shall be such that the use of the equipment will not endanger the life of those using the equipment, and the test equipment shall be provided with clear instructions for the safe usage of such test equipment on or near to electrical systems, equipment and conductors.

### *6.1.30.7 Chlorine*

Where the Contractor requires the handling or use of chlorine, or the work carried out on, or immediately adjacent to, any existing or proposed chlorine installation, the Contractor shall comply with the relevant provisions of the chlorine supplier’s recommendations on the safe handling of chlorine.

### *6.1.30.8 Accident Reporting*

All accidents shall be notified to the Engineer as soon as possible after their occurrence.

### *6.1.30.9 Unexploded Ordnance*

The Contractor shall note that the town and surrounding areas of Batticaloa and Muttur have been subject to armed conflict. Should the need for mine clearance arise the Contractor shall arrange this and meet the cost from the Provisional Sum included for this purpose in the Schedule of Prices.

## *6.1.31 Working Hours*

Site working hours shall be 8 hours per day between 7.00 am and 6.00 p.m. for six days per week (Monday to Saturday). Working outside these hours shall only be carried out by prior arrangement and agreement with the Engineer’s Representative. The Contractor shall pay to the Employer the Engineer’s Supervision costs outside normal working hours.

## *6.1.32 The Site*

The Employer will give the Contractor possession of the area of the Permanent Works and such other areas shown on the bidding document drawings as being available for the Contractor’s use. Such possession may not be exclusive to the Contractor. The Contractor shall make his own arrangements for any other land required by him. The Contractor shall not use the Site for any purpose other than for carrying out the work required under this Contract.

## *6.1.33 Access to the Site*

The Contractor shall arrange for, construct, maintain and afterwards hand over to the Employer on completion of the Contract (or, if directed by the Engineer remove and reinstate) any temporary access required for and in connection with the execution of the Works. Reinstatement shall include restoring the area of the access route to at least the degree of safety, stability and drainage that obtained before the Contractor entered the Site.

Where operations are carried out on securely fenced land belonging to or under the control of the Employer, the Contractor shall ensure that the Employer’s current security regulations are maintained.

The Contractor shall ensure that all workmen leave the site on conclusion of their duties each day.

## *6.1.34 Work through Private Land*

Where any parts of the Works are to be constructed on, over, under, in or through privately owned land the Contractor shall ensure that his methods of working cause the minimum of disturbance to such land and to its owners and occupiers. As soon as practicable after the order to commence the Works has been given the Contractor shall agree with the Engineer the working areas which the Contractor must temporarily occupy in order to construct those parts of the Works affecting land in private ownership and the period of time required for each occupation. The Employer will arrange for temporary occupation by the Contractor of these working areas and for the serving of any Statutory Notices, but the Contractor shall give to the occupier of each area 7 days written notice of his intention to enter. The working areas agreed as aforesaid shall be deemed to be part of the Site.

## *6.1.35 Temporary Works*

Within a reasonable time (and in any case not less than 21 days) before he intends to commence construction of any of the Temporary Works the Contractor shall submit full particulars, including drawings, of the same for the approval of the Engineer. The submission to and approval by the Engineer of any such particulars shall not relieve the Contractor of his responsibility for the sufficiency of the Temporary Works or of his other duties and responsibilities under the Contract. The Contractor shall make safe and reinstate all areas affected by Temporary Works when they are removed.

## *6.1.36 Site to be Kept Tidy*

Throughout the progress of his work the Contractor shall keep the Site and all working areas in a tidy and workmanlike condition and free from rubbish and waste materials. Any Temporary Works, Constructional Plant, materials or other things which for the time being are not required for use by the Contractor may with the consent of the Engineer be removed from the site but otherwise shall be dispersed about the Site in an orderly fashion and shall be properly and securely stored thereon.

## *6.1.37 Permit to Work System*

The Employer shall operate a Permit to Work system which the Contractor shall comply with throughout the Contract.

Any part of the site that is designated by the Engineer as a ‘Restricted Working Area’ may not be entered without a ‘Permit to Work’. All places occupied by mechanical, electrical or chemical equipment and sewer manholes and pump sumps and confined spaces and all points of interface with operational works will usually be so designated. The Contractor shall not allow any of his employees or sub-contractors to enter such an area until a permit has been issued.

When the Contractor requires such a permit he shall give seven days notice to the Engineer, who will arrange for one to be issued. When the Contractor receives such a permit he shall comply with any precautionary requirements that may be specified in it and shall hold the permit until the end of the period covered and then return it to the Issuing Officer. Compliance with the requirements of the permit shall not absolve the Contractor from any responsibilities under this Contract.

Where the equipment in the restricted area can be put entirely out of use, or the flow can be stopped, one permit will usually cover the whole continuous period that the Contractor requires, but otherwise a new permit will be required each day.

Prior to carrying out any excavation work the Contractor shall advise the proposed location of the excavation and shall confirm that the positions of all known services affecting the proposed excavation have been noted. In addition the Contractor shall carry out a sweep with an approved detector and shall mark all known services on the ground. Excavation shall not commence without a “Permit to Excavate” issued by the Engineer.

## *6.1.38 Transport, Delivery and Storage of Plant*

The Contractor shall be responsible for making all arrangements necessary for the transportation of equipment and plant and materials to site, including investigation of the route for bridge clearances and any approvals if required, loading limitations and the like.

The Contractor shall ensure that all assemblies and sub-assemblies delivered to the site are of size and weight suitable for access to the place of installation.

All items of plant, equipment and materials shall be suitably packed for transport to avoid damage and to afford adequate weather protection. The Contractor shall provide all labour and lifting facilities and any other facilities required for on and off-loading of equipment at site.

No delivery shall be made without the prior permission of the Engineer, which must be sought in writing at least seven days before the intended delivery date.

Delivery shall normally be to the designated storage area on site. However, with the agreement of the Engineer delivery may be direct to the point of erection.

The Contractor shall be responsible for reception at the designated storage area, off-loading including all crane age, verification that equipment delivered conforms to delivery inventories, ensuring that stored equipment is adequately protected against deterioration from any cause and subsequent removal from the storage area and off-loading at the point of erection including all crane age and transport.

It is the sole responsibility of the Contractor to maintain protection of the equipment until Taking-Over Certificate has been issued.

The Contractor shall, at his own expense, provide for storage of all equipment supplied under the Contract and its adequate protection and preservation against loss, deterioration or damage however caused, both at his works and on site, where it is required for his approved erection programme, his convenience or the requirements of the overall contract programme.

## *6.1.39 Redundant Equipment*

Redundant equipment including plant removed during the Works shall remain the property of the Employer and shall be moved by the Contractor to a storage area to be allocated on the site. The Engineer will then consult the Employer to establish whether any of the redundant equipment is to be re-utilised by the Employer. If the Employer requires any redundant equipment the Contractor shall arrange for it to be delivered to the Employer’s store. Otherwise he shall make arrangements to dispose of the redundant equipment off site.

## *6.1.40 Construction Safety Standards*

The contractor shall carry out all construction installation and commissioning activities in accordance with good safe working practice. In particular the Contractor shall comply with the requirements of the health and safety of the Department of labour and National Water Supply & Drainage Board, Sri Lanka.

## *6.1.41 Reinstatement of Roads*

Where the Works involve the construction of pipelines or other works in or across public roads, the Contractor shall undertake at his cost the temporary reinstatement of all such roads affected. The temporary reinstatement shall be in accordance with the specifications and requirements of the Roads Development Authority (RDA) or other authority responsible for the road concerned and must be completed prior to the Taking-Over date to the approval of the RDA or other authority. Permanent reinstatement of such roads will be carried out at a later date by the RDA or other authority at no cost to the Contractor.

## *6.1.42 Quality Assurance*

Bidders shall submit evidence that the Plant, equipment machinery, DI /PE pipes, fittings, specials, accessories, valves, chlorinators, chemical dosing systems and other treatment plant equipment, pumps, air blowers, surge arresting equipment, etc. shall be manufactured in factory possessing latest ISO 9001 Quality Management System and shall conform to the Product Conformity to the Standards Specified in the Specifications and in accordance with the Employer’s Requirements. This evidence shall be in the form of the following:

(i) A certificate issued by an independent, internationally recognised Accreditation Agency that the proposed manufacturer of the Plant and materials operates quality management systems, which conform to the requirements of ISO 9001. Name and address of the manufacturing factory, the validity period, auditing periods etc. to be accepted as an internationally recognised independent third party accreditation agency, the agency must have performed accreditation work of a similar nature in a minimum of two countries. As evidence of this, copies of relevant certificates issued by the agency or a statement from the agency or from an ISO Member Body, showing how the agency meets this criterion shall be provided.

## *6.1.43 Testing and Inspection Agencies*

1 The Employer or his representative shall have the right to inspect and/or to test the Goods for their conformity to the Contract. The Contract Data of Contract and/or the Technical Specifications shall specify what inspections and tests the Purchaser requires not specified any where and where they are to be conducted. The Purchaser shall notify the Supplier in writing of the identity of any representatives retained for these purposes.

2 The inspections and tests may be conducted on the premises of the Supplier or his subcontractor(s), at point of delivery and/or at the Good's final destination. Where conducted on the premises of the Supplier or its subcontractor(s), all reasonable facilities and assistance including access to drawings, documents and production data shall be furnished to the inspectors at no charge to the Purchaser.

3 Should any inspected or tested Goods fail to conform to the specifications, the Purchaser may reject them and the Supplier shall either replace the rejected Goods or make all alterations necessary to meet specification requirements free of charge to the Purchaser.

4 The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival in the Purchaser's stores shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Purchaser or its representative prior to the delivery of Goods or Goods' shipment from the country of origin, in case of importing.

5 The Employer requires the goods to be supplied under this contract shall conform to the requirements given in specifications. The Supplier shall obtain the Certificates of Inspection for the specific requirement of this contract document carried out by one of the following inspection agencies acceptable to the Purchaser.

1. M/s Lloyds Register,

Lloyds Register Industrial Division,

Register House, 29 Wallesley Road,

Croydon DRO-2AJ, U.K.

2. M/s Crown Agents,

Quality assurance & Inspection Service

Townend House, Walsall WSI INT

U.K.

3. M/s Societe Generale de Surveillance S.A.,

1, Place des Alpes,

Case Postale 898, CH-1211 Geneva 1,

Switzerland.

4. Bureau of Veritas,

Cedex 44,

92077 Paris Le Defense,

France.

The selected inspection authority’s name and cost to same has to be given in summary of price schedule. On the acceptance of the bid, the Purchaser shall inform directly to the selected inspection authority with a copy to Supplier, the specific requirements for testing including deviations accepted by the purchaser, if any, to be tested. However, the payment to the Inspection Authority has to be made directly by the Supplier on production of test reports.

6 Nothing in clause 6.1.43 and 6.1.44 shall in any way release the Supplier from any warranty or other obligations under this Contract.

7 The Supplier shall obtain the approval of the Engineer to ship the goods to be imported for the Works or to deliver such materials and plant to the site. Applications for such consent to ship shall be accompanied by manufacturer’s test certificates and certificates of inspection prescribed in the Contract or agreed with the Engineer. Application shall be made so as to give the Engineer a reasonable time to deal with such applications.

8 Nominated Inspection Agency shall carryout inspection and testing during Manufacturing process, after Manufacturing and at any time prior to shipping and shall confirm that goods are in conformity with specifications included in the contract document. He shall submit his inspection report to the Employer including all items given in the Terms of Reference (TOR) for the Nominated Inspection Agency which is included in the contract document as Appendix – 11.

## *6.1.44 Pre-shipment Inspection by National Water Supply & Drainage Board (NWSDB)*

## *Engineers*

The Contractor shall arrange for 2 NWSDB Engineers per inspection for pre-shipment inspection visits to country of manufacture before dispatching the DI Pipes, fittings, Valves, Specials and Accessories, pumps and motors, chemical dosing equipment, chlorinators, pressurized tanks, surge vessels, Generators, air compressors, vacuum pumps, HV/LV Transformers, HV switch boards, LV electrical cabinet, gun sets and all motors, SCADA System,all treatment plant equipment, any other plant, equipment or machinery, water meters and other related equipment.

Each shipment should be inspected by NWSDB Engineers before dispatching at Manufacturer’s factory.

The Contractor shall in his bid provide detailed proposals for pre-shipment inspection visit he offers to provide under this clause. The following guidelines shall be used by the Contractor to formulate his proposals.

1 The duration of inspection for each officer shall not be less than Ten (10 ) days excluding Travelling to the Manufacturer’s country and back.

2 Most of the time shall be centred round the manufacturer’s goods which the Contractor proposes to use in the work.

3 The inspection at the specific manufacturer shall include;

* + A general introduction to the manufacturer’s country, area, town & source of materials, etc.
  + introduction to design standards and procedures adopted.
  + introduction to relevant procedures and quality control standards.
  + manufacturing process, and Quality Assurance procedure.
  + testing procedures, mill certificates, product conformity certificate, Quality Management System Certificate and any other relevant certificates etc. regarding the products.
  + packing & dispatching procedure
  + Site visits to inspect installed similar products.

4. The officers shall be guided by experienced engineers and quality controllers who are also competent in English language.

5. All visas, Insurance(Life, Health and Travel) air fares, permits, taxes, transfer fees, travelling within the Manufactures country and all other facilities required to carry out pre-shipment inspection at the manufacture’s factory /premises shall be arranged and paid for by the Contractor and shall be included in the rates and prices of the contract.

Revised on 09-11-2015

6. Each officer shall be paid a per diem to include combined allowances, the amount specified in the schedule 01 of the Ministry of Finance circular M.F. 01/2015/01 Dated 15-05-2015 (Refer Appendix 19 for details) prior to departure.

7 The officers shall be provided with printed catalogues, manuals, illustrative videos etc., relevant to the manufacturing process and also obtain extra information requested by them, and shall arrange to dispatch these to NWSDB Engineers, by the Contractor at his own cost.

8 Contractor shall provide a detailed programme (Itinerary) showing details of inspection, travelling, and all other arrangement etc. required for the pre-shipment Inspection and submit to the Inspection team prior to departure. Contractor shall discus the inspection programe with the inspection team and shall be agreed with the Pre-shipment Inspection team.

9 NWSDB Engineers shall inspect and test DI pipes, fittings, specials, accessories and valves, pumps and motors etc. the as per the attached check list for pre shipment as given in Appendix 12. Manufacturers should perform any other tests which may be required by the NWSDB Engineers.

10 Nominated inspection agency should be present during pre-shipment inspection by the NWSDB Engineers and should assist the NWSDB Engineers for the testing and inspection

11 Any inspections carried out by Inspection Agencies or NWSDB shall not relieve the Contractor of his obligations under the Contract.

12 Contractor/Manufacturer shall not deliver / dispatch materials from the Factory or Stores without approval of the Engineer.

(ii) A draft Quality Plan which demonstrates that the design, manufacturing, testing, production and delivery requirements of the Contract, and the standards to which the equipment and materials to be manufactured are understood, is to be submitted. The Quality Plan shall include the following as appropriate.

* design of all water supply and treatment systems included in the Contract;
* procurement of equipment, components and raw material;
* calibration of test equipment;
* sampling, destructive/non-destructive testing, frequencies of sampling and testing;
* inspection procedures;
* rectification of non-conformities;
* record systems;
* inventory control, packing;
* proposed production, transportation and delivery program; and

site safety plan for all construction activities.

**EMPLOYER’S REQUIREMENT**

**PART 2**

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**EMPLOYER’S REQUIREMENT**

**part – 2**

# 6.2 Particular Scope of the Work and Specifications

### *6.2.1 Employer’s Requirements Stated in the CIDA Conditions Of Contract*

The present Section refers to the contractual issues of the Employer’s Requirements referred to in the CIDA Conditions of Contract.

#### 

#### *Scope……………………………… ………………………………………………………………*

#### *(Please describe)*

#### *6.2.1.1 Employer’s Equipment and Free issue Material, Sub-Clause 4.20*

The Employer shall not make available any Equipment or Free Issue material for use by the Contractor including the chemicals used for treating the water during commissioning, trial operation and taking over of the Works. For the avoidance of doubt the word chemicals shall be taken to mean all chemicals used in treating raw water to achieve the treated water quality, such as Aluminium Sulphate, Polyelectrolyte, Chlorine and Lime. Electricity for commissioning and operation & maintenance shall be provided by the Contractor.

#### *6.2.1.2 Contractor’s Documents, Sub-Clause 5.2*

## Refer Section 6.3.2

#### *6.2.1.3 Training Sub-Clause 5.5*

The Employer shall make available suitable plant operators and required operational personnel to the Contractor during the commissioning tests and trial operation of the Works. The Contractor shall train the personal in the day to day running of the plants and Works giving them access to all parts of the plant. It will be the duty of the Contractor to provide training for the Employer’s Operation staff such that they are competent to properly operate the plant. Training of operational personnel shall be provided as hands on training on the plant to suitably experienced or qualified Employer’s personnel.

Training on Water Treatment Process, Water Treatment Plant Designs, SCADA System, Automation and other related works in a developed South Asian Country acceptable to the Employer for on the job training for not less than forty (05) NWSDB Engineers and other relevant officers as detailed in the section 6.3.5.

#### *6.2.1.4 As-Built Documents, Sub-Clause 5.6*

The Employer will require one (01) softcopy and three (03) hard copies of all “As-Built” drawings and documents within 56 days of the date that the Taking Over Certificate is issued for the entire Works. Details are given in Section 6.1.13.

Prior to the final As-Built drawings being available, the Contractor shall keep all construction drawings updated to show as installed status and shall have these drawings available for the Engineers’ review during the pre-commissioning tests, the commissioning tests and the trial operation prior to taking over.

#### *6.2.1.5 Tests on Completion Contractors Obligations, Sub-Clause 9.1*

The trial operation shall both demonstrate and prove that the Works are capable of producing treated water …………m3 / day. The trial operation shall demonstrate that the water treatment plant is able to treat the flow over a seven day period to produce treated water that complies with the treated Water Quality the Standards specified in SLS 614 (1983) whilst the receiving Raw Water Quality falls within the Raw Water Quality parameters detailed in **Appendix 2 of Section 6.6**.

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Contractor shall be required to perform series of plant testing specially during the extreme raw water quality condition.

Therefore, during the defects liability period, it is the responsibility of the representative of contractor to operate the treatment plant for the extreme raw water quality conditions.

The Contractor shall also demonstrate that the Process Unit operations & Treatment Plant Equipment perform according to the Design requirements of **Section 6.3.2**.

Contractor shall provide all softwares used for operation of SCADA system and others equipments with license for 5 year period.

GENERAL SPECIFICATIONS (attached separately)

Civil Engineering Works

Mechanical Engineering Works

Electrical Engineering Works

#### *6.2.1.6 Protection of the Environment, Sub-Clause 4.18*

Contractor shall not dump the excess materials or demolished materials in any location without the approval of the Employer. Any waster including sludge shall be disposed to meet CEA requirement.

## *Facilities for Employer’s / Contractor’s Supervision Staff*

The Contractor shall provide facilities as described in **Section 6.5** for Supervision Staff.

**PART 3**

# 6.3 Performance Requirement

*(Note : This section shall be modified to suit the Project when Document is prepared)*

The project is to implement a new water supply scheme to cover the ……………. Development area. By developing pipe water supply scheme & providing safe and reliable water to the project area, the project aims to support smooth & timely implementation of the ……………………. plan and contribute to the industrial development and economic growth in the project area. It has been planned to implement the project in ……… stages.

It is expected to produce ………… m3/day of treated water and to distribute to all new area after construction of new treatment plant, reservoirs./tanks and laying of transmission & …….km length of DI/PVC/PE pipes in distribution system.

This Design-Build contract is called for the investigation (including soil investigation, hydrogeological investigations, surveying, etc.), design, construction, testing, commissioning, operation & maintenance of the project and completion of the project and the given below are the project components and the services required.

The scope of work includes:

### *6.3.1 Phase 1 : Preliminary*

### 6.3.1.1 Insurance as per Clause 18 of General Conditions of Contract.

### 6.3.1.2 The facilities for employers staff as per Section 6.5.

#### *6.3.1.3 Transport facilities for employer’s staff.*

as per Section 6.5 (……. Nos. new double cabs with A/C, ……No. hiring van with 12 seats and registration date should be less than 3 years, 01 No. new saloon car with A/C as the minimum).

### 6.3.1.4 Communication facilities as per Section 6.5.

### 6.3.1.5 Necessary specialists, staff and expertise for project management and construction supervision.

Safety precautions

### *6.3.2 Phase 2 : Design*

*General*

The Contractor shall submit Construction Documents to the Engineer.

It is a requirement that the Contractor submits the Preliminary Design for the approval of the Engineer. The Preliminary Design shall consist of the following documents:

* Site Soil Investigation drawings
* Site Hydrological and sub surface investigation details and drawings
* Site topographical and LS Survey drawings
* Site General Arrangement drawing
* Process Design
* Civil works outline drawings
* Treatment plant hydraulic profile drawing
* Plant & Instrumentation Diagram
* Pipe Network Design
* Longitudinal Drawings
* Method Statements for construction work
* Method Statement for pipe laying works
* Sludge Treatment Process

From the approved Preliminary Design other documents shall be submitted for review as per the scheduling hereunder.

#### *6.3.2.1 Civil Work Detail Design*

During the Civil design stage, Civil Detail Design Drawings for construction will be produced. For major structures a “civil design folder” shall be produced including the Reinforced Concrete detail drawings.

Documents for review will be:

* Civil Design folders complete with calculations and detailed General Arrangements and Reinforced Concrete drawings.

#### *6.3.2.2 Process, Plant and Equipment Detailed Designs*

All process plant and equipment selected by the Contractor and mechanical General Arrangement drawings will be in line with **Section 6.2 and 6.3 of Part 2 of the Employers Requirement**.

Documents for review will be:

* Equipment & process and plant & equipment submittals
* Mechanical General Arrangements

#### *6.3.2.3 Electrical and Instrumentation Detailed Design*

Electrical and Instrumentation Detailed Designs shall proceed in parallel to process plant and equipment design and shall be in line with **Section 6.2.**

Documents for review will be:

* Electrical Equipment submittals
* Electrical load analysis
* Single line drawings
* Power block diagrams
* Plant & Instrumentation Diagrams
* Installation Drawings

A basic concept is given in the bidding documents in order to clarify the requirements and the Employer's choices. The Contractor will be responsible for design of the treatment process, the overall and specific arrangements of the different structures and buildings, their dimensions and the choice of equipment. Contractor should carry out Investigations and surveying in all sites and along the proposed transmission and distribution system.

* Intake at ………….. & Raw Water main to water treatment plant shall be designed considering full demand of ………..m3/d. However provisions shall be made to install future pumps for stand by operations.
* Water treatment plant shall be designed for ………… m3/d capacity. However, space shall be provided in WTP lay out plan to expand capacity up to ………… m3/day.

WTP lay out shall be drawn clearly indicating the expanded capacity too.

* …………m3 Clear Water reservoir, High lift Pump House, Chemical House, Workshop, Laboratory and Stores, Office Facilities shall be designed to suit the designed demand of …………m3/d. Floor area requirements of buildings shall be as follows.

|  |  |  |
| --- | --- | --- |
| **Item** | **Building** | **Minimum Area required (m2)** |
| 1 | Workshop | 170 |
| 2 | Stores | 120 |
| 3 | Quarters-Plant Technician | 4 x 100 |
| 4 | OIC /EAA | 4 x 100 |
| 5 | Pump Operator | 3 x 70 |
| 6 | Laboratory& office | 125 |

* Other component of WTP shall be designed to suit the demand of ……….m3/day.
* All transmission mains to Ground reservoirs and towers shall be designed considering the total demand (Please refer the Section 12 for conceptual Schematic Diagram of Transmission System).
* Raw Water Pumps to Water Treatment Plant from Intake
  1. No. of pumps to be installed - ……….
  2. Pump operation - ……………..
  3. Pump capacity - Pumps shall be selected to provide ………. m3/d at ………….(m) head ……nos pump operation
  4. Mode of operation - Variable speed / fixed (select the suitable)
  5. Provision shall be made to install …… nos pumps in future.
* Pumps for the treated water transmission system shall be selected as follows (Please refer the Section 12 for conceptual Schematic Diagram of Transmission System).
  + 1. Pumps to ……….m3 Ground Reservoir (G1) from WTP

1. No. of Pumps to be installed in stage I - ……..
2. Pump operation in Stage I - 01 duty / 01 Stand by
3. Pump Capacity -The pump shall be selected to provide

………….m3/day at two pump operations

1. Mode of Operation - Variable Speed / fixed (select the suitable)
2. Provision shall be made to install two pumps in future
   * 1. Pumps to ………..m3 Tower at ……………… (T1) and ………m3 Tower ………….. (T2) from ………….m3 Ground Reservoir (G2)
   1. No. of Pumps to be installed in stage I - ……..
   2. Pump operation - ………………
   3. Pump Capacity -The pump shall be selected to provide

…………m3/day at ……. pump operations

* 1. Mode of Operation - Variable Speed
  2. Provision shall be made to install two pumps in future
* Design of Distribution system consisting of DI/PE pipe lines of diameter …..mm to ….. mm approx. length of ……km.
* The studies concerning the treatment process of raw water made available at ………………………*(specify if available)*
* The general design of the plant and the corresponding associated facilities,
* The definition of the equipment to be installed,
* Surge analysis of transmission system shall be studied,
* The construction studies for the civil engineering works and erection,
* Studies for the distribution and transmission system including network analysis and preparation of drawings and design. Length of transmission pipes is approximately ……. km. Length of distribution pipes is approximately ……..km. (DI/PE).
* Efficiency and consumption studies, energy saving studies.
* The contractor shall submit soft copies and hard copies of detail Civil Engineering Drawings, Structural & Hydraulic design calculations for the every component of the Project. Structural Designs should be carried out to the latest British Standards.
* Process network & internal piping work.
* Studies for the Treatment Plant SCADA system

The following parameters will be taken into account:

* Natural parameters to be taken into consideration
  + quality of raw water source and seasonal variations,
  + hydro-climatic conditions,
  + topography and geotechnical data of the site.
  + Buried network/utilities of the site
    - Parameters imposed by the Employer
  + plant instantaneous flows,
  + daily production,
  + required quality of treated water,
  + plant raw water supply method,
  + method of delivery at the plant outgoing pipe,
  + required storage volume,
  + level of automation based on specified functional analysis.
* The studies for the treatment plant SCADA system.

The employer’s functional requirements are given below. Contractor should design the system inclusive of them but not limited to them.

1. Functions requirement through SCADA system.

1. Controlling functions
   1. Raw water flow.
   2. Treated water flow to ……….. m3 reservoir
   3. Treated water flows to ……………………………………….. towers
   4. Treated water flows to ……………………………………….. GR, existing tower
   5. Chemical feeding rates.
   6. C12 feeding rates (pre and post)
2. Operating functions
   1. Operation of pumps to towers, reservoirs and existing Ground reservoirs and towers
   2. Filter Backwashing
   3. De-sludging at sedimentation stage.
   4. De-sludging thickened sludge
   5. Recirculation of supernatant of backwash recovery tank
3. Monitoring functions
   1. Raw water level
   2. Raw water turbidity
   3. Raw water pH
   4. Residual chlorine after pre-chlorination.
   5. Settled water turbidity
   6. Final water turbidity
   7. Final water pH
   8. Final water Residual Chlorine
   9. Clear water tank level
   10. All tower water levels
   11. All ground reservoir water levels
   12. Flows to each tower ./ground reservoir

2. Other control requirements

Mechanisms to avoid tower /ground reservoir overflows.

3. Standby requirement

a) Raw water and treated water pumps: 100% Stand-by required   
 b) Filter wash water pumps: 50% standby required.  
 c) Filter air blowers: 100% standby required.   
 d) Chemical dosing pumps for each chemical, one standby unit for each pump   
 size.   
 e) Chlorinators: 100% standby required.   
 f) Alum Storage Tank : 100% standby required   
 g) Lime Storage Tank : 100% standby required

1. Fine screen & micro screen: Capability of operating the plant with 50 % of the facility
   * Requirement of garden lights
2. Treatment Plant

…… Nos. 200W Sodium Vapour Lamps with 6m high GI steel poles or higher

quality.

1. All Tower sites

05 Nos. 200W Sodium Vapour Lamps with 6m high GI steel poles or higher

quality.

1. All Ground Reservoir sites 05 Nos.

200W Sodium Vapour Lamps with 6m high GI steel poles or higher

quality.

1. Intake site

08 Nos. 200W Sodium Vapour Lamps with 6m high GI steel poles or higher

quality.

* Protections

“Latest BS/International Standards shall be applied for designing following protection requirements.

Electric surge protection

Lightning protection

Earth protection

### *6.3.3 Phase 3 : Construction*

The site installations

1. The contractor will be responsible for all the organizational work and temporary installations. Temporary water and electricity supply, including consumption during the works will be provided by Contractor.
2. Site clearing in all sites and along pipe line trace.

The Contractor will construct;

1. Raw water intake including a control gate across the canal, micro strainer to limit inflow of algae and low lift pump station of capacity …………… m3 at an identified position.
2. Water treatment plant of capacity ……………….. m3/d.
3. A high lift pump station closer to the clear water tank of …………. m3 at the treatment plant site.
4. Supply & laying of ………. mm diameter DI/PE raw water transmission pipe line approx. length of …….km from intake to treatment plant.
5. Supply & laying of …… mm DI/PE, 450mm DI/PE, ……… mm DI/PE, 300mm DI/PE, ………mm DI/PE and ……….. mm DI/PE clear water transmission pipe lines of approx. length of ……..km, …….km …km, …..km, ……..km and …… km respectively.
6. Supply & laying of DI/PE pipe lines distribution system & DI/PE pipe lines of diameter ……. mm to …… mm approx. length of ……. km. Approximate lengths of pipes are; 400.mm – ….. km, 350mm –……km, 300 mm – ……km, 250 mm – ……km
7. A ………..m3 capacity under ground tank and ……… m3 capacity …. nrs under ground tank with booster pump station
8. ……….. m3 capacity elevated towers -……. nrs.
9. Supply & installation of pumping sets and accessories, surge vessels etc. at various locations as required.
10. Supply and installation of HV equipments (Complying to BS standard)including transformers, switch gears, protections and other accessories, to obtain power supply to all pumping stations, treatment facilities and ground reservoirs & towers. (NWSDB will arrange to make available HV supply to the locations under project cost)
11. Acceptable pump types

Raw water pump - Vertical shaft driven, axially split, centrifugal pump

in dry well

- Maximum motor is RPM - 1000

Treated water pumps - Single stage - Split casing centrifugal

Single stage - End suction centrifugal

(Maximum motor RPM 1000, if vertical shaft

driven type)

Chemical pump - Diaphragm type

Sludge pump - Progressive cavity pump

Acceptable pump casing– Cast Iron /Ductile Iron. Grade to be

material decided to suit the requirement

Flow meter type – electro Magnetic

1. Yard piping, fire fighting, internal roads up to existing main road, boundary fence, gates, toilet & bathrooms, yard lighting, emergency lighting, communication facilities, domestic water supply, overflow and storm water drainage up to existing water flow and landscaping for all sites.
2. 8 nos. quarters, office, workshop, stores, laboratory for Water Treatment Plant site and 1 no. quarters at intake site, 1 no. at ……m3 Ground Reservoir site, ………….
3. Security huts, transformer rooms where necessary
4. Chlorine Neutralization unit installed at Water Treatment Plant to be used in an emergency.
5. Sludge treatment process complied with CEA approval
6. Sludge thickener and drying beds & connection to the outside drain
7. Back wash water recovery system
8. Permanent road reinstatement along pipe line traces
9. Pressure testing /disinfection of pipes
10. Testing of structures for water tightness
11. Lifting requirements shall be inclusive of followings but not be limited to them.

|  |  |  |  |
| --- | --- | --- | --- |
| **Location of lifting** | **Facility needed** | | |
| **Hoist travelling** | **Trolley travelling** | **Bridge travelling** |
| Raw water Stop log | Manual | Manual | --------- |
| Fine screen, micro screen, Sludge removal in intake well | Electrical | Electrical | Manual |
| Raw water pumping station | Electrical | Electrical | Electrical |
| Treated water pumping station at WTP | Electrical | Electrical | Electrical |
| Chemical building at Treatment plant | Electrical | Electrical | ---------- |
| Chlorine building at WTP | Electrical | Electrical | ---------- |
| Chlorine building at …….. m3 tank | Electrical | Electrical | ---------- |
| Backwash pump House | Electrical | Manual | Manual |
| Pump house at ………. m3 tank | Electrical | Electrical | Electrical |
| Workshop | Electrical | Electrical | Electrical |
| Stores | Manual | Manual | --------- |

*(Note : The system shall be changed depending on the condition)*

1. Testing and commissioning of all electro-mechanical installations
2. Testing and commissioning of SCADA system including all remote sensors and PLC of the treatment plant.
3. Testing and commissioning of process and establishment of guarantees
4. Revising and adjusting SCADA system to suit employer’s requirement after commissioning
5. Generators for Intake site, WTP site & ………. m3 capacity Ground Reservoir sites. Storage capacity for fuel tank is such that 48 hrs storage capacity shall be provided to utilize in case of power interruption.
6. Include chlorinators with following facilities at WTP & ………… m3 GR/Towers. Vacuum type Chlorinator with vacuum regulator, Ejector, Booster pumps, Leak detector, Auto shut off valve, Auto changeover and duel cylinder weighing scale with all other ancillary equipments for efficient operation and maintenance
7. Installation of mechanical and electrical equipments for all sites
8. Installation of SCADA system and intercom system for WTP
9. The contractor shall use technically most suitable data transferring methods for transferring data among required stations to ensure reliability of the system.
10. Installation of surge protection equipment for pipe line and electrical/electronic equipment; where necessary
11. Installation of micro strainer at intake site (if required to control the algae inflow)
12. Operational safety and health requirements shall be included for following facilities and the operators who handle those facilities.
    1. For chlorination system
    2. For chemical systems
    3. For pump houses
    4. For other plant buildings
    5. For electrical/Mechanical/Electronic equipment

*The contractor will submit/handover;*

1. Design and operating analysis of the treatment process with sufficient justifications
2. Site layout, plant layout, schematic, scheme layout, etc.
3. Detailed design calculations (hydraulic and structural) for each and every component of the Treatment Plant, Intake, Ground Reservoirs, Water Towers, etc.
4. Detailed calculations for network analysis and network analysis of Transmission/Distribution system. Electronic version together with the licensed copy of Analysis Programme.
5. The mandatory spare parts given in the form TEC-12 of section 5.0 shall be provided for each relevant item supplied/installed under the contract. For each & every equipment, bidders shall furnish list of spare parts inclusive of prices of them with the bid in the format given in the form TEC-12 of section 5.0

In addition, bidders shall provide manufacturers recommended spares for five years operation, but which are not covered by the mandatory spares for the each & every item. Details of these spares shall be provided as per the format given in the form TEC-12A of section 5.0

1. The laboratory equipments given in the form TEC-12B of section 5.0 shall be provided by the contractor. At bidding stage each bidder shall provide itemized price list for these items.
2. mandatory spare parts for equipment, pipes, etc. for 5 years maintenance period after commissioning
3. as-built drawings
4. detailed instrumentation P&I diagrams, design calculations for instrumentation including catalogues, technical literature and certified true copies of ISO standards/BS/BSEN Standards which are used for the designs or specified in catalogues, etc.
5. Details of Lightning protections, electrical surge protections, Harmonic protections and fire protection (calculations are required).
6. detailed electro-mechanical drawings, detailed design calculations, etc. for relevant component of the project including catalogues, technical literature, test certificates and certified true copies of ISO standards for all equipments.
7. Maintenance schedules and manuals illustrating each and every component and giving detailed procedures of assembling/dismantling, trouble shooting such that Employers, Engineers/EAA and mechanics can attend for repairs their own …….
8. Temporary storage facilities shall be provided by the contractor & disposal material to be placed at approved sites by the Engineer.

### *6.3.4 Phase 4 : Three months for Operation and Maintenance*

* Testing of process during operation & maintenance period
* Transmission network to be tested early stage of operation & maintenance period to confirm that transmission system is functioning as per the designed model.
* Operation and Maintenance of the treatment plant and the SCADA system during the first year after completion.
* Staff training for Engineers, Engineering Assistants and Technical Officers, chemists and WTP operators.
* Detailed statement of operation (water, reagents, energy, labour, servicing and renewable equipment).
* 03 months operation and maintenance of the works after commissioning and training of NWS&DB staff for operation and maintenance and the SCADA system.

Note: On completion of the three month's operation, the definitive operating statement will be compared with the forecast statement submitted.

### *6.3.5 Overseas training of NWS&DB Engineers.*

Overseas Training for not less than two weeks duration per each NWSDB Engineer/Officer on Water Treatment Process Design, Planning & Designs of Water Treatment Plants, Water Supply Schemes, SCADA System, automation and other related works for NWSDB Engineers and other relevant officers for on the job training in a developed South Asian Country. Number of officers shall not be less than forty. Contractor shall provide cost of training and all necessary facilities and other minor expenses and arrange all Visa, permits and such other things, air fare, taxes, travelling expenses, transfer fees, accommodation on full board basis, travelling within the country and all other legitimate expenses and per diem to incidental and subsistence allowances.

### *6.3.6 Others*

* To allow for a defect liability period of 24 months after commissioning and taking over by the Employer.
* Continuation of local process Engineer for assistance to operation and maintenance

### *6.3.7 Basic Data*

#### *6.3.7.1 Description of the Project background and Existing WSS*

The existing WSS provides drinking water to …………………….. Urban Council …………………….. Pradheshiya Sabha, …………………….. Pradeshiya Sabha and few communities located at the periphery in …………………………………, …………………….., and ………………………….. Pradeshiya Sabha areas and along …………………………………….. road from ………………………….. to ……………………......... The present system delivers water about ……… m3/day to the consumers with …….. individual connections and …… nos. of stand posts for the population about ………….. and there are about ……….. nos. of commercial consumers.

The original source for the ……………… WSS is ………………. at ……………..

Existing intake is situated …… km away from the treatment plant ………. mm dia DI/PE water main is used to pump water from Intake.

Water from old treatment plant is pumped to elevated water towers at …………….. and …………. with capacity of each ………m3 and ………… m3.

Water from new treatment plant is pumped to elevated water tower at …………….and ……………with capacity of …….. m3 and ………. m3 respectively.

At present consumers in …………………………………….. local authority limits gets about ………. hr/day supply where as the consumers out side the limits get only limited hours due to insufficient residual pressure of the distribution mains. Even though there is a high demand for extension of existing pipe lines to new areas, they are not encouraged due to the insufficient capacity of the schemes. As there are very old pipes also in the system the percentage of non revenue water is about ……….. The present demand of ………………………………………… is about ………. m3/d (port, harbour, Airport, Oil Refinery)

#### *6.3.7.2 Meteorology*

Rainfall

Daily rainfall is recorded at ………. stations within the boundaries of the project area. These stations are maintained by either Meteorological Department or the Irrigation Department and historical records are available. Long-term average monthly rainfall for selected stations influencing the ……………….. Project Area is given below.

The Project area lies in the dry zone and the annual rainfall is less than ……… mm and as a long term average mostly lies below ………. mm.

The rainfall in the project area is mostly bimodal with precipitation during two seasons NE and SW with inter-monsoonal rains between.

Average Monthly Rainfall (mm) for selected stations influencing …………………… Project Area.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Station | Period | Jan. | Feb. | March | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Annual Total |
| ………………………… | 1980/84 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/93 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/95 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/99 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1989/99 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/04 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1983/04 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/04 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1964/04 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| ………………………… | 1961/04 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |
| Udawila | 1961/91 | ……. | ……. | …….. | …….. | …….. | …… | ……. | ……. | …….. | …….. | …….. | …….. | …….. |

…….. main rivers ……………….., ……………….. and ……………….. traverse parallel and the project area lie between ……………….. and ………………...

## 

### *6.3.8 Performances and Requirements*

#### *6.3.8.1 Production requirements*

The minimal required daily output is ………… m3 .

Considering a total daily production during 22 hours by day, **the instantaneous treated water flow rate required is** ………… **m3/h** (………… MGD).

The production however will be continuous, 24 hours a day.

#### *6.3.8.2 Admitted treatment reagents*

Following reagents will be used for water treatment:

* Chlorine gas,
* Poly Aluminum Chloride:
* Aluminium sulphate (solid form) : Al2(SO4)3, 18 H2O,
* Activated carbon (powder form) / Granular Form
* Lime (powder form): Ca(OH)2.

#### *6.3.8.3 Plant outflows*

All the plant outflows, namely:

* sludge produced by the clarification stage,
* washing water from sand filters,(supernate to be re-circulated)
* overflows from aeration tank, filters and treated water tank,
* clean or waste water from the different treatment stages,

will be sent to the sludge collecting tank and then discharged to the Waste Treatment Plant.

The Contactor will propose, in option, the construction of a sludge thickening unit composed of;

* a sludge thickener,
* drying beds,
* and sludge collecting tank,

in order to treat sludge produced by the clarification stage.

#### *6.3.8.4 Drinking water quality requirements*

Drinking water quality shall comply with:

* the Sri Lankan Standard (SLS 614 : Part 1 and Part II : 1983),
* and the World Health Organisation (WHO) requirements for the parameters which are not given in SLS 614.

Contractor will have to design the treatment process to comply with the maximum desirable parameters detailed below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameters** | **Unit** | **Maximum desirable level** | **Standard considered** |
| pH |  | 6.5 to 8.5 | SLS |
| Color | mg/l Pt-Co | 5 | WHO |
| Turbidity | NTU | 2 | WHO |
| Alkalinity | mg/l | 200 | SLS |
| Total Hardness | mg/lCaCO3 | 250 | SLS |
| Free Ammonia | mg/lNH4 | - | SLS |
| Ammonia | mg/l NH4 | - | WHO |
| Phospates | mg/l | - | SLS |
| Nitrate (as (N) | mg/l | - |  |
| Nitrate As(N) | mg/l NO3 |  | WHO |
| Sulphate | mg/l SO4 | 200 | WHO |
| Sodium | mg/l Na | - | WHO |
| Iron | mg/l Fe | 0.3 | SLS |
| Total Iron | mg/l Fe | 0.3 | SLS |
| Calcium | mg/l | 100 | SLS |
| Magnésium | mg/l | 30 to 150 | SLS |
| Copper | mg/l Mn | 0.05 | SLS |
| Manganese | mg/l Mn | 0.05 | WHO |
| Aluminium | mg/l Al | - | SLS |
| Fluoride | mg/l F | 0.6 | SLS |
| E.Coli | /100ml | - | SLS |
| Chem.Oxygen Demand | mg/l | - | - |

The drinking water treatment plant, including water treatment, sludge treatment, filter washing water and other outflows treatment shall be designed to allow continuous treatment of raw water with the characteristics mentioned above.

The treatment plant must achieve the drinking water specifications as required in 6.3.3.4, and in the operation conditions detailed in 6.3.3.4.

#### *6.3.8.5 Operating balance sheet*

### At the stage of bid

The Contractor will provide in his bid a detailed breakdown of the consumption costs per m3 of treated water. The cost breakdown will take into account:

* Chemicals for water and sludge treatment,
* Power,
* Spare parts and maintenance costs.

Labour and staff will be excluded.

### Three month operation

After the three month of operation, the Contractor will provide a complete operating balance sheet.

Labour, running and maintenance staff, energy, reagents and consumption will be at the Employer's duty but taken into account in the operating balance sheet.

### *6.3.9 Testing and Checking of Works and Equipment*

#### *6.3.9.1 Inspection and testing during manufacturing and Pre-shipment*

(i)

|  |
| --- |
| The Contractor shall arrange for 2 NWSDB Engineers per inspection for pre-shipment inspection visits to place of manufacture before dispatching the DI Pipes, fittings, Valves, Specials and Accessories, pumps and motors, chemical dosing equipment, chlorinators, pressurized tanks, surge vessels, Generators, air compressors, vacuum pumps, HV/LV Transformers, HV switch boards, LV electrical cabinet, gun sets and all motors, SCADA Systemand other related equipment listed below;  Each shipment should be inspected by NWSDB Engineers before dispatching at Manufacturer’s factory in the manufacturer’s country.  The Contractor shall in his bid provide detailed proposals for pre-shipment inspection visit he offers to provide under this clause. The following guidelines shall be used by the Contractor to formulate his proposals. |
|  |

Revised on 09-11-2015

Revised on 29-06-2016

|  |  |
| --- | --- |
| a) | The duration of inspection for each officer shall not be less than ten days for pipes & fittings, pumps and other Mechanical and Electrical equipment, excluding Travelling to the Manufacturer’s country and back. |
| b) | The inspection at the specific manufacturer shall include;   * + A general introduction to the manufacturer’s country, area, town & source of materials.   + introduction to design standards and procedures adopted.   + introduction to relevant procedures and quality control standards.   + manufacturing process, and Quality Assurance procedure.   + testing procedures, mill certificates, product conformity certificate, Quality Management System Certificate and any other relevant certificates, etc. regarding the products.   + packing & dispatching procedure   + Site visits to inspect installed similar products. |
| c) | The officers shall be guided by Technical Experts/Engineers and Quality Controllers who are also competent in English language. |
| d) | All visas, Insurance (life, Health and Travel) air fares, permits, taxes, transfer fees, travelling within the manufacture’s country and all other facilities required to carry out pre-shipment inspection at the manufacture’s factory /premises shall be arranged and paid for by the Contractor and shall be included in the rates and prices of the contract. |
| e) | Each officer shall be paid a per diem to include combined allowances the amount specified in the schedule 01 of the Ministry of Finance circular M.F. 01/2015/01 Dated 15-05-2015 (Refer Appendix 19 for details) prior to departure. |
| f) | The officers shall be provided with printed catalogues, manuals, illustrative videos etc., relevant to the manufacturing process and also obtain extra information requested by them, and shall arrange to dispatch these to NWSDB Engineers, by the Contractor at his own cost. |
| g) | Contractor shall provide a detailed programme (itinerary) showing details of inspection, travelling, and all other arrangement etc. for the pre-shipment Inspection and submit to the Inspection team prior to departure. Contractor shall discuss the inspection Programe with the inspection team and shall be agreed with the Pre-shipment Inspection team. |
| h) | NWSDB Engineers shall inspect and test DI pipes, fittings, specials, accessories and valves, pumps and motors etc. the as per the attached check list for pre shipment as given in Appendix 12. Manufacturers should perform any other tests which may be required by the NWSDB Engineers.  Revised on 08-05-2017 |
| i) | Nominated inspection agency should be present during pre-shipment inspection by the NWSDB Engineers and should assist the NWSDB Engineers for the testing and inspection. |
| j) | Any inspections carried out by Inspection Agencies or NWSDB shall not relieve the Contractor of his obligations under the Contract. |
| k) | Contractor/Manufacturer shall not deliver / dispatch materials from the Factory or Stores without written approval of the Engineer. |

(ii) A draft Quality Plan which demonstrates that the design, manufacturing, testing, production and delivery requirements of the Contract, and the standards to which the equipment and materials to be manufactured are understood, is to be submitted. The Quality Plan shall include the following as appropriate.

* design of all water supply and treatment systems included in the Contract;
* procurement of equipment, components and raw material;
* calibration of test equipment;
* sampling, destructive/non-destructive testing, frequencies of sampling and testing;
* inspection procedures;
* rectification of non-conformities;
* record systems;
* inventory control, packing;
* proposed production, transportation and delivery program; and
* site safety plan for all construction activities.

The Contractor shall submit to the Engineer the report of all the factory tests, including all the conditions of testing, methods, measuring, results and graphs.

### Same team will test on details after incorporating to works. The contractor shall submit factory test reports including manufactures test certificate.

#### *6.3.9.2 Testing during the Construction Phase*

### Concrete Tests

All concrete tests shall be carried at according to the specifications

(a) Materials (Cement, sand, coarse aggregates, reinforcements, admixtures, curing agents, and like things which are incorporated to prepare concrete)

(b) Tests during preparation of concrete, placing of concrete and strength tests at

various time intervals

(c) Tests after gaining strength if required by the Engineer.

#### *6.3.9.3 Tests on Completion*

##### *6.3.9.3.1 Testing of Civil Works*

#### *Water tightness testing of water retaining structures*

Water tightness tests must be carried out on all liquid retaining structures, after installation of pipes or sealed parts through the walls.

Concrete structures being supposed to be impervious, test for water tightness shall be carried out before the application of any waterproof coating, to detect any main cracks of the concrete.

Final test will be performed after application of surfacing waterproof coating.

Testing shall be carried out before any backfill is placed around the concrete structure. If fill has been placed during the test, the Contractor must take into account of level of groundwater table.

In case of structure with several compartments, each one of them must be filled at the same time and to the same level, and then emptied one by one, in order to observe the behaviour of the partition walls.

These tests should be carried out by the Contractor prior to the issue of the taking over certificate, under the control of Engineer and with agreement of the Employer.

If parts of work are not satisfactory, the Contractor must propose curing methods to the Engineer in order to make the work acceptable, and the Contractor shall carry out such work at his own cost. A new testing shall be carried out.

These tests, supply of water and emptying, will be at the responsibility of the Contractor and at his own cost.

The test shall be carried out according to the following standard : "Requisition for the Civil Engineering tanks construction" (ITBTP – 10/6/66 - § 3.3 – Article 3 Tests) or BS 8007.

First filling will be carried out as directed by the Contractor, to insure a gradually filling with water.

Ten days after the end of filling of the structure, the water level shall be brought up in order to compensate water absorbed by the walls.

If any drop in water level is jointly noticed other than due to evaporation, leakage measurements must be carried out at least 15 days after the end of structure filling.

A rain gauge and an evaporometer will be installed on site.

The ground water level will be checked during the measurement, when there is fill around the buildings.

In the case of a high water table, seepage can occur from the outside to the inside of the building.

Buildings will be filled to the maximum level.

#### *Test of stability of the tanks*

This test shall be executed for all the tanks.

Altimetric points of the buildings will be reported, before and after filling.

Controls of building settlement will be performed by the Contractor at his own cost.

These controls are obligatory only for tanks built on special foundation and on foundation grounds with a safe load less than 1 bar.

#### *Water tightness Testing of Pipelines*

The test for checking the water tightness of pipes shall be as specified in **paragraph 3.4 of Section 6.4** (General Specifications for Civil Engineering).

Welded pipe lines and piping elements shall designed to remain watertight under a test pressure at least equal to 1.5 maximum service pressure.

##### *6.3.9.3.2 Testing of Equipment*

#### *Testing of Pumps*

Pump performance test shall be carried out as specified in standard "BSENISO 9906:2000”

The maximum power absorbed by the pump at the contractual(s) point(s) shall not exceed 90% of the designed power of the motor.

The Contractor shall join to its report the factory test graphs.

Vibration test shall be carried out in accordance with ISO 2372 - 1974

#### *Testing of Flow meters and Analyzers*

Before testing the drinking water treatment plant, all flow meters and analysers should be checked.

⮚Flow meter checking

* Measurements of water flow rate on pipes under pressure : they shall be carried out using a ultrasonic flow meter, or if possible, by checking volumes of water and the time for filling or emptying a water structure between two levels.
* Measurements of chemical flow rate : they shall be carried out by measuring the emptying or filling time of a gauged tank.
* Measurements of scour air : they shall be carried out by checking the operation time of air compressor, and pressure.

Note : Agreement by COFFRAC or an equivalent recognized institution to be supplied by the Contractor.

⮚Analyser checking

Analyzers that give the value of the parameters to determine the quality of raw water and drinking water will be checked by sampling the water, which be analyzed in the laboratory.

The readings of analyzers during sampling will be compared with the results of the analyses carried out in the laboratory.

For checking of the pH and the temperature, mobile recording apparatus will be used.

#### *Inspection and Testing of Electrical Equipment*

Before starting of the electrical equipment, the Contractor has to present a conformity certificate to CEB conform to the specifications and standards in force.

The Contractor has to submit the installation to an approved control body for checking.

All defects, if any, will be corrected.

2 copies of the report will be sent to the Engineer.

If a new control is necessary, all expenses will be borne by the Contractor.

#### *Inspection and Testing of the SCADA System*

All systems (PLC, computers, personal computers, SCADA systems, networks) shall be tested during commissioning period and during normal operating conditions.

Tests shall concern materials, parameters, programs and software.

The Contractor shall submit to the Engineer, 2 months before the tests, the complete list of tests for the whole of the operation, and corresponding procedures for the Employer's approval.

The run-through of the session is as follows:

The first step consists in checking that all the equipment conforms to the specifications: Logic controllers, communication front end device, network and circuitry, operator console, imagery, etc

The contractor will connect together all the control and instrumentation equipment in order to perform the communication tests. Then the "external data" will be input and must incorporate the system to be tested to allow testing under conditions as close as possible to reality.

The tests to be performed and the minimum tests required include:

* simulations of inputs, checking of associated actions (control, action on outputs, screen display, historical logging of action, printout),
* verification of system performance,
* verification of software performance,
* simulation of commissioning phases,
* modification of parameters on operator terminal (local or remote) and verification of required processing.

### *6.3.10 Water Quality Testing*

#### *6.3.10.1 General*

##### *6.3.10.1.1 Commissioning Procedure*

The sequence and requirements for the Tests on Completion and Tests after Completion shall be as follows:

1. Pre-commissioning trials;
2. Tests on Completion;
3. Tests after Completion for water treatment plants.

##### *6.3.10.1.2 Test Schedules and Records*

The exact form of the tests shall be agreed between the Engineer and Contractor. Prior to the commencement of testing the Contractor shall submit to the Engineer for approval a written test schedule detailing the proposed tests, procedures and method statements.

A draft schedule of tests shall be submitted to the Engineer at least eight weeks before the tests are programmed to commence.

The Contractor’s test schedules shall describe the sequence in which he intends to commission the various parts of the Plant taking into account the programme constraints and requirement to maintain the output of existing works throughout construction as specified elsewhere.

For any and every test which the Contractor is required to carry out pursuant to the Contract, the Contractor shall produce a written report, in a format approved by the Engineer, certifying that the test has been carried out and the result. The Contractor’s representative who carries out such tests shall sign the test record. The tests which are witnessed by the Engineer shall be countersigned by the Engineer upon the same record provided by the Contractor. The Contractor shall be responsible for collecting and collating all data into a bound report in an approved format.

##### *6.3.10.1.3 Test Equipment and Labour*

The Contractor shall provide all assistance, labour, materials, electricity, fuel, stores and apparatus and instruments necessary to carry out the tests efficiently.

Measuring instruments, indicators and other apparatus shall be approved by the Engineer. They shall be suitably calibrated in accordance with the relevant British Standard or equivalent Certification of testing by an acceptance authority shall be provided by the Contractor.

##### *6.3.10.1.4 Duty / Standby and Service Units*

Where units and items of plant are provided on a duty/standby basis each shall take an equal share of the duty during the tests.

For the purpose of the test, if so instructed by the Engineer, the number of treatment units in operation shall be reduced to obtain the maximum design loading rates on the units in service.

##### *6.3.10.1.5 Sampling and Analysis*

Discrete representative water samples shall be taken by the Contractor from designated points in the Plant. The sample location and sampling procedure shall be set out in the Contractor’s method statement and approved by the Engineer. Sampling shall be undertaken throughout the day, 7 days per week. The samples shall be divided into three equal portions, of at least one litre each, to enable the Contractor and Engineer to analyze independently if required and the third samples shall be retained in a suitable location for reference.

The Engineer shall be given the opportunity to witness all sampling and laboratory analysis performed by the Contractor.

The sample shall be analyzed by the Contractor in the Works laboratory for the following parameters:

(a) Raw Water - Turbidity

- True Colour

- pH

- Algae & residual Alum

(b) Clarified Water - Turbidity

- True Colour

- Total Aluminium

- Soluble Aluminium

- Algae & residual Alum

(c) Filtered Water - Turbidity

- True Colour

- pH

- Total Aluminium

- Algae & residual Alum

(d) Final Water - Turbidity

- True Colour

- pH

- Total Aluminium

- Free Chlorine

- Total Iron

- Total Manganese

- Algae & residual Alum

(e) Water for the distribution system - Turbidity

- True Colour

- pH

- Total Aluminium

- Free Chlorine

- Total Iron

- Total Manganese

- Algae & residual Alum

(f) Water for Reservoir - Turbidity

- True Colour

- pH

- Total Aluminium

- Free Chlorine

- Total Iron

- Total Manganese

- Algae & residual Alum

#### *6.3.10.2 Pre-Commissioning Trials*

##### *6.3.10.2.1 Scope of Trials*

The purpose of the Pre-commissioning Trials is to test and demonstrate reliable operation of all mechanical and electrical plant.

Tests on all items of mechanical and electrical plant while the Plant is operating on a low output.

While the Plant is operating under these conditions all mechanical and electrical equipment shall be demonstrated to show that it operates as designed and specified, both individually and as part of a system.

Raw water will be fed through each stream of each process stage in turn and each item of auxiliary equipment shall be operated in a similar manner. Change over of duties of all plant shall be demonstrated and each item of plant shall take a proportionate share of the operating duty during a total minimum period of 72 hours continuous satisfactory operation.

The Contractor shall provide a supply of potable water to the pump sump to enable the treated water pumps to be fully tested over a continuous operating period of not less than 24 hours. Each pump shall be brought into operation during this period.

##### *6.3.10.2.2 Procedures*

The following list of procedures is not exhaustive but is intended to indicate the types of checks necessary for the Contractor to demonstrate that the plant is complete, can be reliably operated and is ready for commencement of the Tests on Completion:

1. Power-up and prove electrical systems, adjust voltage levels and protection systems;
2. Carry out rotation checks and short proving runs on all plant and systems. Check noise, vibration, temperature and pressures are in accordance with manufacturer’s recommendations;
3. Pumping plant shall be tested to verify the volumetric output, head generated and power input over the total operating range for each pumping combinations.
4. Check the action of control devices, actuators and drivers, adjust and calibrate as necessary;
5. Check control system input and output signals;
6. Check instruments and measuring systems, calibrate signals , indicators and recorders;
7. Prove alarms;
8. Prove safety systems and interlocks;
9. Start-up plant services, stabilise, adjust and regulate;
10. Introduce raw water and progressively start-up each plant and set to work;
11. Check noise emissions are within specified limits;
12. Demonstrate restart of items of plant on restoration of power supply following an electricity supply failure;
13. Demonstrate the manual and automatic operations of all circuit breakers and associated switchgear on each power distribution system.

##### *6.3.10.2.3 Testing of the Water Treatment Efficiency on Completion*

The purpose of the Tests on Completion for Water Treatment Plant is to demonstrate that the Plant is likely to pass the treated water quality specification when it is subjected to the subsequent more intensive Test after Completion (Guarantee Testing).

These tests will be carried out on each structure (buffer tank, aeration tank, clarifiers, filters, treated water tank, thickener in option) during the building works,

The purpose of these tests will be to check :

* the quality of treated water,
* the quality of waste water and sludge,
* the consumption of chemicals, water service and power.

##### *6.3.10.2.4 Quality tests on treated water*

After construction of each structure, the Contractor will operate the plant and will check its treatment efficiency.

The contractor will measure the water quality on following parameters:

|  |  |
| --- | --- |
| 1. **Measurement points** | 1. **Water quality parameters to be measured continuously** |
| 1. Raw water pipe | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Aeration tank outlet | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Clarifiers outlet | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Filters outlet | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Treated water tank outlet | 1. Turbidity, Cl2, Algae & residual Alum |
| 1. Reservoir / Tower |  |
| 1. Distribution |  |

The drinking water quality requirements are defined in **Section 6.3** – Particular Scope of Work and performance requirements – **Paragraph 6.3.8.4** “drinking water quality requirements”.

##### *6.3.10.2.5 Quality tests on waste water and sludge*

During the construction phase, after commissioning, the Contractor will control the quality of waste water and sludge.

|  |  |
| --- | --- |
| 1. **Measurement points** | 1. **Quality parameters to be measured continuously** |
| 1. Clarifiers sludge outlet | 1. Suspended matters |
| 1. Filters waste water outlet | 1. Suspended matters |
| 1. Sludge Thickener outlet 2. (in option) | 1. Suspended matters |
| 1. Sludge Thickener overflow 2. (in option) | 1. Suspended matters |

Sludge from sludge thickener outlet will have to reach suspended matters concentration of 60 g/l.

#### Tests flows

Performance tests will be carried out for the drinking water flow consumed during the testing period.

The Contractor will make a test report in which he will indicate:

* test results at each measurement point,
* flow values corresponding at each measurement or analyze.

#### Tests duration

Quality tests will be carried out and recorded at minimum during 3 days continuously on each measurement point.

Parameters measured with laboratory analysis will be checked at minimum 3 times by day during 3 days and at day time of :

* minimum drinking water flow consumed,
* maximum drinking water flow consumed,
* mean drinking water flow consumed.

These tests will be ran up to get a satisfactory water quality during 3 successive days.

#### Control of Consumables

During testing periods, consumption of:

* chemicals,
* power,
* water service,

shall be checked.

The Contractor will calculate these consumptions per treated cubic meter.

#### *6.3.10.3 Testing during Operation and Maintenance (Guarantee Testing)*

##### *6.3.10.3.1 General*

Guarantee testing shall be jointly carried out by the Contractor and the Engineer. Tests will be performed during a period of normal operating conditions of the plant.

Control test shall include :

* testing to check operating conditions of control system, measurement system (flow meter and analyzer), and supervision system,
* testing program to determine performances of the drinking water treatment plant, including the pumping stations
* control of consumption to check that the values during normal operating conditions of the plant are satisfactory, compared with these specified in the contract : chemicals, service water, power,
* testing of certain structures (sludge thickness for example), if necessary.

##### *6.3.10.3.2 Quality tests on treated water*

During the one year assistance for Operation and Maintenance the Contractor will check the global treatment efficiency.

The Contractor will measure the water quality for the following parameters:

|  |  |
| --- | --- |
| 1. **Measurement points** | 1. **Quality parameters to be measured continuously** |
| 1. Raw water pipe | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Aeration tank outlet | 1. Turbidity, T°, pH, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Clarifiers outlet | 1. T°, pH, Turbidity, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Filters outlet | 1. T°, pH, Turbidity, Colour, Iron, Manganese, Algae & residual Alum |
| 1. Treated water tank outlet | 1. Turbidity, Cl2, Algae & residual Alum |
| 1. Treated water tank outlet | 1. Turbidity, Cl2, Algae & residual Alum |
| 1. Reservoir /Tower |  |
| 1. Distribution |  |

The drinking water quality requirements are defined in **Section 6.3** – Particular Scope of Work and performance requirements – **Paragraph 6.3.8.4** “drinking water quality requirements”.

##### *6.3.10.3.3 Quality tests on waste water and sludge*

During the two years Operation & Maintenance, the Contractor will measure waste water quality and sludge quality for the following parameters:

|  |  |
| --- | --- |
| 1. **Measurement points** | 1. **Quality parameters to be measured continuously** |
| 1. Clarifiers sludge outlet | 1. Suspended matters |
| 1. Filters waste water outlet | 1. Suspended matters |
| 1. Sludge Thickener outlet 2. (in option) | 1. Suspended matters |
| 1. Sludge Thickener overflow 2. (in option) | 1. Suspended matters |

Sludge from sludge thickener outlet will have to reach suspended matters concentration of 60 g/l.

##### *6.3.10.3.4 Tests flows*

These performance tests will be carried out at the following flows:

* drinking water flow consumed in normal operation,
* maximum raw water pumping stations capacity.

##### *6.3.10.3.5 Tests duration*

During the two years Operation and Maintenance, the Contractor will:

* record the quality parameters measured in continue,
* assist operators to make analysis on parameters specified above,
* assist the treatment plant operators to make the necessary adjustments on the process.

A test at maximum flow will be carried out by the Contractor during a continuous period of 3 days with flow variations according the treated water tank capacity and the drinking water flow pumped. This test period will be planned by NWSDB, the Engineer and the Contractor together. During this test period the treated water quality tests described above will be made. These tests will be carried out until a satisfactory water quality during 3 consecutive days is reached.

Furthermore, the Contractor will send monthly during 12 months a drinking water sample to an accredited laboratory for a complete analysis of the main physico-chemical and bacteriological parameters.

The drinking water quality requirements defined in **Section 6.3** – Particular Scope of Work and performance requirements – **Paragraph 6.3.8.4** “drinking water quality requirements” shall be reached.

##### *6.3.10.3.6 Control of Consumables*

During testing periods, consumption of:

* chemicals,
* power,
* water service,

shall be checked. The Contractor will calculate these consumptions per treated cubic meter.

These tests are intended to check :

* the performances of the treatment plant (for water and sludge),
* the performance of the pumping stations (raw water, treated water),
* the quality of treated water,
* the consumption of chemicals, service water, and power.

For these tests, a complete check will be carried out to determine the efficiency of treatment.

During the test period, the Contractor shall ensure supervision of the plant.

### *6.3.11 Guarantees*

The Bidder is to provide the guarantees for the quality of the water treatment, the performance of the plant and particular guarantees on equipment.

#### *6.3.11.1 Treatment Guarantees*

The following guarantees apply on the whole treatment plant.

##### *6.3.11.1.1 Capacity of the Treatment plant*

The required daily treated water flow is ……. m3/d. Plant Capacity

The daily production shall be produced on 22 hours.

The treatment plant shall have a minimal treated water production capacity of ……….m3/h

##### *6.3.11.1.2 Raw water Qualities*

The plant shall treat water from the source described in the **Appendix - 2** “Raw Water Quality Details” Section 6.6 “Appendices to Employer’s Requirements”.

##### The water to treat will be a mix composed of either:

##### *6.3.11.1.3 Treated Water Quality*

The treated water shall comply with;

* the drinking water quality specified in the Section 6.3 Particular Scope of Works and Performance requirements Paragraph **6.3.8.4** “Drinking water quality requirements.
* the Sri Lankan Standard (SLS 614: 1983, Part 1 and Part 2)
* the World Health Organization (WHO) requirements.

##### *6.3.11.1.4 Sludge Quality (“sludge treatment”)*

The minimal suspended solids concentration of the thickened sludge shall be 60 g SS/L.

The minimal suspended solids concentration of the sludge after dewatering on drying shall be ………….g SS/L. The sludge treatment shall be in line with the sludge treatment policy in Appendix 18 of Appendices to Employer’s Requirements.

#### *6.3.11.2 Performance of the Plant*

##### *6.3.11.2.1 Guarantees of Reagents Consumptions*

|  |  |  |
| --- | --- | --- |
| **Reagents** | **For a treated water flow ………. m3/day** | |
| **Consumptions** | **Consumption** |
| Aluminium Sulphate | …………g/m3 | ………..t/year |
| Activated Carbon | …………g/m3 | ………..t/year |
| Lime | …………g/m3 | ………..t/year |
| Potassium permanganate | …………g/m3 | ………..t/year |
| Polyelectrolyte | …………g/m3 | ………..t/year |
| Other reagents | …………g/m3 | ………..t/year |

##### *6.3.11.2.2 Guarantees of Power Consumption*

*Without any Options*

Based on a daily treated water flow of …………. m3, the power consumption will not exceed ………………..kWh/day.

*Option “Sludge Treatment”*

The additional power consumption of the equipments included in the option “sludge treatment” will not exceed ……..kWh/day.

*Option “Recycling of filters waste backwash water”*

The additional power consumption of the equipment included in the option “Recycling of filters waste backwash water” will not exceed ………..kWh/day

##### *6.3.11.2.3 Water Loses*

Water loss is defined as the difference between the raw water volume entering the plant and the treatment water output from the plant on a weekly basis.

*Without the option “Recycling of the filters waste backwash water”*

Water losses from the water treatment plant shall not be exceeded ………………% of the treatment water output.

*With the option “Recycling of the filters waste backwash water”*

With the option “Recycling of the filters plant shall not exceed ………………..% of the treated water output.

#### *6.3.11.3 Particular Guarantees*

##### The following guarantees will start once the taking over certificate is signed.

##### *6.3.11.3.1 Electromechanical equipments*

The electromechanical equipments provided will be guaranteed 24 months.

##### *6.3.11.3.2 Water tightness*

The water tightness of new civil works structures is guaranteed during 10 years.

The water tightness of the renovated civil work structures are guaranteed during 2 years.

##### *6.3.11.3.3 Metallization*

The guarantee on metallization is 10 years with reference to image 8 of the European scale.

##### *6.3.11.3.4 Paint of metallic structures, the periods of guarantee are as follows.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Location** | **Out Door Surfaces** | **In Door Surfaces** | **Effectiveness of Anti-Corrosion Protection** |
| In Industrial atmospheres | 4 years (3+1) | 5 years (4+1) | Image 7 of European Scale |
| In alternating contact with air and water | 4 years | - | Image 7 of European Scale |

At the end of one year, the painted surface condition shall not exceed the level of corrosion shown on image 9 of the European scale.

# 6.4 Specifications (Separate Annex)

6.4.1 General Specifications

6.4.2 Civil Works

6.4.3 M & E works

# 6.5 Facilities for the Engineer’s Representative

1. The Contractor shall provide facilities to accommodate the Engineer’s Representative. As such the use of “Engineer’s Representative” under this sub-clause shall be interpreted as ‘the Engineer’s Representative’ nominated by the Engineer.

The Contractor shall provide, air-condition, light, clean and maintain, until the completion of the Works and thereafter as may be required, accommodation and equipment as described in the Contract for the sole use of the Engineer’s Representative. Offices and other accommodation shall be erected, furnished, equipped with lights, air conditioning, telephone, photocopier and fax machine and ready for occupation at an agreed location and use within 7 days of the Date for Commencement of the Works, and fully serviced within 28 days of that date.

1. Survey equipment and a Licensed Surveyor and Chainmen shall be made available on the day of commencement of the works and shall be provided at the Employer’s Representative request at any time during the Contract.
2. The Contractor shall provide 8 (eight) parking spaces adjacent to the offices for the sole use by the Engineer’s Representative and his staff and visitors.
3. Telephone facilities for the Engineer’s Representative, shall have separate connections direct to a public telephone exchange with privacy of conversation for the Engineer’s Representative.

### *6.5.1 Office, Kitchen/Store and Toilet*

1. The layout of all offices and car parking facilities for the Engineer’s Representative shall be arranged to the approval of the Engineer’s Representative.
2. The Engineer’s Representative’s office shall consist of an erected unit of floor area not less than 150 sq.m. located within a radius of 75-100 m to the work site. The unit shall be suitable in all respects for the weather resistance and thermal insulation conditions prevailing in the area. The unit shall have a separate washroom and toilet. Parking spaces for 4 vehicles and 24 hrs. security shall have to be provided.
3. The Site Offices shall consist of up to 04 mobile units with minimum floor area 30 m2 each suitable in all respects for the weather resistance and thermal insulation conditions prevailing at site. The offices shall have a separate washroom attached with a shower, toilet and wash basin 24 hr. security shall be provided.
4. The Kitchen/Stores for the above shall consist of an additional mobile unit minimum floor area 12 m2 suitable in all respects for the weather resistance and thermal insulation conditions prevailing at site. 24 hrs. security shall be provided.
5. All the accommodation shall be supplied with mains electricity for air conditioning and lighting and shall have standby power generating provision.
6. The wash room facilities shall contain 1 Nr WC, 1 Nr. wash basin with potable water, 1 Nr. instantaneous water heater, 1 Nr. roller towel, 1 Nr. soap dispenser, toilet roll supply, and electric shower complete. Both the wash room facilities and the kitchen unit shall be connected to a clean water supply source and shall be served by mains drainage or septic tank.
7. Office Equipment

1 Nr. refrigerated drinking water dispenser and accessories

1 Nr. Laptop, 3Nos. Desktop Computers with soft wares (Licensed Versions) such as Water CAD, Auto CAD, SAP 2000, etc., and printers with A4 paper supply

4 Nr. office desks 1200 x 750 with lockable drawers, two containing suspended filing system (including filing materials)

8 Nr. switched sockets (positions to be agreed with Employer’s Representative)

4 Nr. free standing electric fans

4 Nr. upholstered office desk chairs with arms

8 Nr. stacking type office chairs

2 Nr. 1500 x 700 door mat

2 Nr. table approximately 2000 x 1000

4 Nr. waste paper bins

1 Nr. exclusive outside line telephone

3 Nr. telephone as extension to above

1 Nr. facsimile machine complete with paper supply and dedicated telephone line, Xerox 7220 or similar

1 Nr. desk top photocopying machine Canon NP 6016 or equivalent, with cassette feeder and sorter included, and toner and paper supply

1 Nr. desk top laser printer Hewlett Packard LaserJet 4 plus or equivalent, plus toner and paper supply

1 Nr. drawing table including drawing machine and draughtsman’s chair

1 Nr. plans chest AO size, minimum 4 drawer capable of storing 150 AO drawings total

4 Nr. nest of filing trays (4 trays per nest)

4 Nr. air conditioners

4 Nr. Angle poise drawing board light

2 Nr. steel lockable cupboard

4 meters of 250 wide shelving to be sited at the discretion of the Employer’s Representative

5 Nr. Cellular telephones complete with dedicated numbers

6 Nr. Scientific Pocket Calculators of 12 – 2 digits

Other necessary stationary items

At the end of the Defects Liability Period, this equipment shall be handed over by the Contractor to the Engineer’s Representative and this equipment shall become the property of the Engineer’s Representative.

1. Kitchen/Store

1 Nr. cooker/grill, shall be gas/electrically operated and includes supply of gas cylinders and refills for the duration of the Contract

1 Nr. sink with supply of potable water

1 Nr. instantaneous water heater complete with draining board and cupboard under

2 Nr. 13A switched socket

1 Nr. automatic electric kettle

1 Nr. refrigerator with 6 cu.ft capacity

4 Nr. coat hooks

2 meters of “melamine” shelving

Regular supply of clean kitchen towels

1 sets of cutlery and crockery for 4 people

1 Nr. water filter of capacity 25 l made of stainless steel for each office site office, with boiled water supply for the duration of the Contract

This equipment and the accessories shall be retained up to the end of the Defects Liability Period and shall be handed over by the Contractor to the Employer’s Representative and this equipment shall become the property of the Employer’s Representative.

### *6.5.2 Surveying Equipment*

1 No. level N1050 Zeiss-Jena with tripod

1 No. 5 m staff

8 nos 3 m steel tapes

3 nos 30 m fiber glass tapes

8 nos 2 m ranging rods

2 nos measuring wheels

1 No. 35 mm Digital camera with minimum 10.0 Mega Pixels, memory cards (internal 20GB, external SD/SDHC up to 4GB) , compact type with auto focusing, fully automatic loading, advancing and rewinding, built in flash with automatically adjusted zoom setting, and self timing. The lens shall be 35 mm – 70 mm with zoom setting by pressing zoom button, shutters shall be programmed electronic type, frame counter in LCD panel. Date imprint functions shall be available to print year, month, date and time. Power source shall be AA size batteries.

The above camera shall be handed over to the Engineer’s Representative at the beginning of the Contract and shall be the property of the Engineer’s Representative. However, the Contractor shall be responsible for the supply of replacement batteries, repairs and general maintenance up to the end of the Defects Liability Period.

In addition to the above, the Contractor shall provide on a regular basis, a total of 60 Nos. 24 exposure colour film rolls to the Engineer’s Representative in order to take progress photographs. The Engineer’s Representative will, from time to time, return the exposed film rolls to the Contractor for developing and printing one copy each of 5.0” x 3.5” size (postcard size) photographs and these shall be handed over to the Engineer’s Representative with the negatives. The Engineer’s Representative shall then decide on the appropriate progress photographs suitable for record purposes and will advise the Contractor to print 3 Nos. copies of each of 5.0 “x 3.5” (postcard size) selected-photographs. The Contractor shall also supply the necessary Photography Albums to affix the above progress photographs and selected copies (3,000 Nos.). The quality of the printing of the photographs and the make and type of the albums shall be to the approval of the Engineer’s Representative.

The “set” as indicated in the Bill of quantities is defined as 3 copies of the same photograph, of size 5.0” x 3.5”

Supply of wax crayons, timber pegs, nails, paint (spray canisters), and drain tracing materials (Drain trace or equivalent). These equipment shall be provided and maintained for the sole use of the Engineer’s Representative and his staff for the duration of the contract and when appropriate, shall have a manufacturer’s or agent’s specified tolerances at the date of issue.

At the end of the Defects Liability Period, this equipment shall be handed over by the Contractor to the Engineer’s Representative and this equipment shall become the property of the Engineer’s Representative.

Helmets, Gumboots, Rain Coats, Umbrella in sufficient quantities shall be provided and replace time to time for the use of technical staff of the Engineer’s representative.

### *6.5.3 Attendance*

Secretary/PC operator, Office helper and general labourer to be provided. They shall work directly under Engineer’s Representative or any officer nominated by him time to time.

All premises provided for the use of the Engineer’s Representative and his staff shall be properly cleaned and maintained daily.

The Contractor is required to provide on request a Licensed Surveyor and two Chainmen, capable and experienced in survey work.

If any item of equipment requires servicing or repair an equivalent replacement must be provided as soon as possible.

### *6.5.4 Transport*

The Contractor is required to provide, for drivers, for insurance and maintain the following transport for the sole use of the Engineer’s Representative and his staff. At the end of the Defects Liability Period, these vehicles shall handed over by the Contractor to the Engineer’s Representative and these vehicles shall become the property of the Employer.

1 Nr. 1500-2400 cc capacity Saloon Car – Japan made

3 Nr. 4 Wheel drive 2500 cc Capacity Double Cab – Japan made

2 Nr. 2 Wheel drive 2500 cc Capacity Double Cab – Japan made

1 Nr. Hiring van

All vehicles shall be supplied new, shall be right hand drive, with power steering, water cooled, diesel engine, 5 seater (For hiring van- 12 seats), four door type, and be supplied with air conditioning, digital FM radio/cassette player and complete with all the standard accessories.

In addition, the car shall be complete with hand rests/hanging hooks at 3 passenger sides and de-mister at the rear windscreen.

All brands of vehicles proposed shall be Japan made and shall have been in use in Sri Lanka for at least 5 years and shall have proven track record of suitability for Sri Lankan urban and rural roads.

The vehicles shall not be in any way inferior in quality of similar vehicles and models which are on display and supplied from ex-stock from, the accredited agents in Sri Lanka. There shall be a warranty of a minimum of one year. The Contractor shall issue a certificate along with the tender for his conformity in this regard.

Maintenance shall include fuel, repairs, stand-by driver, provision of replacement vehicle in the event of provided vehicle being out of service, servicing and routine maintenance (oil, water, tyres, fitters and others as required and etc.) The cost of fuel supply shall be estimated on the basis of 8,000 km of total running distance per month for one vehicle referred to above. In case this limit is exceeded, due to special circumstances the excess fuel cost shall also be borne by the Contractor. The stand-by vehicles in case of a breakdown of the existing vehicle or the stand-by driver in case of the regular driver on leave or sick shall be provided subjected to the approval of the Engineer’s Representative. The drivers shall be allowed up to a maximum total of 450 hrs. for three drivers of overtime and in case this limit is exceeded in special circumstances the additional cost too shall be borne by the Contractor.

#### *6.5.4.1 Site Office for the Officers of Engineer’s Representative*

The Contractor shall provide a office for the sole use of the officers of Engineer’s Representative and furnish, equip, clean, maintain, air condition, heat, light and, if directed, subsequently remove a temporary building as scheduled below for the exclusive use of the Engineer’s Representative and his staff. This office shall be adjacent to the Contractor’s office.

* Office building, including washrooms, 100 m2.
* Laboratory, 15 m2

At the intake pumping station site the Contractor is required to provide a smaller office (15m2 in area) for use by the Engineer’s supervisory staff. The Contractor shall provide furniture and equipment as listed in this sub-clause.

Floors shall be covered by proprietary heavy duty vinyl sheet throughout. The washroom shall be provided with wash basin and cold potable water supplies and a flush operated WC connected to an approved septic tank (which shall be removed and refilled at the end of the Contract) provided by the Contractor. All doors shall be lockable and there shall be sufficient windows and adequate fly screened ventilation.

A car port for four cars shall be provided adjacent to the site office to provide shaded accommodation for the sole use of the Engineer’s staff. Vehicle and pedestrian access to the office shall be maintained and kept free of dirt and other obstructions at all times.

The Contractor shall supply and maintain in the office building, furniture and equipment at least as follows:

* Internal and external entrance door mats and external boot scraper
* battery operated wall clocks
* 4 office tables with arm (3 chairs per table) chairs
* 1 drawing board, tee square and stool
* 4 visitor chairs
* 2 lockable metal filing cabinets with four drawers and all fitments
* 2 plan chests with at least 8 drawers each
* 3 book cases each 1.2 m long and fitted with 4 shelves 400 mm apart
* 1 maximum/minimum thermometer
* 2 desk top computers with Intel Pentium 1.6 GHz processors, minimum 20 Gb hard disks, 256 Mb RAM, Windows XP Professional, Microsoft Office latest, Microsoft Excel, Microsoft Power Point, premier versions, uninterruptible power supply and surge protection device.
* One computer to be installed with a fully operational Internet, e-mail system with modem.
* 2 x 15 inch monitors for the computers
* 2 printers, HP Laser jet 4000 or equivalent
* 1 Parallel port back-up device
* All necessary interconnecting cables between the screens, printer and back-up device.
* 1 typist’s desk and chair
* 1 dry powder photocopy machine (up to A3 capacity)
* 1 electronic scientific calculating machine with at least two memories and printer or printing attachment (battery/mains operated)
* 1 ‘tea service’ for 15 persons
* 1 refrigerator of capacity 150 litres
* 2 kettles
* 4 angle poise desk lamps
* 2 variable speed floor mounted oscillating fans
* 2 gas rings (with gas cylinder and regulator)
* General office and stationery equipment
* General purpose cupboards including one with cleaning equipment
* Lockable cupboard fitted for storage of survey instruments, staffs, tripods and other survey equipment
* Adjustable blinds on all office windows
* 4 fire extinguishers (CO2)
* Dustbins and wastebaskets

The office and the materials, surface fittings and furniture shall be new and unused at the start of the Contract.

The Contractor shall install a telephone/facsimile (fax)/email/internet system in the offices and make all arrangements including payment for connection to the national telephone network.

The offices shall be air conditioned and lit by electricity. The Contractor shall maintain light and cold air conditioning in all the rooms and clean daily all rooms, furniture, fittings and WC’s throughout the period of the Contract. The Contractor shall provide full-time attendance on Site to carry out these duties.

Before placing any orders or delivering any materials or fittings for the offices the Contractor shall obtain the approval of the Engineer in writing as to the location and type of the structure and the furniture, fittings, and equipment to be supplied.

The office and contents shall be maintained until the Works have been completed and the final Certificate issued after which time all goods, materials, furniture. The computers, screens, software, printers and back-up devices shall be handed over to the Employer in whom the ownership shall then be vested.

#### *6.5.4.2 Assistance for the Engineer*

The Contractor shall provide every assistance to the Engineer and his staff in carrying out their duties and shall provide a sufficient supply of measuring tapes, hammers, ranging rods, survey books, pegs, poles, paint, lines, tools, instruments, spirit levels and other materials, , meters, gauges and small tools for testing and checking and setting out tolerances of the Works and the erection testing commissioning and maintenance of the Plant. The Contractor shall also provide for the Engineer and his staff such waterproof clothing, safety helmets, rubber boots, torches and the like as may reasonably be required by them. These articles shall remain the property of the Contractor, and they shall be required or replaced by him to the extent necessitated by fair wear and tear.

### *6.5.5 Spare Parts*

Contractor shall hand over spare parts listed in the TEC forms in the manner that they should be stocked and stored in suitably designed closed shelves fabricated by the contractor at his cost to protect them from the environment.

**6.6 APPENDICES TO EMPLOYER’S REQUIREMENTS**

**6.6 APPENDICES TO EMPLOYER’S REQUIREMENTS**

|  |  |  |
| --- | --- | --- |
| **Appendix -1** | - | GS Division in the Project area & it’s population data. |
| **Appendix -2** | - | Raw water quality data |
| **Appendix -3** | - | Summary of population projections. |
| **Appendix -4** | - | Location & site plans for proposed structures under this project. |
| **Appendix -5** | - | Capacity of proposed storage reservoirs & locations. |
| **Appendix -6** | - | Details of proposed transmission pipe lines. |
| **Appendix -7** | - | Data required for the computation of net present value of the production cost for 1st 10 year. |
| **Appendix -8** | - | Electricity Board Tariff Structure |
| **Appendix -9** | - | Design Criteria and Specification |
| **Appendix -10** |  | Supplementary Design Criteria & Specifications |
| **Appendix -11** | - | TOR for Independent Inspection Agency |
| **Appendix -12** | - | Pre-shipment Inspection of DI pipes & fittings  by NWSDB Engineers - Check list |
| **Appendix -13** | - | Pre-Qualified Manufacturers for  Supply & Delivery of DI Pipes & Fittings |
| **Appendix – 14A** | - | Confirmation from the DI Fittings Manufacturer to Supply DI Fittings to DI Pipe Manufacturer |
| **Appendix -14B** | - | Confirmation from the Rubber Rings Manufacturer to Supply Rubber Rings to DI Pipe Manufacturer |
| **Appendix -14C** | - | Guarantee for Supply of DI Pipes, Fittings, accessories and Rubber Rings for Leak Proof Pipe Line |
| **Appendix -15A** | - | Local Accredited Agent’s Confirmation of Supply of DI Pipe Fittings & Specials according to Work Programme |
| **Appendix -15B** | - | Local Accredited Agent’s Confirmation of Supply of PE Pipes & Fittings according to Work Programme |
| **Appendix -16** | - | Joint Venture Agreement |
| **Appendix - 17** | - | Form of Asset Management |
| **Appendix - 18** | - | Sludge Management Policy for Water Treatment Plants |

**Appendix -1*page 1***

POPULATION DATA

The last census for the whole country was done in 2012 and the data is given below.

**D.S. Division :- ……………………… (Part)**

|  |  |  |  |
| --- | --- | --- | --- |
| **G.N. Division Name** | **G.N.**  **Number** | **Total No. of Persons** | |
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**Appendix -1 *page 2***

**D.S. Division :- ……………………**

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**Appendix -1*page 3***

**D.S. Division :- ………………….**

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| **G.N. Division Name** | **G.N.**  **Number** | **Total No. of Persons** | |
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**Appendix -1*page 4***

**D.S. Division: -……………………**

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| **G.N. Division Name** | **G.N.**  **Number** | **Total No. of Persons** | |
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**Appendix -1 *page 5***

**D.S. Division :- ……………………….**

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| **G.N. Division Name** | **G.N.**  **Number** | **Total No. of Persons** | |
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**Appendix -1 *page 6***

**WATER DEMAND BASED ON LAND USE PATTERN**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Road Name** | **Node No** | | **No of …..** | **Population** | **Water demand** |
| **From** | **To** |
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**FUTURE PLANNED DEVELOPMENT**

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| --- | --- | --- | --- | --- |
| **Road Name** | **Type of Development** | **Employees** | **Water demand** | **Expected year of implementation** |
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**Appendix -2**

**RAW WATER QUALITY DETAILS (Sample Form)**

# SCHEME :

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Test Results of the Samples Collected on:** | | | | | | | | | | |
|  |  |  |  |  |  |  |  | **AVG** | **Max** | **Min** |
| Odour |  |  |  |  |  |  |  |  |  |  |  |
| Colour (Hezen) |  |  |  |  |  |  |  |  |  |  |  |
| Turbidity (NTU) |  |  |  |  |  |  |  |  |  |  |  |
| PH |  |  |  |  |  |  |  |  |  |  |  |
| Electrical Conductivity (µs/cm) |  |  |  |  |  |  |  |  |  |  |  |
| Chloride (as Cl) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Free Residual Chlorine as Cl2 (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Total Alkalinity (as CaCO3) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Free Ammonia (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Nitrate (as N) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Nitrite (as N) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Fluoride (as F) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Total Phosphate (as PO4) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Total Residue (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Total Hardness (as CaCO3) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |
| Calcium (as Ca) (mg/l) |  |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Test Results of the Samples Collected on:** | | | | | | | | | | | |
|  |  |  |  |  |  |  |  | **AVG** | | **Max** | **Min** |
| Total Iron (as Fe) (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |
| Sulphate (as SO4) (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |
| Manganese (as Mn) (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |
| TOC |  |  |  |  |  |  |  |  |  | |  |  |
| Total Nitrogen |  |  |  |  |  |  |  |  |  | |  |  |
| DO |  |  |  |  |  |  |  |  |  | |  |  |
| BOD |  |  |  |  |  |  |  |  |  | |  |  |
| COD (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |
| Total Coliform (#/100ml) |  |  |  |  |  |  |  |  |  | |  |  |
| Fecal Streptococci |  |  |  |  |  |  |  |  |  | |  |  |
| E-Coli (#/100ml) |  |  |  |  |  |  |  |  |  | |  |  |
| Algae (Cells/ml) |  |  |  |  |  |  |  |  |  | |  |  |
| **Heavy Metal Analysis of water** |  |  |  |  |  |  |  |  |  | |  |  |
| Lead (as Pb) (mg/l) |  |  |  |  |  |  |  |  |  |  | |  |
| Cromium (asCr)(mg/l) |  |  |  |  |  |  |  |  |  |  | |  |
| Cadmium (asCd)(mg/l) |  |  |  |  |  |  |  |  |  |  | |  |
| Zinc (as Zn) (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |
| Manganese (as Mn) |  |  |  |  |  |  |  |  |  | |  |  |
| Copper (as Cu) (mg/l) |  |  |  |  |  |  |  |  |  | |  |  |

Names of the algae Species Present

Algae name Count

Melosira dead filaments 1.13 x 104 cell/lit

Melosira sp 2.05 x 103 cell/lit

Sub – Dominant species of algae : Osciliroria sp, synedra sp

Appendix -3 *Page 1*

POPULATION PROJECTIONS

##### *Population Forecast*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **GND Number** | **GND Name** | **Population Forecast** | | | | | |
| **2012** | **2015** | **2020** | **2025** | **2030** | **2035** |
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|  |  |  |  |  |  |  |  |
| **TOTAL** | |  |  |  |  |  |  |

Appendix -3*Page 2*

##### *Population Forecast for*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area**  **Year** | **Population Forecast** | | | | | |
| **2012** | **2015** | **2020** | **2025** | **2030** | **2035** |
|  |  |  |  |  |  |  |

**Appendix -5**

**PROPOSED STORAGE RESERVOIRS**

Capacity of storage reservoirs and locations are listed below.

|  |  |  |
| --- | --- | --- |
| **Location** | **Capacity (m3)** | **Type of Storage Reservoir**  **(Ground Reservoir / Tower** |
| Refer Annex – I Section 12 |  |  |
| Refer Annex – I Section 12 |  |  |
| …………………. |  |  |
| …………………. |  |  |
| …………………. |  |  |
| …………………. |  |  |
| …………………. |  |  |

**Note**: 1. Minimum shaft height shall be …….. m

2. This Table shall be prepared to suit the Project requirement

**Appendix-6**

**Details of Proposed Treated Water**

**Transmission Network**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| From | To | Dia of Pipe **(mm)** | Material | Approx **Length (km)** |
| Water Treatment Plant | Ground Reservoir (……….m3)  (GPS co-ordinate;  X = …………….  Y = ……………. |  |  |  |
| Ground Reservoir (………..m3)  (GPS co-ordinate;  X = …………….  Y = ……………. | Ground Reservoir (……..m3)  (GPS co-ordinate;  X = …………….  Y = ……………. |  |  |  |
| Water Treatment Plant | Tower/Ground Reservoir |  |  |  |
| Tower | …………m3 Ground Reservoir. |  |  |  |
| ………..m3 Ground Reservoir. | Tower |  |  |  |
| Ground Reservoir (………….m3) | Tower |  |  |  |
|  |  |  |

**Note:** 1. Please note that these lengths are approximate lengths and it could be varied with

detailed drawings.

2. This Table shall be modified to suit the project requirement.

**Appendix-7**

# Data Required for the Computation of Net Present Value

**of the Production Cost for First 10 Years**

## *Power Cost - Based on the Tariff of Ceylon Electricity Board with*

10% Annual Increase. Latest tariff structure is attached

as annex 5.8 -A.

**Chemical Cost** - Lime – Rs. 23/= per Kg.- 5% annual increase

Alum – Rs 28.75/= per Kg.- 5% annual increase

Gas Chlorine – Rs. 198 per Kg- 5% annual increase

**Staff Cost**

Proposed O&M staff for head works as given below.

**Salary/Month/Person**

Officer In Charge (01 No.) Rs. …………….

Technical Officers (03 Nos.) Rs. …………….

Clerks (01 No.) Rs. …………….

Pipe Fitters (01 No.) Rs. …………….

Mechanic (1 No.) Rs. …………….

Electrician (01 No.) Rs. …………….

Pump Operators (04 Nos.) Rs. …………….

Plant Attendants (04 Nos.) Rs. …………….

Unskilled Labourers (04 Nos.) Rs. …………….

*(the current salaries including overtime shall be obtained from P&A Section of NWSDB)*

Bonus, ETF, EPF etc. 25% of cost.

Repair & Maintenance Cost

1. Structures
2. Electro – Mechanical Equipment

Discounting rate for NPV 10% annually.

**Note:** 1. Cost of chemicals and salaries shall be the current prices, number of staff shall be

modified to suit the project requirement.

## *Basis of Calculations of Production Cost*

Production cost of water must include all costs to be incurred for pumping & treatment etc., from the point of intake upto the end of the treatment process, which is the clear water sump of the treatment works.

**Appendix-8**

**Electricity Board Tariff**

Include current Tariff System obtained from the Ceylon Electricity Board.

**Appendix-9**

**Design Criteria & Specifications**

**(Sample Form)**

The design criteria to be used for the project

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Planning horizon |  | **2025** | | | |
| 2 | Population Growth Rate | Year/  Growth Rate | 2009–12  2.5% | 2013-15  3.00% | 2016-20  4.00% | 2021-25  3.00% |
| 3 | Per Capita Demand | Direct Connection  Mahaweli Demand |  | 120 | l/c/d | l/c/d |
| 4 | Non Revenue Water | Year  New Area | 2009–12  15% | 2013-15  15% | 2016-20  20% | 2021-25  20% |
| 5 | Non Domestic Demand | Year  New Area | 2009–12  ……% | 2013-15  ……% | 2016-20  ……% | 2021-25  ……% |
| 6 | Maximum day/Average day ratio |  |  | 1.25 |  |  |
| 7 | Peak hour/Average hour ratio |  |  | 2.0 |  |  |
| 8 | Minimum Residual Pressure at the end of the distribution system |  |  | 10m |  |  |
| 9 | Pipe Friction Factor | PVC  DI |  | 130  120 |  |  |
| 10 | Pipe Material | All Transmission  Distribution Below  250 mm Dia  Distribution 250 mm& above Dia |  | DI/PE  PVC  DI |  |  |
| 11 | Minimum overall pump efficiency of Raw water & Treated water pumps |  |  | 65% |  |  |
| 12 | Swabing Teas with necessary valves, fittings & chamber for transmission mains | At 2 km intervals as maximum distance in between two. |  |  |  |  |
| 13 | Section valves for transmission mains | At 1 km intervals as maximum distance in between two. |  |  |  |  |
| 14 | Junction valves for distribution system | For all out-going pipe lines at a junction. |  |  |  |  |
| 15 | Air Valves | On transmission & distribution lines wherever necessary as per the specification |  |  |  |  |
| 17 | Washout Valves | On transmission & distribution lines wherever necessary as per the specification |  |  |  |  |

**Appendix -10**

**SUPPLEMENTARY DESIGN CRITERIA & SPECIFICATIONS**

1. **General**
2. The purpose of design guideline is to provide the Bidders scope of design, submittals and required design criteria design and to maintain the consistency of design which coincides with employer’s policy.
3. All works shall be executed by following code, regulation, and related law

* Structural Designs – BS standards
* Applicable Law is Law of Democratic Socialist Republic of Sri Lanka

1. All equipments which are supposed to be applied to this project shall have more than one year’s operation experiences.
2. All structures which contact water is required to have water proofing structure.
3. Underground structure is required to be checked against uplift water pressure.
4. Water treatment process is required to have an individual 2 (two) process system.
5. Contractor shall submit the preliminary design for the approval of the Engineer and shall not be allowed preceding the further works without the approval of Engineer.
6. **Scope of Design**
7. Scope of Design shall follow Sec. 8 employer’s Requirement.
8. Scope of works includes all expenses to investigate site for design.
9. Design period
10. Bidding (outlined) design shall be submitted with bidding documents.
11. Detailed design shall be finished within 4 (four) months from commencement date.
12. **Submittals lists of Design Documents**
13. Bidding (outlined ) design

The Bidders shall follow sec. 5A Bidding Form attachment from form TEC -10.

1. Detailed Design

Contractor is required to submit detailed design report as followings.

|  |  |  |
| --- | --- | --- |
| **Item** | **Size** | **Quantity** |
| Process design report | A4 | 5 |
| Detailed Design Report | A4 | 20 |
| Hydraulic Calculation Sheet | A3 | 5 |
| Structural Calculation Sheet | A4 | 15 |
| Model for transmission & distribution | A4 | 15 |
| Capacity Calculation sheet | A4 | 5 |
| Specification | A4 | 5 |
| Site Survey Report (topographic, Geotechnical) | A4 | 5 |
| Priced Bill of Quantities | A4 | 5 |
| Breakdown of Bill of Quantities | A4 | 5 |
| Drawings | A3 | 10 |
| Drawings | A1 | 10 |

1. All items should be submitted by CD-ROM.
2. Drawings should be made by Auto CAD program.
3. Please include following under submittals with bid:
   1. Manufacture’s literature for each type of equipment supplied/installed under the contract
4. All items should be made with individual bookbinding.

**Appendix -11**

( 1 of 6)

**TOR FOR INDEPENDENT INSPECTION AGENCY**

**DI Pipes & Fittings**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **1.**  **1.1** | **Physical Proportion**  **Socket & Spigot Pipes**  Pipe wall thickness  External Diameter  Internal Diameter  Length of Pipe  Socket Length  Chamfering of Spigot end  C - Class  Grooves in the Socket.  Thickness of Internal Cement lining  Smoothness of Internal Cement lining.  External Zinc Coating.  Thickness & Weight of external Zinc Coating.  Compressive Strength of the Cement Lining.  Curing period of Pipes after Cement Lining.  Smoothness of external Bitumen Coating. |  |  |  |

Revised on 09-11-2015

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **( 2of 6)** | | | | |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **1.2**  **1.3** | Flanged Pipes  Flange thickness  Flange diameters  No. of bolt holes  Length of pipe  Wall Thickness of Pipe  C – Class of Pipe  Cleanliness of Flange  Raised Face or Flat Face  Smoothness of Raised Face/Flat Face  Integrally casted or Factory Welded  Condition of weld if welded.  Thickness of Internal Cement lining  Smoothness of Internal Cement Lining.  External Zinc Coating.  Thickness & Weight of external Zinc Coating  Method of Application of Bitumen Coating.  Compresure Strength of the Cement Lining  Curing period of Pipes after Cement Lining.  Smoothness of external Bitumen Coating  **Socketed Bends**  Socket Diameter  Length of Bend  C-Class of Bend  Wall Thickness of bend  Grooves in the Socket. | Revised on 09-11-2015 |  |  |

**(3 of 6)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **1.4** | Thickness of Internal Cement lining  Smoothness of Internal Cement lining  External Zinc Coating  Thickness & Weight of external cement coating  Method of Application of Bitumen Coating  Compresure Strength of the Cement Lining  Curing period of Bends after Cement Lining  Smoothness of external Bitumen Coating.  **Flanged Bends**  Flange Diameter  Length of Bend  Thickness of Flange  No. of Bolt holes  Wall Thickness of Pipe  Raised Face or Flat Face  Smoothness of Raise Face/ Flat Face  Integrally Casted / Factory welded condition of  Weld if welded  C – class  Thickness of Internal Cement lining  Smoothness of Internal Cement lining  External Zinc Coating  Thickness & Weight of External Coating  Compressive Strength of the Cement Lining. |  |  |  |

Revised on 09-11-2015

**(4 of 6)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **1.5** | Method of Application of Bitumen Coating  Compressive Strength of the Cement Lining  Curing period of Bends after Cement  Smoothness of external Bitumen Coating.  **Tees**  **Socketed Tees**  Length of Tees  Length of Branch  Diameter of Tee (all faces)  Wall Thickness of Tees  Wall Thickness of Branch  Condition of grooves in socket  C – Class  Thickness of Internal Cement lining  Smoothness of Internal Cement lining.  External Zinc Coating  Thickness & Weight of External Zinc Coating  Method of Application of Bitumen Coating  Compressive Strength of the Cement Lining  Curing period of Tees after Cement Lining  Smoothness of external Bitumen coating. | Revised on 09-11-2015 |  |  |

**(5 of 6)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **1.6** | **Flanged Tees**  Length of Tee  Length of Branch  Diameter of Tee (all Branches)  Wall Thickness of Tee  Diameter of Flanges (All faces)  No of Bolt holes  Flange thickness  Integrally Casted or Factory Welded  Condition of weld if welded  Flanges of Raised Face or Flat Face  Smoothness of Raised Face/ Flat Face  C – Class  Thickness of Internal Cement lining  Smoothness of Internal Cement lining.  External Zinc Coating  Thickness & Weight of external Zinc Coating  Method of Application of Bitumen Coating  Compressive Strength of the Cement Lining  Smoothness of external Bitumen coating. |  |  |  |

**(6 of 6)**

Revised on 09-11-2015

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Activity** | | **Test Performed** | **Results** | **Acceptability as per Specification** |
| **2.**  **2.1** | **Strength & Metalogical Properties**  **DI Pipes & Fittings**  1. Method of Casting Metelogical Properties  ……………. Tensile Strength  Hardness minimum Elongation Positive  Internal Hydrostatic Pressure Negative  Internal Pressure  2. Manufacturing Standards of Pipes &  Fittings.  3. Lubricant make & seal type of designation  of lubricant.  4. Manufacturing of lubricant  5. Manufacturing Standard of lubricant  Joint Rings/ Gaskets  6. Materials of Joint Ring/ Gasket  7. Manufacturing Standards of Joint Ring/  Gasket  8. Hardness of materials of Joint Ring/  Gasket.  9. Seal Type designation of Joint Ring/  Gasket Nuts & Bolts.  10. Materials of Nuts & Bolts Washers  11. Manufacturing Standard of Nuts & Bolts  12. Number of Washers/ Bolt. |  |  |  |

**Appendix- 12**

**(1 of 13)**

**PRE-SHIPMENT INSPECTION OF DI PIPES & FITTINGS**

# BY NWSDB ENGINEERS - CHECK LIST

Name & Location of the Factory

Pipe : - ………………………………………………………………………………

………………………………………………………………………………

Fittings : - ………………………………………………………………………………

….……………………………………………………………………………

Valves : - ..………………………………………………………………………………

..………………………………………………………………………………

Couplings :- …………………………………………………………………………………

…………………………………………………………………………………

Adaptors :- …………………………………………………………………………………

…………………………………………………………………………………

Flanged Pipes : - …………………………………………………………………………………

…………………………………………………………………………………

(Requirement - Pipes and fittings should be manufactured by same manufacturer or manufacturing group.)

Applicable Standards

Manufacturing Standards : (ISO 2531 : 2009/BSEN 545: 2010) …………….

Of pipes & Fittings

Manufacturing Standards of

Joint Rings : (BSEN 681-1/ISO …………….

Quality Assurance Standards : (ISO 9001: 2008) ……………

Parameters to be checked

Markings to casted on, painted or cold stamped

Mechanical Properties, Hardness, Elongation,

Hydrostatic Pressure Tests

Wall Thickness

Length of straight pipes

Straightness

External Coating

Internal Coating

Testing of Welded Flanges

Chemical Composition of Pipes & Fittings (Composition of metals).

Condition of Pipes & Fittings

Warping or shrinkage

Surface or other defects detrimental to functionality : Satisfactory/Unsatisfactory

Handling of pipes, Fittings after production : Satisfactory/Unsatisfactory

Inspection Procedure

Witness testing a sample with Factory QC Team : Yes/No

Witness testing with Independent Inspection Agency : Yes/No

**(2 of 13)**

Revised on 30-12-2014

**PRE-SHIPMENT INSPECTION OF DI PIPES & FITTINGS**

CHECK LIST

Mark Yes or No in the Remarks Column as Appropriate Date of Inspection …………

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Technical  Specifications  Clause No. | Description | | Values as per  Specifications | Satisfactory/  Unsatisfactory | | Remarks | |
| GENERAL | | | | | | | |
| Quality  Assurance | Availability of Valid Quality Standard  Certificates | | ISO 9001:2008 |  | |  | |
| Independent  Inspection | Availability of Inspection Agency.  Certificate before Shipment | | - |  | |  | |
| Markings | Pipe Material (Ductile Iron) | | - |  | |  | |
|  | Year of Manufacture (Last Two Digits) | | - |  | |  | |
|  | Manufacturers Identification Mark/Name | | - |  | |  | |
|  | Nominal Diameter in mm | | - |  | |  | |
|  | Class Designation | | - |  | |  | |
|  | Quality Standard & Product Conformity certificate | | - |  | |  | |
|  | Client Identification | | - |  | |  | |
|  | Socket Penetration Lines (2 Lines) | | - |  | |  | |
|  | In case of Fittings, these marks shall appear on the body of each fitting together with its main characteristics such as angle of bend, pressure rating of flange etc. | | - |  | |  | |
| Material Characteristics | | | | | | | |
|  | Mechanical Properties |  | | |  | |  |
|  | Minimum Tensile Strength | 420 N/mm2 | | |  | |  |
|  | Minimum Bending Strength | Table B1 BSEN-545 2010 | | |  | |  |
|  | Modulus of Elasticity | 14- 18 N/mm2 | | |  | |  |
|  | Brinell hardness for pipes | 230HB | | |  | |  |
|  | Brinell hardness for fittings | 250 HB | | |  | |  |

Revised on 30-12-2014

**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

**(3 of 13)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test Hydrostatic Test | | | | | | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 - Clause 6.5 & Table 14  ISO 2531:2009 - Clause 6.5 & Table 10 | | | | | | | | | | | |
| Sample  No | Item of Testing | Test Condition | | | | | | Deviation | Tolerance  Allowed | Comply? | Remarks |
| Flexible joints | | Push-fit joints | | Flanges & flanged joints | |
|  |  | +ve int. pressure | -ve int. pressure | +ve ext. Pressure | Dynamic int. pressure | Flanged joints | Screwed & welded flanges |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | | | | | | |
| Name : 1. Name : 2. | | | | | | | | | | | |
| Signature: 1. Signature: 2. | | | | | | | | | | | |
| Date : | | | | | | | | | | | |

Revised on 30-12-2014

**(4 of 13)**

**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Length of Straight Pipes and Fittings | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) , Fittings Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 – Clause 4.2.3 & Table 3,4,5,6  ISO 2531 :2009 - Clause 4.2.3 & Tables 2,3,4,5 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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Revised on 30-12-2014

**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Straightness | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 – Clause 4.2.4  ISO 2531 :2009 -Clause 4.2.4 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Internal & External Diameter of Pipes & Fittings | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) , Fittings Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 – Clause 4.2.2  ISO 2531 :2009 - Clause 4.2.1 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Wall Thickness of Pipes & Fittings | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF), Fittings Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 – clause 4.2.1  ISO 2531 :2009 - Clause 4.2.2 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Internal Coating ( Strength & Thickness) | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) , Fittings Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010 – Clause 4.4.3 & 4.5  ISO 2531 :2009 - Clause 4.4.2 & 4.5.2 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date :  Revised on 30-12-2014 | | | | | | |

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**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test External Coating ( Thickness of Zinc Mass & Paint coating) | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF), Class : Dia x Length :  & Coating for fittings and Accessories  Tech Spec Clause No: Reference Standard : BSEN545:2010- clause 4.4.2 & 4.5  ISO 2531 :2009 - clause 4.4.1 & 4.5.1 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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**PRE –SHIPMENT INSPECTION OF DI PIPES & FITTINGS - CHECK LIST**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Chemical Composition | | | | | | |
| Bill No: Item No. & Qty. Sample size:  Description of Item : DI Pipes (SS/DF) Class : Dia x Length :  Tech Spec Clause No: Reference Standard : BSEN545:2010& ISO 2531 :2009 | | | | | | |
| Sample  No | Item of testing | Physical/Measured  Value | Deviation | Tolerance  Allowed | Comply? | Remarks |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| Inspection & Testing Witnessed by | | | | | | |
| Name : 1. Name : 2. | | | | | | |
| Signature: 1. Signature: 2. | | | | | | |
| Date : | | | | | | |

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**INSPECTION OF DI PIPES & FITTINGS**

**CHECK LIST**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Technical Specifications**  **Clause No.** | **Description** | **Requirements as per Specifications** | **Satisfactory/**  **Unsatisfactory** | **Remarks** |
| HANDLING OF PIPES AND FITTINGS AFTER PRODUCTION | | |  |  |
|  | Packing |  |  |  |
|  | Handling |  |  |  |
|  | Stacking |  |  |  |
|  | Inspection by Factory/Inspection Authority |  |  |  |
|  | Transport Arrangements within manufacturers Country |  |  |  |
|  | Shipping Arrangements |  |  |  |
|  | Freight Insurance Arrangements |  |  |  |
| CONCLUSION AT THE END OF THE INSPECTION TOUR | | |  |  |
| Total Process of Production, Testing, Packing,  Handling, Insurance and Freight  Arrangements Satisfactory | | |  |  |

**Observations :**

**Signature 1 Signature 2**

**Name & Designation 1: Name & Designation 2:**

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**Rubber rings / Gaskets**

**Physical Parameter**

1. Dimensions :…………………..
2. Diameter :…………………..
3. Hardness :………………….
4. Appearance :…………………..
5. Lot Numbers : …………………..

**Quality**

1. Product Conformity certificate
2. ISO 9001:2008 certificate

**Packing Arrangements**

1. Inspection by Independent Inspection Agency : ………….
2. Shipping Arrangements :……………..

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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample No** | **Diameter** | **Thickness mm** | **Hardness** | **Appearance** | **Deviation** | **Tolerance allowable** | **Whether Comply** | **Remarks** |
|  |  |  |  |  |  |  |  |  |

Product conformity certificate available acceptable : ………………..

(witness the original certificate)

ISO 9001;2008 Quality Management System certificate available and acceptable: ……………..

(witness the original certificate)

**Appendix 13 - PRE-QUALIFICATION OF MANUFACTURERS FOR**

**SUPPLY & DELIVERY OF DI PIPES, FITTINGS, VALVES, MANHOLE COVERS& PVC PIPES & FITTINGS**

***When Bidding Document is prepared please include updated list of prequalified manufactures under this Appendix* *from the website: www.waterboard.lk***

**Appendix- 14A**

**Confirmation from the DI Fittings Manufacturer to Supply DI Fittings to DI Pipe Manufacturer**

***Note: This is to be typed on a company letter heading***

General Manager,

National Water Supply & Drainage Board,

Galle Road, Ratmalana.

Sri Lanka.

**Guarantee to Supply of DI pipe fittings to DI pipe manufacturer M/s. ………………………**

**………………………………………………..……*(Name & Address of the Pipe Manufacturer)***

We, …………………………………………………………………………………………………...***(Name & Address of the DI Pipe fittings Manufacturer)*,**the manufacturer of DI pipe fittings hereby guarantee that, DI pipe fittings manufactured at our above factory located at ………...……

…………………………………………….conforming to EN 545/ ISO 2531/ EN 598/ ISO 7186 and ISO 9001:2008 shall be supplied to M/s……………………………………………….. …..……………………………………………………………….…… ***(Name of the DI Pipe Manufacturer)***to be used with ………………………………….*(brand of the pipe)*, pipes manufactured at the …………………………………………………………………………*.(Office & Address of the Pipe Manufacturer)*

…………………………….

Authorised Signatory Attested by the Attorney at Law

and the Company Seal

…………………………………..

Signature of the Attorney at Law

Name : ………………………………….

In the Capacity of : …………………………………. Seal …………………………………

In the place of …………………….…

……………………………...*(address)*

Witnesses :

1 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

2 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

**Appendix- 14B**

**Confirmation from the Rubber Rings Manufacturer to Supply Rubber Rings to DI Pipe Manufacturer**

***Note: This is to be typed on a company letter heading***

General Manager,

National Water Supply & Drainage Board,

Galle Road, Ratmalana.

Sri Lanka.

**Guarantee to Supply of Rubber Rings to DI pipe manufacturer M/s. …………………………**

**………………………………………………….……*(Name & Address of the Pipe Manufacturer)***

We, …………………………………………………………………………………………………...***(Name & Address of the Rubber Rings Manufacturer)*,**the manufacturer of Rubber Rings hereby guarantee that, Rubber Rings manufactured at our above factory located at ………...……………...

………………………………………………conforming to EN 681-1/ ISO 4633 and ISO 9001:2008 shall be supplied to M/s. …..……………………………………………………………..

…………………………………… ***(Name of the DI Pipe Manufacturer)*** to be used with ……………………*(Trade name of pipes)*pipes manufactured at the ……………………...……………….

…………………………………………………………………………….*(Office & Address of the DI pipe manufacturer)*and …………………………… *(Trade name of DI fittings)* DI pipe fittings manufactured at the .........................................………………………………………………………. ………………………………………(*Office & Address of the DI pipe fittings manufacturer).*

…………………………….

Authorised Signatory Attested by the Attorney at Law

and the Company Seal

…………………………………..

Signature of the Attorney at Law

Name : ………………………………….

In the Capacity of : …………………………………. Seal …………………………………

In the place of …………………….…

……………………………...*(address)*

Witnesses :

1 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

2 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

**Appendix- 14C**

**Guarantee for Supply of DI Pipes, Fittings,**

**accessories and Rubber Rings for leak proof pipe line**

***Note: This is to be typed on a company letter heading***

General Manager,

National Water Supply & Drainage Board,

Galle Road, Ratmalana.

Sri Lanka.

We, ……………………………………………………………………………………………………………, ***(Name & Address of Pipe Manufacturer)*** the Manufacturer of DI Pipes, hereby guarantee that,

1. Pipes manufactured by the above factory will be supplied with the DI fittings manufactured by M/s. ……...………………………………………………………………………………..

………………………………….……….. **(*Name & Address of DI fittings manufacturer)***

**(A guarantee from the DI fittings manufacture is attached)**

2. DI pipes, fittings, accessories and rubber rings supplied, match and fit properly and adequately each other to ensure leak proof pipeline installations under all working conditions.

3. We will unconditionally undertake to replace any material rejected by the Engineer within the time period as agreed with the Engineer during implementation stage at no additional cost to NWSDB ensuring the timely implementation of the project.

4. We will unconditionally undertake that the Nominated Inspection Agency inspect, test and issues a certificate ensuring that DI pipes, fittings, accessories and rubber rings inspected shall fit properly and adequately to ensure leak proof pipeline installations under all working conditions upon shipment.

…………………………….

Authorised Signatory Attested by the Attorney at Law

and the Company Seal

…………………………………..

Signature of the Attorney at Law

Name : ………………………………….

In the Capacity of : …………………………………. Seal …………………………………

In the place of …………………….…

……………………………...*(address)*

Witnesses :

1 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

2 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

**Appendix- 15A**

**LOCAL ACCREDITED AGENT’S Confirmation ofSupply OF di**

**PIPE FITTINGS & SPECIALS accordingto WORK PROGRAMME.**

***Note: This is to be typed on a company letter heading***

[Address of the Local Accredited Agent]

…………………………………………..

………………………………………….

………………………………………….

Chairman,

Procurement Committee,

# Bid for ……………………………… Water Supply Scheme

**Contract No…………………………………….**

We, ………………….…………………………………………………………………………[*name ofthe Local Accredited Agent*] of ……………………………………………………………………………………………….……………………………………………………………….…….*(address of the Local Accredited Agent)* confirm that we willSupply & Deliver DI Pipe Fittings and Specials submitted in this bid to the bidder M/s. ……………………………………………………………………………………………………………………………………………………….*(Name& Address of the bidder)* according to the work programme of the bidder, included in the bid.

…………………………….

Authorised Signatory Attested by the Attorney at Law

and the Company Seal

…………………………………..

Signature of the Attorney at Law

Name : ………..……………………………….

In the Capacity of :……………………………… Seal ……………………………

In the place of …………………….…

……………………………...*(address)*

Witnesses :

1 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

2 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

**Appendix- 15B**

**LOCAL ACCREDITED AGENT’S Confirmation ofSupply OF pe**

**PIPES & FITTINGS according toWORK PROGRAMME.**

***Note: This is to be typed on a company letter heading***

[Address of the Local Accredited Agent]

…………………………………………..

………………………………………….

………………………………………….

Chairman,

Procurement Committee,

# Bid for……………………….……… Water Supply Scheme

**Contract No…………………………………….**

We, ……………………..……………………………………………………………………… [*name of the Local Accredited Agent*] of …………………………………………………. ………………………………………………………………….……………………………………………………….…….*[address of the Local Accredited Agent],* confirm that we will Supply & Deliver PE Pipes & Fittings submitted in this bid to the bidder M/s. ……………………………………………………………………..*(Name of the bidder)* according to the work programme of this bidder included in the bid.

…………………………….

Authorised Signatory Attested by the Attorney at Law

and the Company Seal

…………………………………..

Signature of the Attorney at Law

Name : ……………….………………………….

In the Capacity of :………………………………….

Seal …………………………………

In the place of …………………….…

……………………………...*(address)*

Witnesses :

1 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

2 Signature : ……………………………………………………………

Name : ……………………………………………………………

Capacity : ……………………………………………………………

Address : ……………………………………………………………

**Appendix- 16**

**Joint Venture Agreement**

**This agreement** made and entered into at the places and on the dates hereinafter set forth by and between.

……………………………………………. a Company duly incorporated under the laws of the ……………………………………………………………….. and having its Registered Office at ……………………………………………………………………………………… ………………………………………. and having a place of business in Sri Lanka at …… …………………………………………………………………………….(hereinafter referred to as “the Party of the First Part” which term or expression as herein used shall where the context to requires mean and include the said …………………………………………………... ……………………….. its successor or successors and assigns) of the **one Part**.

……………………………………………………………. a Company duly incorporated in ……………… and having its Registered Office at …………………………………………… ……………………………………………………….. (herewith referred to as “the Party of the Second Part” which term or expression as herein used shall where the context so requires mean and include the said ………………………………………………….. its successor or successors and assigns) of the **SECOND PART.**

**And**

**………………………………………………….** Company duly incorporated under the laws of the ……………………………………………………………….. and having its Registered Office at ……………………………………………………………………………………… ………………………………………. (hereinafter referred to as “the Party of the Third Part” which term or expression as herein used shall where the context to requires mean and include the said …………………………………………………...……….. its successor or successors and assigns) of the **THIRD Part**.

**WITHNESSETH**

**Preamble**

1. National Water Supply & Drainage Board of the Democratic Socialist Republic of Sri Lanka has invited offers for the ………………………………………………………… …………………………………………………………………………………………………………………………………………………………………………………………………….…………..…………………………………(contract no….………………………… ………………………………………………………………………………………………)

(hereinafter referred to as “the Project”)

2. The parties hereto has agreed among themselves to establish and implement a Joint Venture for the purpose of submission of an offer and in the event of such offer being accepted and the contract being awarded in respect of the………………………………………………………………………………………………………………………………………………………………………………………………………………………………………… (contract no. ………………………………………………………………………… ………………………………………………………) execution of the works stipulated in the said contract on the terms and conditions stipulated therein.

NOW THIS AGREEMENT WITNESSETH and it is hereby and between the parties hereto as follows :

**ARTICLE 1 – OBJECT OF THE JOINT VENTURE**

1.1 The object of the Joint Venture shall be submission of an offer and in the event of such offer being accepted and the contract being awarded in respect of the ………………………………………………………………………………………………………………………………………………………………………………………………………………….……….…………………………………………………(contract no……………………………….………………………………...…

……………………….…) execution of the works stipulated in the said contract on the terms and conditions stipulated therein. (hereinafter referred to as “the Project”).

**ARTICLE 2 – ESTABLISHMENT OF THE JOINT VENTURE**

2.1 The Parties hereto shall establish and carry on the Objects of the Joint Venture under the name “………………………………………………….” (hereinafter referred to as “the JVC”)

**ARTICLE 3 – CAPITAL AND OTHER REQUIREMENTS OF THE JVC**

3.1 The equity participation by the Parties hereto in the JVC shall always be in the following proportion :

i. The Party of the First Part - ………. per centum (……%) of the equity

ii. The Party of the Second Part - ………. per centum (……%) of the equity

iii. The Party of the Third Part - ………. per centum (……%) of the equity

3.2 The capital requirement of the JVC shall be determined by the Parties hereto from time to time.

**ARTICLE 4 – OWNERSHIP AND LEAD PARTY**

4.1 There shall be One Hundred shares in the JVC which shall be owned by the parties hereto in the manner following :

i. The Party of the First Part - ………. shares

ii. The Party of the Second Part - ………. shares

iii. The Party of the Third Part - ………. shares

4.2 The Party of the First Part shall be the Lead party of the JVC.

4.3 The Lead Party shall have the authority to

i. sign and execute any applications, contracts, receipts and any other document including any and all applications, contracts and other documents in respect of the Project and to receive instructions on behalf of the JVC.

ii. to represent the JVC at any forum in respect of the Project.

iii. be in charge of the Project.

4.4 The Lead Party shall also co-ordinate the activities of all the parties in relation to the performance of the Project among the Parties hereto and/or with other appropriate bodies, companies or authorities.

4.5 The Party of the Second Part shall act as Deputy Joint Venture Leader of the Third Part and shall act as a ………………….. and provide ……………………….. for the works of the Project and along with the Lead Party shall coordinate the activities of the Parties in relation to the performance of the Project.

4.6 The Party of the Third Part shall act as Deputy Joint Venture Leader of the Third Part and shall act as a …………………… for the Project, including the provisions of all ……………………………………………. for the Project and along with the Lead Party shall coordinate the activities of the Parties in relation to the performance of the Project.

**ARTICLE 5 – TENDERING, NEGOTIATIONS AND SIGNING OF THE CONTRACT**

5.1 The compilation and submission of the offer shall be coordinated by the Lead Party.

5.2 Each Party shall provide in time, correctly and completely, all documents and information which the Lead Party may require and which the other Parties may require for the calculating, planning and executing of their respective Scopes of Work.

5.3 Each Party shall include in its offer all costs in relation to the execution of its Scope of Works in accordance with the Bid Documents of the Project.

5.4 If changes to the Scope of Works are required by one Party that Party shall immediately inform in writing the other Parties of such changes.

5.5 The contents of the offer shall be agreed by all the Parties hereto.

5.6 All contracts agreements and other writings in respect of the Project wherein the Parties hereto are involved shall be in the name of the JVC.

**ARTICLE 6 – FINANCING**

6.1 The capital requirement of the JVC shall be financed by the Parties hereto in proportion to their equity participation in the JVC stipulated in Article 3.1 herein.

6.2 The JVC may obtain working capital over and above its equity by commercial borrowing in Sri Lanka or in overseas if necessary. If, as a condition to granting any such loan, the lender requires guarantee(s), the parties hereto shall undertake to provide the guarantee(s), in the proportion respective of their ownership stipulated in Article 4 herein.

6.3 The Party of the First Part shall be responsible to provide the Bid Bond amounting to Rs. ……………… Party of the Second Part provides counter bond to the bank of the Party of the First Part in a sum of Rs......................... The Party of the Third Part provides counter bond to the bank of the Party of the First Part in a sum of Rs. ………………….

**ARTICLE 7 – SCOPE OF WORKS OF THE JVC**

7.1 In the event of the Contract for the Project (hereinafter referred to as “the said Contract”) being awarded to the JVC;

i. The Party of the First Part shall carry out ……… per centum (…….%) of the Works under the said Contract;

ii. The Party of the Second Part shall carry out ……….. per centum (…….%) of the Works under the said Contract;

iii. The Party of the Third Part shall carry out …………. per centum (……..%) of the Works under the said Contract;

7.2 Upon determining the Scope of Works allocated to each party in the manner aforesaid, that party shall be responsible for the proper execution, completion and maintenance of such Works allocated to it including any variations and/or additional Works within the scope of such allocated Works (hereinafter referred to as the “Allocated Works”).

7.3 Each Party shall be entitled to the value of the Allocated Works as stipulated in the said Contract.

**ARTICLE 8 – SHAREING OF PROFITS AND LOASSES AND LIABILITIES**

8.1 Notwithstanding anything to the contrary the Parties hereto shall be jointly and severally liable to the National Water Supply & Drainage Board for the execution, completion and maintenance of the Works in terms of the said Contract.

8.2 Without prejudice to Article 8.1 each Party shall be responsible for all costs, expenses, liabilities, claims, demands, interest, obligations arising out of the Allocated Works of each Party.

8.3 Each Party shall indemnify and keep indemnified the other from and against all costs, expenses, liabilities, claims, demands, interest, obligations, prosecutions arising out of the Allocated Works of each Party or arising out of the execution of any bonds, guarantees or indemnities of whatsoever nature entered into by the JVC in respect of the Works and are within the scope of Allocated Works of each Party.

8.4 Each Party shall be entitled to the profits or bear the losses made in respect of the Allocated Works of each Party.

**ARTICLE 9 – BOARD OF MANAGEMENT OF THE JVC**

9.1 The JVC shall be managed by a Board of Management consisting of ……….. Members (hereinafter referred to as “the Board”)

i. The Party of the First Part shall have the right to appoint ……….. Members to the Board;

ii. The Party of the Second Part shall have the right to appoint ……….. Members to the Board;

iii. The Party of the Third Part shall have the right to appoint ……….. Members to the Board;

9.2 The right of appointment of the nominees conferred on the Parties hereto shall include the right at any time to remove any such persons appointed by such Party and to replace any person who (for any reason whatsoever) ceases to be a Member and from time to time to determine the period which such persons shall hold office as Member.

9.3 Any appointment, removal or replacement of a Member as aforesaid shall be made in writing and be signed by the appointer and shall take effect as from the date of its receipt at the office of the JVC or on the date of appointment specified in the notice, whichever is later.

9.4 The Party of the First Part shall have the right to appoint the Chairman of the Board.

9.5 The Board shall meet at least once a month and no business shall be transacted at any meeting of the Board unless a quorum consisting of all Members is present throughout the meeting. All decisions at the Board shall be by a unanimous vote.

9.6 The Parties hereto shall ensure that their nominees on the Board shall implement the operating policies decided by the Parties hereto in terms of These Presents.

**ARTICLE 10 – MANAGEMENT OF THE JVC**

10.1 The JVC shall be managed by the Board of Management who shall appoint competent staff to manage the business of the JVC.

10.2 The employee of the Parties may be seconded to the JVC to carry on the business of the JVC.

10.3 The Board shall decide on the salaries payable to the employees of the JVC and such salaries and all statutory payments due and payable to all employees of the JVC shall be met by and paid out of the funds of the JVC.

10.4 The tasks and authority of the staff shall be determined by the Board from time to time.

10.5 The Bankers of the JVC shall be such Bank or Banks as the Board shall from time to time agree upon and the Board may open an account or accounts at such Bank or Banks and all cheques, orders for payments and requisitions in respect of the said account or accounts shall be signed by Three Members of the Board.

10.6 All income derived from the business carried out by the JVC shall be received by the JVC.

10.7 All expenses which may be incurred in carrying on of the business of the JVC shall be paid out of the funds of the JVC and in the case of deficiency thereof then by the Parties hereto in the proportion respective of their ownership stipulated in Article 4 herein.

**ARTICLE 11 – ACCOUNTS, AUDIT AND RECORDS OF THE JVC**

11.1 The accounting system of the JVC shall conform to the generally accepted accounting policies and principles of Sri Lanka and shall accurately reflect the financial position of the JVC.

11.2 The Board shall cause to prepare annual and monthly reports with respect to the activities of the JVC. The Board shall approve the said annual and monthly reports.

11.3 The Parties hereto agree to cause the books and records of the JVC to be audited at the end of each financial year during the term of this Agreement by the Auditors of the JVC which shall be an independent public accounting firm. Such firm of accounts shall yearly provide the Parties with a financial report in English and in accordance with generally accepted accounting principles of Sri Lanka. Copies of such Annual Audits shall be provided to both Parties hereto at the expense of the JVC. Subject to the approval at the meeting of shareholders such Annual Audit shall be final and binding upon the Parties as to the revenue, costs, fees, expenses, losses and profits of the JVC, absent manifest error or fraud.

11.4 All deeds, documents of title, share registers, other registers, minute books, share certificate books, cheque book, all agreements, contracts, records and all other documents whatsoever of the JVC shall be held at the disposal of the Board.

11.5 Either Party shall have the right at any time to inspect the books of the JVC at such Party’s expense.

**ARTICLE 12 – CONFIDENTIALITY**

12.1 Each Party shall maintain strict confidence and secrecy in respect of all information of a confidential nature received by such party, directly or indirectly, pursuant to this Agreement or otherwise relating to the JVC and shall not use such information other than where necessary for the business of the JVC. The restrictions set forth in this Clause shall not apply to information which (a) was publicly available at the time of such disclosure or subsequently becomes publicly available through no act or omission of the Party making disclosure or; (b) was released by another party to a Third Party without breach of this Clause or (c) the Party is required by law or by a Court of Competent Jurisdiction to disclose such information.

**ARTICLE 13 – ASSIGNMENT**

13.1 Neither of the Parties hereto shall assign this Agreement or rights and obligations accruing or binding on them or their respective shares without the prior written consent of the other being obtained.

13.2 Neither of the Parties hereto shall do or willingly suffer to be done anything whereby any property of the JVC may be attached, seized or taken in execution under a writ issued by a Court of Law or other lawful authority or may be otherwise endangered.

**ARTICLE 14 – PERIOD**

14.1 This Agreement shall become effective from the date of this Agreement and shall remain in force until terminated pursuant to Article 15 hereof.

**ARTICLE 15 - TERMINATION**

15.1 This Agreement may be terminated forthwith upon the serving of notice in writing upon the occurrence of any one or more of the following events:

i. by either party, if the relevant authorities, if any do not approve the Joint Venture inform and substance acceptable to the Parties hereto.

ii. by the other party, if one party shall commit a breach of any of its obligations under this Agreement which shall fail to remedy within 60 days from written notice being given requiring that breach to be remedied ;

iii. by the other party, if one party shall be or become incapable for a period of 60 days of performing any of its obligations under this Agreement;

iv. by the other party, if one party fails to perform the Allocated Works of that party;

v. by the other party, if one party or its creditors or any other eligible party shall file for that party’s dissolution, liquidation, reorganization or compulsory composition or if that party has entered into dissolution, liquidation, bankruptcy, reorganization, or compulsory composition or if that party is unable to pay any debts as they become due, has explicitly or implicitly suspended payment of any debts as they become due (except those debts which are contested in good faith) or gas liabilities which exceed its assets, or if the creditors of that party have taken over its management or if the relevant financial institutions have suspended that party’s clearing house privileges or if any material or significant part of that party’s undertaking, property or assets shall be expropriated or confiscated by action of any government;

15.2 In the event of the said Contract is not awarded to the JVC then in such as event These Presents shall stand terminated.

15.3 In the event of the said contract has been completed and defect liability period have been full filled then in such an event These Presents shall stand terminated.

**ARTICLE 16 – CONSEQUENCES OF TERMINATION**

16.1 Termination of this Agreement shall be made without prejudice to the accrued rights and liabilities of the Parties at the date of termination, unless waived in writing by the mutual agreement of the Parties.

16.2 If this Agreement is terminated for any reason whatsoever after the award of the said Contract the Parties hereto shall be paid for the Works executed by each party up to the date of termination of this Agreement upon receipt by the JVC of the monies for such Works carried out by the JVC.

16.3 In the event of this Agreement being terminated in terms of Articles 15.1 (ii), (iii), (iv) or (v) herein;

i. the defaulting party shall be excluded from further participation in the JVC;

ii. the non defaulting party/ parties shall continue to carry on the Works in terms of the said Contract. Provided always the defaulting party shall be responsible for the losses incurred in respect of the Allocated Works of the defaulting party/parties;

iii. the non defaulting party/ parties shall operate the banking accounts of the JVC to the exclusion of the

and

iv. the defaulting party shall execute all documents and carry out all acts necessary to transfer the rights of the defaulting party to the non defaulting party and the defaulting party doth hereby grant the non defaulting party the authority and power to execute all such documents and carry out all such acts on behalf of the defaulting party.

16.4 upon termination of this Agreement in the manner aforesaid the Parties hereto shall subject to Article 16.3 herein cause the JVC to be duly dissolved and liquidated.

**ARTICLEL 17 – MISCELLANEOUS**

17.1 Should any of the provisions of this Agreement be void for any reason whatsoever, the validity of the remaining provisions shall thereby not be effected. In such cases the Parties hereto shall agree to replace them in effective provisions by a new one which shall be legally valid.

17.2 The Parties hereto shall co-operate closely and confidently in all matters related to the said JVC and will inform one another immediately of any important circumstances effecting the JVC.

17.3 Any collateral Agreements must be in writing and made subsequent to this Agreement.

17.4 The Party of the First Part shall obtain all necessary approvals to establish and carry on the Joint Venture and to register the JVC with the relevant authorities.

17.5 The Parties hereto declare that they have not concluded any contracts or agreements prior to these Presents which are inconsistent with the provisions of this Agreement.

17.6 This Agreement shall be governed by and constructed in accordance with the laws of the Democratic Socialist Republic of Sri Lanka.

17.7 Each Party undertakes to carry out this Agreement in good faith and to respect the spirit as well as the letter of its provisions.

17.8 Each Party warrants and represents to the other Party that it has no outstanding commitments or obligations which would impede its ability and right to enter into this Agreement and/or fulfill its obligation hereunder except those which have been disclosed at the time of execution of this Agreement.

17.9 Each Party agrees to hold the other Party harmless and to indemnify the other Party/ Parties against any and all liabilities, losses, damages, finder’s fee, commissions and/or expenses which either of them may sustain by reason of the breach or alleged breach of the provisions contained herein.

17.10 The failure of any Party at any time or times to require performance by the other Party of any provision of this Agreement shall not affect in any way the right of such Party to require performance of that or any other provision and any waiver by any Party if any breach of this Agreement shall not be constructed as a waiver of any continuing or succeeding breach of such provision, a waiver of the provision itself, or a waiver of any other right under this Agreement.

17.11 the Parties hereby represent and warrant that they have full power, authority and legal right to enter into this Agreement.

17.12 The Parties hereby agree and undertake to take all such steps as may be or become necessary to give full effect to the provisions contained in this Agreement and to use their respective votes in the JVC for achieving their objective.

17.13 This Agreement shall not be deemed to be for the benefit of any Party other than the Parties hereto nor shall it give any persons other than the Parties hereto any right to enforce its provisions other than in the manner stipulated herein.

17.14 Any of the Parties hereto and/or any of their respective Directors shall not or cause any of its subsidiaries and/or associate companies and/or any entity controlled and/or managed by them either directly or indirectly in any capacity whether on their own account or as a member, director, employee, agent, partner, joint venture, advisor or consultant to provide any services in respect of the Project other than as stipulated herein.

17.15 All expenses incurred in respect of drafting and preparing this Agreement shall be shared equally among the Parties hereto.

**ARTICLE 18 – ARBITRATION**

18.1 In the event of a dispute or difference arising between the Parties hereto concerning this Agreement or any matter of whatsoever nature arising thereunder or the operation or the interpretation thereof or the rights, duties liabilities of any Party hereto under or in connection therewith or the fair value of the shares of the JVC the Parties hereto agree to resolve such dispute or difference by mutual negotiation and failing settlement by mutual negotiation within a period of thirty (30) days from the date of notification of such dispute by one Party to the other or others, the dispute or difference shall be referred to binding arbitration by two arbitrators if the dispute is between two Parties or if the dispute is between three parties by three arbitrators, one to be appointed by each Party, with provision for an Umpire to be appointed by the two arbitrators or if three arbitrators are appointed the Umpire to be appointed from amongst them before commencement of the arbitration in the event of indecision of the arbitrators. The Party requesting arbitration, shall, with such request, nominate its arbitrator and the other Party shall within thirty (30) days thereof make its own nomination. Should the other Party fail to nominate its arbitrator within the said thirty (30) days or should any nominated arbitrator fail or refuse to act, the proceedings shall be before the other nominated arbitrator who shall be the sole arbitrator or two arbitrators as the case may be. The decision of the arbitrators or the sole arbitrator or the Umpire as the case may be regarding the dispute, claim or difference and the award made shall be final and binding upon the Parties.

18.2 The Rules to be adopted at the Arbitration shall be the Rules of Arbitration Act, No. 11 of 1995 of the Democratic Socialist Republic of Sri Lanka or the Rules of the Arbitration Center of the Institution for the Development of Commercial Law and Practice, Sri Lanka.

18.3 The Place of Arbitration shall be in Colombo and the cost of the Arbitration shall be met by the Parties hereto together on a pro-rata basis or singly in accordance with the recommendation of the Arbitrator or Arbitrators.

**ARTICLE 19 – NOTICES**

19.1 All approvals, consents and notices required to be given or served hereunder by either Party hereto to the other/s shall be deemed to have been duly given or served if the same shall have been delivered to be left at or sent by Registered Post by either Party to the other/s at its principal or registered office as the case may be; provided always that either Party aforesaid shall have the right to inform the other/s in writing of any other address at which such approvals consents or notices aforesaid shall be received by it and the same shall be held to have been duly given or served if the same shall have been delivered to left at or sent by Registered Post to such Party at such other address.

IN WITNESS WHEREOF ………………………... the duly appointed Attorney of …………..……………………………………………….……………….. has placed his hand, …………………………………………………………………..……………………. and …………………………………………………. Have affixed their respective Company Seals and hereunto and to two other of the same tenor and date as These Presents on the dates and at the places hereinafter written.

The signature of the said ………………………………. )

the duly appointed Attorney of ………………………… )

placed his hand hereunto in the presence of following )

witnesses at ……………….. on this ……… day of )

………………… 20…… )

Witnesses :

1.

2.

The Common Seal of the said ………………………….. )

was affixed hereunto in the presence of )

)

………………… - Director )

)

who do hereby attest the sealing thereof at ……………. )

……………… on this …… day of ………….. 20……. )

Witnesses :

1.

2.

The Company seal of the said ………………………..… )

was affixed hereunto in the presence of )

1.

2.

who do hereby attest the sealing thereof at ……………… )

on this …… day of ……….. 20…. )

Witnesses :

1.

2.

**Appendix- 17**

**FORM OF ASSET MANAGEMENT**

**DEMOCRATIC SOCIALISTREPUBLIC OF SRI LANKA**

**MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION**

**NATIONAL WATER SUPPLY & DRAINAGE BOARD**



**SLUDGE MANAGEMENT POLICY FOR**

**WATER TREATMENT PLANTS**

**December 2012**

**Appendix - 18**

**MINISTRY OF WATER SUP**

Revised on 06-02-2019

**Sludge Management Policy for Water Treatment Plants**

**1.0 Introduction**

Considerable amount of wastewater is produced in water treatment plants due to backwashing of rapid sand filters and release of accumulated sludge in sedimentation tanks. Treatment of the wastewater emanating from the water treatment plants has not been practiced in the past as a policy even in large scale water treatment plants such as Ambatale, causing pollution of the downstream environment. In water treatment plants the amount and the concentration of wastewater produced will depend on the raw water quality which may differ seasonally.

The National Environmental Act Number 47 of 1980 and amended Act Number 56 of 1988 and the latest amendment on 1st February 2008 specifies the requirements of compliance to “Tolerance Limits for the Discharge of Industrial Waste Into Inland Surface Waters” to meet the identified 31 parameters. The compliance for water treatment plant effluent is of no exception. The new standards dictate discharge criteria for colour (maximum spectral adsorption coefficient) of

* 7m-1 for wavelength for yellow (436nm)
* 5m-1 wavelength for red range (525nm)
* 3m-1 blue range (620nm)

to be achieved in order to obtain or renewal of the Environmental Protection License for Emission or Disposal of Wastewater which will become mandatory for all water treatment plants in the near future. In addition, chemicals used in water treatment contain trace concentrations of heavy metals which will ultimately end up in the water bodies.

In larger capacity water treatment plants (>4500 m3/d), it is advantageous to reuse the backwash water in order to conserve energy. The additional energy consumed for backwash water recovery pumping would be comparatively less than the equivalent for raw water pumping. Thus it would be prudent to adopt backwash water recovery in large water treatment plants.

**2.0 Treatment of Wastewater from Water Treatment Plants**

**2.1 Sludge Thickening**

Sludge thickening is defined as the removal of water from the sludge to aim at substantial reduction of sludge volume. For example if sludge with 0.8% dry solids (DS) can be thickened to 4% DS; a five fold decrease in sludge volume is achieved. The objective of thickening is to produce a sludge that is as thick as possible which can be pumped without difficulty and a relatively solid free liquid supernatant.

The major advantage of sludge thickening is the cost saving in sludge handling processes. The design and operation as well as the performance of several subsequent processes are positively affected by a higher solid content of the input sludge. Stabilization as well as dewatering processes is improved at higher sludge concentrations.

Gravity sludge thickening is the method commonly adopted. Slope of the bottom of the gravity thickeners should be carefully selected in order to facilitate flow of thickened sludge towards the centre/collection pit. Gravity thickeners, usually circular in shape and provided with pickets or rakes to improve dewatering of sludge. A dry solids content of 2-2.5% can be expected from gravity thickening.

Polymer dosing to enhance performance of thickening process can increase the dry solids content at least to 4% and it will improve the efficiency of dewatering processes such as sludge drying beds, centrifuge which would follow thereafter. The centrate resulting from dewatering should not be recycled back into the water treatment plant. Instead it can be sent back to the sludge regulation tank under gravity to undergo thickening process

The thickener supernatant can be discharged to the environment if it complies with the CEA regulations or else suitable pre-treatment should be provided. Progressive cavity pumps can be used to transfer the thick slurry to an appropriate sludge dewatering process depending on the hydraulic profile of the treatment plant.

* 1. **Sludge Dewatering**

The alternatives for sludge dewatering systems are described below. Guidance for selection of an appropriate system is given in Table 1.

Table 1: Comparison of Sludge Dewatering Systems

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatment Process** | **Advantages** | **Disadvantages** | **Land Requirement** | **Cost Per Unit of Treated Water** |
| Sludge Drying Beds | Low cost | Lateral Clogging  Rain can impede the drying process | High | Low |
| Solar Sludge Drying Beds | DS content of 80-85% possible | Capital Cost is slightly increased due to UV Protected Polythene | Considerably lower than conventional drying beds | High |
| Sludge Lagoons | Low cost | Rain can impede the drying process | Low | Low |
| Filter Press | DS content of 20-30% possible | High capital & O&M cost  Polymer dosing is required  Sand and grit can damage the belt | Low | High |
| Centrifuge | DS content of 15-20% possible | High capital & O&M cost  Polymer dosing is required | Low | High |

The filtrate from the selected dewatering system should be returned to the sludge regulation tank.

* + 1. **Sludge Drying Beds**

Sludge drying beds are most favoured when lands are available in close proximity to the water treatment works. Areas where strong sunlight is available with average annual rainfall lower than 2200mm are appropriate. Filtrate of the sludge drying beds can be directed under gravity to sludge regulation tank for subsequent thickening and should not be discharged to the environment. However in areas having higher rainfall (average annual rainfall between 3000 to 6000 mm) in order to achieve higher dry solid contents solar sludge drying beds having a roof cover of UV protected polythene can be utilized..

Past experience in water treatment plants in Sri Lanka reveals that sludge emanating from dissolved air floatation technique which contain considerable amount of algae retard the drying process of the sludge drying beds. In such situations it may be more appropriate to adopt mechanical dewatering techniques such as centrifuge with polymer dosing. Such process selection may have to be verified through research. User friendly arrangement to be provided to collect dried sludge from sludge drying beds

* + 1. **Sludge Lagoons**

Lagoons may be the cheapest method of sludge dewatering but large land area is required compared to mechanical dewatering techniques. However, compared to conventional sludge drying beds, lagoons require considerably lesser land extent. Lagoons can be lined or unlined or can be provided with under drain arrangement for better dewatering requirements.

Unlined earthen sludge lagoons are more effective in dealing with large volumes of sludge from higher capacity water treatment plants. However due consideration should be given to the following during planning of the water treatment plant layout to locate sludge lagoons

* Fluctuation of groundwater table (seasonal high groundwater table should be sufficiently below the bottom of the lagoon preferable below 2.5 m)
* Underlying soil characteristics should be investigated to see its suitability, soil percolation rate between 25 to 150 mm/hr being preferred.
* Annual precipitation preferably to be below 3000mm
* Access ramps to be provided for dumper/tractor/mini loader to collect dried sludge from the lagoon and final disposal as outlined in section 2.5.

**2.2.3 Mechanical Sludge Dewatering**

Important operational parameters to be considered in evaluation of these systems are: ***energy consumption, required polymer dosage and separation efficiency***. Further, mechanical dewatering systems such as Belt Filter Presses, Filter Presses and Centrifuges should operate continuously as far as possible in order to reduce usage of treated water for the cleaning operation required at the end of each operation cycle and to optimize utilization of equipments. These equipments require

* high skilled maintenance staff
* suitable polyelectrolyte with dosing arrangement
* electrical power for operation of the equipment

Therefore the process is usually attractive only in large sludge dewatering facilities with incoming flow > 0.3m3/s (25,920m3/day). As such correct assessment of sludge generation and selection of the capacity of each unit is very important.

After mechanical dewatering, the sludge is generally directed through a conveyer into a skip or a hopper. The filtrate from mechanical dewatering facility can be directed back to the sludge regulation tank. Most mechanical dewatering equipment can achieve 15-20% DS content but the actual performance needs to be verified from manufacturers.

Mechanical sludge dewatering is only recommended for

* major water treatment plants that generate large quantity of sludge
* treatments plants that do not have adequate land or
* areas that experience average annual rainfall in excess of 3000mm

**2.3 Backwash Water Recovery**

Backwash recovery is aimed to utilize water resources to its maximum potential, minimize energy consumption and thereby optimize production costs. The backwash recovery process should not cause any adverse impacts on the treated water quality. The possible health implications could be trace amounts of heavy metals that may be present in raw water or in water treatment chemicals as impurities, pathogenic microorganisms, algal toxins/THM which may be produced during physical/chemical processes of the treatment works or present in raw water.

In this context, reuse of thickener supernatant is not recommended as about 95% of the contaminants in raw water are removed from the sedimentation process and hence may contain pathogenic organisms such as C**ryptosporidium and Giardia Lamblia which is resistant to chlorination**. The presence of these organisms in major rivers in Sri Lanka has not been investigated as yet.

It is advantageous to reuse the backwash water in order to conserve energy by minimizing the utilization of low lift pumps and to recover 2-5% of water. Backwash water recovery has many advantages as indicated in Section 1. However, the introduction of backwash water recovery needs careful evaluation of the raw water quality, the proposed treatment process and the cost-benefits.

Therefore the recommended unit processes for backwash water recovery to be incorporated in the sludge treatment stream are as follows;

* Backwashed water is first directed to backwash recovery tank (minimum two tanks each having capacity at least to hold two backwashes) where it is allowed to settle for a selected time. After allowing for sedimentation, supernatant is gravity fed to backwash recirculation tank which is constructed with common wall to the backwash recovery tank to minimize construction cost as shown in Annex 1. The gravity feeding system should comprise of pontoon attachment at the surface of the inlet pipe (which needs to be covered with suitable mesh to prevent escaping of floating debris) and the bottom end supported by a hinged bend in order to facilitate rotation of the pontoon attached inlet pipe as water level drops up to the sludge thickening zone of the backwash recovery tank.



Moving inlet pipe with pontoon with hinged bend (Kalatuwawa WTP: 1954)

* Backwash recirculation tank should be equipped with two wet well submersible pumps, one duty one standby, to pump the supernatant from backwash recovery tank to the raw water regulation tank. The submersible pumps should be equipped with float switches suitable for automatic operation and will be provided with guide rails and lifting chains to facilitate maintenance. The pumping rate should be decided by giving due consideration to the hydraulic capacity of the treatment units.
* After supernatant (clear water) in the backwash water recovery tank is completely transferred to backwash recirculation tank, the sludge from the backwash recovery tank is then pumped to sludge regulation tank using submersible wet well pumps similar to the operation of backwash recirculation pumps.
* Sludge emanating from the sedimentation tank can be directly sent to sludge regulation tank. The mixer equipped inside the sludge regulation tank will agitate and mix the sludge from sedimentation and backwash recovery tanks to achieve homogeneous concentration and to keep the sludge under suspension.

Two wet well submersible pumps, one duty one standby, to be provided to lift sludge from the sludge regulation tank to the gravity thickener.

* From the gravity thickener, the sludge is directed to ultimate disposal which could be either sludge drying beds, sludge lagoons or mechanical dewatering facility preferably by utilizing progressive cavity pumps, one duty one standby operation.

**2.4 Wastewater from Slow Sand Filters**

During scraping operation of the biological layer called “schmutzdecke” of the slow sand filters, the removed sand can be washed using “hydro cyclone” and reused when “re-sanding” of the slow sand filters is required. The dirty water resulting from the hydro cyclone needs to be treated appropriately in line with the disposal standards. A sludge thickener can be used if the number of filters is higher and continuous type of treatment is needed as in larger scale water treatment plants. If the treatment plant is of small scale, it may be sufficient to have a roughing filter together with natural or constructed wetland to polish further to meet the discharge standards as this type of system may be suitable for intermittent operation as generally slow sand filters need to be cleaned once in two to three months depending on the raw water quality.

**2.5 Disposal of sludge**

The dried sludge resulting from different dewatering methods discussed above should be disposed in compliance to environmental regulations. The options available for disposal of sludge are as follows;

* Land Disposal
  + Forest
  + Land Reclamation
  + Landfill
* Incineration
* Melting
* Brick and roof tile construction (after mixing with other constituents to obtain the desired consistency)

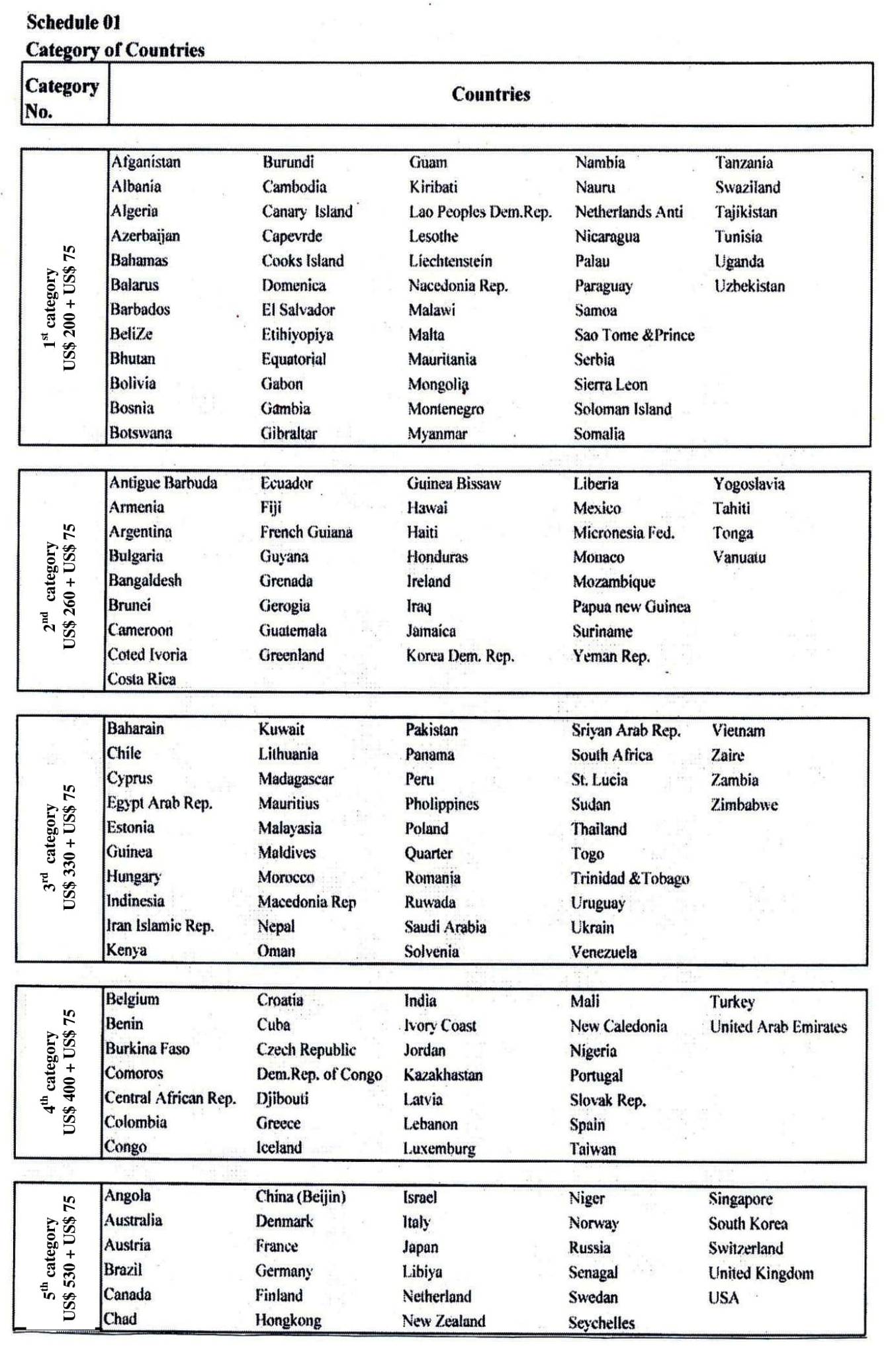
Table 1: ***EU Council Directive 86/278/EEC for land application of Sludge***

|  |  |  |
| --- | --- | --- |
| **Metal** | **Limiting Value (g/ha/year)** | **Limiting Value (mg/kg DS)** |
| Cadmium, Cd | 30 | 10 |
| Copper, Cu | 3000 | 1000 |
| Nickel, Ni | 900 | 300 |
| Lead, Pb | 2250 | 750 |
| Zink, Zn | 7500 | 2500 |
| Mercury, Hg | 30 | 10 |
| Chromium, Cr | 3000 | 1000 |

**Note:** Incineration and melting is extremely expensive and definitely not attractive to a country like Sri Lanka at least in the present context.

**3 Recommendation**

* Treatment of wastewater from water treatment plants has become mandatory in view of the requirements specified in the National Environment Act. The requirement of NWSDB to obtain a license from CEA to operate the treatment works will become mandatory in the near future.
* The treatment of wastewater from water treatment plants using conventional water treatment processes requires the following basic processes;
* Backwash recovery system which includes backwash recovery tank, backwash recirculation tank, sludge regulation tank, sludge thickener, complete with equipment as stated in Section 2.3.
* Sludge Disposal should be carried out using an appropriate method as outlined in Section 2.5.
* If the raw water source is highly contaminated with algae, backwash water recovery should be revived in relation to physical/chemical treatment proposed and possibility of presence/development of algal toxins

****

Revised on 08-05-2017

**APPENDIX 19 - ENTITLE ALLOWANCES ON FOREIGN TRAVELS &**

**RELATED EXPENSES**

**VII (a)**

**FORM OF BID**

**GOVERNMENT OF THE DEMOCRATIC SOCIALIST REPUBLIC**

# OF SRI LANKA

**MINISTRY OF CITY PLANNING, WATER SUPPLY AND HIGHER EDUCATION**

# NATIONAL WATER SUPPLY AND DRAINAGE BOARD

**BID FOR DESIGN AND BUILD**

**……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

**FORM OF BID**

NAME OF ONTRACT: Design, Construction, and Commissioning of…………………………………………………………………………………………………………………………………………………………………………………

To : *[****insert name and address of the Employers****]*

We have examined the Conditions of Contract, Employer’s Requirements, Schedules and Addenda Nos.…………. for the execution of the above- named Works. We accordingly offer to design, execute and complete the said Works and remedy any defects fit for the purpose, in conformity with the Bidding Documents and the enclosed Proposal, at the lump sum stated in the Form of Price Proposal included in a separate envelope and submitted with this bid, or other such sums as may be determined in accordance with the terms and conditions of the Contract.

We Confirm that our bid includes this General Information, Price Proposal, and Design/ Technical Proposal sealed under three separate envelopes.

We agree to abide by this Bid until\*………………[insert date], and it shall remain binding upon us and may be accepted at any time before that date.

We Confirm that, we(including all members of joint venture and subcontractors) are not associated, directly or indirectly, with the consultant or any other entity in preparation of the Design, Specifications, and other documents for the Contact.

If this offer is accepted, we will provide the specified Performance Security, commence the Works as soon as reasonably practicable after the Commencement Date, and complete the Works in accordance with the above-named documents within the Time for Completion. We will ensure that works will be done in conformity with the contract.

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.

We understand that you are not bound to accept the lowest offer or any other bid you may receive.

Signature of the persons duly authorized to sign documents for and on behalf of

Address:

Date:

-----------------------------------------

\*Refer instructions to Bidder’s clause 15.1

Revised on 11-11-2015

**SECTION VIII (a)**

**SCHEDULES RELATED TO**

**GENERAL INFORMATION**

**(“A” SCHEDULES)**

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

***Each Bidder or member of a JV must fill in this form***

|  |  |  |  |
| --- | --- | --- | --- |
| Schedule A1 – Preliminary Information *(enclose this Schedule in the envelope marked, “Envelope 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  *(iii) For sub contracting main contractor and major sub contractors shall furnish information separately.* | | | |
| **ITB clause reference** | Description | **Information**  (to be filled by the Bidder) | **Remarks** |
| **3.1** | CIDA Registration | | Provide certified copies and label them as attachment to Clause 3.1 |
| Registration number |  |
| Grade |  |
| Spatiality |  |
| Expiry Date |  |
| **4.1 (a)** | Legal Status | |  |
|  | If a Joint Venture, names and addresses of Joint venture partners | 1. --------------------------- 2. -------------------------  3. ------------------------- | Provide a certified copy of the Joint Venture Agreement. |
|  | If a Joint Venture, name of the Lead Partner |  |  |
|  | *For joint ventures,* each joint venture partner shall furnish Legal Status separately | | |
|  | Name (Lead partner) |  | Provide certified copies and label them as attachment to  Clause 4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |

Revised on 06-05-2016

|  |  |  |  |
| --- | --- | --- | --- |
|  | Principal 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 them as attachment to Clause 4.1 (a) | |
|  | VAT Registration Number |  | |
|  | Name (Partner 2 ) |  | Provide certified copies and label them as attachment to Clause  4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal 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 them as attachment to Clause 4.1 (a) | |
|  | VAT Registration Number |  | |
|  | Name (Partner 3 ) |  | Provide certified copies and label them as attachment to Clause  4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal 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 them as attachment to Clause 4.1 (a) | |
|  | VAT Registration Number |  | |

|  |  |  |
| --- | --- | --- |
|  | For subcontracting | |
|  | Name & Address of the main contractor |  |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal place of business |  |
|  | Written power of attorney of the signatory to the Bid |  |
|  | VAT Registration Number |  |
|  | **Names & address of major subcontractors** |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Subcontractor 1** |  | Provide certified copyof the Sub Contract Agreement Clause  4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal 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 them as attachment to Clause 4.1 (a) |
|  | VAT Registration Number |  |

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| --- | --- | --- | --- |
|  | **Subcontractor 2** |  | Provide certified copyof the Sub Contract Agreement Clause  4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal 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 them as attachment to Clause 4.1 (a) |
|  | VAT Registration Number |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Subcontractor 3** |  | Provide certified copy of the Sub Contract Agreement Clause  4.1 (a) |
|  | Legal status |  |
|  | Place of registration |  |
|  | Principal 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 them as attachment to Clause 4.1 (a) |
|  | VAT Registration Number |  |

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

***Each Bidder or member of a JV must fill in this form***

|  |  |  |
| --- | --- | --- |
| Schedule A2 – Annual Turn-over Information(Construction only – Last five years) *(enclose this schedule in envelope marked, “ Envelope 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. | | |
| **Year** | **Turn-over** | **Remarks** |
| 1 |  | Attach audited reports  and label them as attachment to Clause 4.1 (c) (i) |
| 2 |  |
| 3 |  |
| 4 |  |  |
| 5 |  |  |

|  |  |  |
| --- | --- | --- |
| Schedule A3 – Adequacy of Working Capital *(enclose this schedule in envelope marked, “ Envelope 1 – General Information)*  *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 them as attachment to Clause 4.1(c)(ii) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Total |  |  |

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

***Each Bidder or member of a JV must fill in this form***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Schedule A4 – Construction Experience in last five years *(enclose this schedule in envelope marked, “ Envelope 1 – General Information)*  (i) For joint ventures, each joint venture partner shall furnish information separately.  (ii) for subcontracting main contractor and major sub contractor’s shall furnish information separately. | | | | | |
| **Criteria** | **Compliance Requirements** | | | | **Documents** |
| **Requirement** | **Single Entity** | **Joint Venture** | | | **Submission Requirements** |
| **All Partners Combined** | **Each Partner** | **One Partner** |

# General Construction Experience

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Experience under construction contracts in the role of contractor or subcontractor for at least the last **Ten** years prior to the applications submission deadline. | must meet requirement | not applicable | must meet requirement | not applicable | Form EXP - 1 |

# Specific Construction Experience

# (a) Contracts of Similar Size and Nature

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participation as contractor, management contractor, or subcontractor, in at least **one** contract within the last **Ten** years, each with a value of at least **Rs. ……Million** that have been successfully completed and that are similar to the proposed construction works. The similarity shall be based on the physical size, complexity, methods, technology or other characteristics as described in Section 5 (Employer’s Requirements) | must meet requirement | must meet requirement | not applicable | not applicable | Form EXP - 2(a) |

# (b) Construction Experience in Key Activities

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| For the above or other contracts executed during the period stipulated in 4.3 above, a minimum construction operation and hand over experience in the following key activities: | must meet  all requirements | must meet  all requirements | not applicable | not applicable | Form EXP - 2(b) |
| Construction operation and handover of raw and treated water pumping systems of **….** ML/day capacity, including over **……**km of transmission pumping mains for 1 scheme. |  |  |  |  |  |
| Construction operation and handover of water treatment plants using processes defined in Employer’s Requirements of **….** ML/day capacityfor 1 scheme |  |  |  |  |  |
| Construction operation and handover Water Towers / Reservoirs |  |  |  |  |  |
| Supply & Installation of E&M equipment |  |  |  |  |  |

**The bidder must submit documentary evidence certified by clients/consultants in support of his experience as claimed above.**

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

# *Each Bidder or member of a JV must fill in this form*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Schedule A5 – Design Experience in last five years *(enclose this schedule in envelope marked, “ Envelope 1 – General Information)*  (i) For joint ventures, each joint venture partner shall furnish information separately.  (ii) for subcontracting main contractor and major sub contractor’s shall furnish information separately. | | | | | |
| **Design Experience for Water Supply Systems** | | | | | |
| For the above or other contracts executed during the period stipulated in 4.3 above, a minimum Design experience of the contractor or the designer in the following key activities shall be met:\* | must meet  all requirements | must meet  all requirements | not applicable | not applicable | Form EXP - 2(b) |
| Design of raw and treated water pumping systems of **...** ML/day capacity, including over **….** km of transmission pumping mains for (one) 1scheme. |  |  |  |  |  |
| Design of water treatment plants using processes identified**….**ML/day capacity for (one) 1 scheme. |  |  |  |  |  |
| Design of Water towers / Reservoirs |  |  |  |  |  |
| Design of SCADA and supply & Installation of E&M equipment |  |  |  |  |  |

**The bidder must submit documentary evidence certified by clients/consultants in support of his experience as claimed above.**

*\* The bidder may have worked only as a construction contractor on similar works, but the Engineer who completed the design and supervised his work should have had the above experience, even if the latter had worked independently. Ideally the same design group could be proposed to work with the bidder by the formation of the Joint Venture if this partner has the requisite experience.*

**BID FOR DESIGN AND BUILD ……………………….. WATER SUPPLY SCHEMES**

**CONTRACT No. : ……………………………….**

***Each Bidder or member of a JV must fill in this form***

|  |  |  |
| --- | --- | --- |
| Schedule A6 – Major Items of Construction Equipment Proposed *(enclose this schedule in envelope marked,“Envelope1–General Information”)*   1. *The Bidder shall provide details of proposed items of equipment referring the Appendix to Table 6 below* 2. *Equipment requirements recorded in the Appendix to Table 6 at each location would be the minimum, but shall satisfy the needs according to the detail programme of works for the particular site. No idling resources are expected to be at the site, by the client* | | |
| **Item** | **Type** | **Capacity** |
| 1. | Excavator/ Loader 1-2 m3 | 02 |
| 2. | Hand Rammers | 01 |
| 3. | Soil Compactor – Mechanical ½ ton | 01 |
| 4. | Hand Roller 2 – 3 ton | 01 |
| 5 | Dumper minimum capacity 1 m3 | 01 |
| 6 | Steel Wheel Roller up to 4 ton |  |
| 7. | Concrete mixer complete with scales up to 0.25 | 01 |
| 8 | Concrete mixer complete with scales etc 0.25 - 0.5 m3 | 01 |
| 9 | Concrete mixer complete with scales over 0.5 m3 | 02 |
| 10 | Concrete vibrator 38mm dia. | 06 |
| 11 | Portable Air compressor complete with hose and pneumatic tools minimum capacity 2.83 m3 (100 cu.ft) per minute and pressure 70 kg/cm2 (100 psi) | 01 |
| 12  13  14 | Mobile crane up to 2 ton  Mobile crane up to 5 ton  Lorry / Truck 5 ton capacity | 01  01  01 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item** | **Description** | **Minimum No.**  **Proposed by NWSDB** | **Minimum**  **No. Provide by the contractor** | **Minimum Period Proposed** | **Remarks (hired/own)** |
| 15 | Portable welding set 500 A capacity complete with welding accessories. | 02 |  |  |  |
| 16 | Generating Set up to 4 kw | 02 |  |  |  |
| 17. | Bitumen sprayer up to 6 ton | 01 |  |  |  |
| 18 | Road Roller 6 –10 ton | 01 |  |  |  |
| 19 | Water Tanker 4 – 6 m3 | 01 |  |  |  |
| 20 | Water Pump (complete with hoses etc.) 100 ft3/min | Sufficient  number |  |  |  |
| 21 | Rubber Roller up to 5 ton | 01 |  |  |  |
| 22 | Pneumatic Roller 10 ton | 01 |  |  |  |
| 23 | Truck with Tipper 3 – 8 ton | 01 |  |  |  |
| 24. | Bar bending Equipment. | 01 |  |  |  |
| 25 | Engineer’s Level | 01 |  |  |  |
| 26. | Theodolite.  Welding Plant | 01 |  |  |  |
| 27 | 1m x 1m x 1 m scaffolding units with diagonal ties, bends, base plates, connecting couplings, clamps etc. made of 48 mm dia . DI tubes or scaffolding units equivalent to above |  |  |  |  |
| 28 | Shoring | Sufficient  quantity |  |  |  |

**Appendix to Table 6**

|  |  |  |
| --- | --- | --- |
| **Equipment Type** | **Characteristics** | **Minimum Number Required** |
| **Intake** |  |  |
| Compressor (portable) | 50 HP | 1 |
| Backhoe excavator (crawler type) | 90 - 120 HP | 1 |
| Generator with lighting | 150 kVA | 1 |
| Dump Truck | 4 T | 1 |
| Dump Truck | 2 T | 2 |
| Loader |  |  |
| Truck Crane | 15 T | 1 |
| Truck Mixer | 5 m3 | 2 |
| Concrete Pump Car |  | 1 |
| Concrete Vibrator (electrical) with long flexible |  | 2 |
| Submersible dewatering pump | 4 inch | 2 |
| Submersible dewatering pump | 6 inch | 2 |
| Submersible dewatering pump | 8 inch | 1 |
| Surveying equipment |  |  |
| on site concrete & slump test equipments |  |  |
| **Water Treatment Plant** |  |  |
| Backhoe excavator (crawler type) | 90 - 120 HP | 1 |
| Backhoe excavator (wheel type) |  | 1 |
| Mobile crane | 10 T | 1 |
| Pilling hammer |  | 2 |
| Tower crane |  | 1 |
| Sludge pump |  | 4 |
| Generator | 150 kVA | 1 |
| Submersible dewatering pump | 4 inch | 2 |
| Submersible dewatering pump | 6 inch | 2 |
| Concrete Pump Car |  | 2 |
| Concrete Vibrator (electrical) with long flexible |  | 4 |
| Dump Truck | 4 T | 2 |
| Dump Truck | 2 T | 2 |
| Loader |  |  |
| Truck Mixer | 5 m3 | 4 |
| Vibro hammer |  | 2 |
| Concrete cutter |  |  |
| Surveying equipment, GPS |  |  |

|  |  |  |
| --- | --- | --- |
| **Equipment Type** | **Characteristics** | **Minimum Number Required** |
| **Transmission** |  |  |
| Backhoe excavator (crawler type) | 90 - 120 HP | 2 |
| Backhoe excavator (wheel type) |  | 4 |
| Dump Truck | 4 T | 4 |
| Dump Truck | 2 T | 4 |
| Submersible pump | 6 inch | 6 |
| Vibro hammer |  | 2 |
| Truck Crane |  | 1 |
| Asphalt cutter |  |  |
| Compactors |  |  |
| Dewatering equipment |  |  |
| Shoring equipment/ materials |  |  |
| Mobile generators with lights |  |  |
| Surveying equipment |  |  |
| **Towers** |  |  |
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| **Reservoirs** |  |  |
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|  |  |  |
| **Design office equipment** |  |  |
| Computers |  |  |
| Plotters |  |  |
| Printers |  |  |
| Scanners |  |  |
| **Concrete batching plant** |  | 1 |