INVITATION TO APPLY FOR TENDER FOR THE CONSTRUCTION OF SIX LANE ELEVATED ROAD FROM BASAVESHWARA CIRCLE TO HEBBAL FLYOVER VIA LE MERIDIAN HOTEL AND MEKHRI CIRCLE, IN BENGALURU

INTERNATIONAL COMPETITIVE BIDDING

OFFICE OF THE EXECUTIVE ENGINEER, INFRA STRUCTURE DIVISION - 3, BANGALORE DEVELOPMENT AUTHORITY (BDA), T. CHOWDAIAHA ROAD, KUMARA PARK WEST, BENGALURU-560020

Tender for the work of

CON STRUCTION OF SIX LANE ELEVATED ROAD FROM BASAVESHWARA CIRCLE TO HEBBAL FLYOVER VIA LE MERIDIAN HOTEL AND MEKHRI CIRCLE, IN BENGALURU

TENDER REFERENCE No :

PERIOD OF SALE OF TENDER DOCUMENT : 28.09.2015 From 17.00 Hrs to 20.11.2015 16.00 Hrs

LAST DATE FOR SALE OF TENDER DOCUMENT : 20.11.2015 16.00 Hrs

LAST DATE AND TIME FOR RECEIPT OF TENDERS : 20.11.2015 16.00 Hrs

TIME AND DATE OF OPENING OF COVER ONE OF TENDERS : 03.12.2015 16.30 Hrs

PLACE OF OPENING OF COVER ONE OF TENDERS : Executive Engineer,
Infrastructure Division -3
Bangalore Development Authority
Bengaluru – 560 020.

TIME AND DATE OF OPENING OF COVER TWO OF TENDERS : Will be Intimated

TENDERER EXECUTIVE ENGINEER-ID-3

PLACE OF OPENING OF COVER TWO: OF TENDERS:		Executive Engineer, ID-3, BDA, Kumarakrupa Road Bengaluru – 560 020.
ADDRESS FOR COMMUNICATION	:	Executive Engineer, ID-3, BDA, Kumarakrupa Road Bengaluru – 560 020.

TENDERER EXECUTIVE ENGINEER-ID-3

Contents of Tender Document

SECTION 1

INVITATION FOR TENDERS (IFT)

BANGALORE DEVELOPMENT AUTHORITY

T.Chowdaiah road, Kumara Park West, Bengaluru-560 020

No/ BDA/ EE/ ID3/ T- 02/ 2015-16

Office of the Executive Engineer
Infrastructure Division -3
Bangalore Development Authority
Bengaluru – 560 020.
Dated 28/09/2015

INVITATION FOR TENDERS (IFT)

(INTERNATIONAL COMPETETIVE BIDDING)

(e-Procurement mode only)

1. The Executive Engineer, Infrastructure Division - 3 (ID-3), BDA, Bengaluru invites item rate tenders from eligible tenderers, for the construction of works detailed in the table below. Two cover tender procedure as per Rule 28 of the Karnataka Transparency in Public Procurements Rules, 2000 shall be followed. The tenderers are required to submit two separate sealed covers, one containing the Earnest Money Deposit (EMD) and the details of their capability to undertake the tender (refer ITT Section 2 (Clauses 3 and 6), which will be opened first and the Second Cover containing the price quote of tender which will be opened only if the tenderer is found to be qualified to execute the tendered work. The tenderers are advised to note the minimum qualification criteria specified in Section 2 Clause 3 of the ITT to qualify for award of the contract.

2. Tender documents may be downloaded from Government of Karnataka (GoK) e-procurement website https://eproc.karnataka.gov.in/eportal/index.seam ("e-procurement portal") under login for contractors. e- procurement helpline No. 080 – 25501216 and 080 – 25501227
   After logging in, scroll down to the bottom right-hand side to see list of tenders. Links to download the details of Notice Inviting Tender (NIT) and a copy of the tender document are provided in the list of tenders. The tender can be downloaded from the portal as per prescribed date and time published in

the portal. Only interested contractors who wish to participate should remit on-line transaction fee for tender after registering in the portal. The transaction fee is non-refundable.

3. Tenders must be accompanied by EMD, which will be paid online through e-procurement portal. (Details available in the portal)

4. Tenders must be electronically submitted (on-line through internet) within the date and time published in e-procurement portal. First Cover of the tender will be opened at prescribed time and date mentioned in the e-procurement portal, in the presence of the tenderers who wish to attend at the office of the Executive Engineer ID-3, BDA, Bengaluru. BDA shall not be responsible for any delay in receiving or partial uploading due to technical glitches of the applications and reserves the rights to accept / reject any or all applications without assigning any reasons thereof.

5. A pre-tender meeting will be held at published time and place in e-procurement portal to clarify issues, if any, and to answer questions on any matter that may be raised at that stage as stated in Section 2 Clause 8.2 of ITT of this tender document.

6. Other details can be seen in the Tender document

Calendar of Events

i) Tender documents will be available : 28/09/2015 from 17.00 Hrs.

ii) Last date for receiving queries : 13/10/2015 16.00 hrs

iii) Pre-Tender meeting date & office : 16/10/2015 at 11:00 Hrs. at BDA Main office.

iv) BDA response to queries latest by : 20/10/2015.

v) Last date for Receipt of Tender : 30/11/2015 up to 16.00 Hrs

vi) Bid (Technical) opening date : 03/12/2015 at 16.30 Hrs or any other working day, if tender opening date happens to be on an unforeseen holiday.

Item No	**Nmame of work (Tender reference)**	**Approximate value of work (INR)**	**EMD (INR)**	**Period of completion (Insluding Monsoon period)**
1	2	3	4	5
1	Construction of Six Lane Elevated Road from Basaveshwara Circle to Hebbal Flyover Via Le-Meridian Hotel and Mekhri Circle in Bengaluru	***1310 Crores***	**1310 Lakhs** (INR 1 Lakh in Cash & balance INR 1309 Lakhs in the form of BG)	**24 Months**

1.0 Scope of Tender

a. Steel Flyover

i) Construction of Six lane Steel Flyover from Basaveshwara Circle to Hebbal Flyover via. Le-Meridian Hotel and Mekhri Circle in Bengaluru. Steel piers supported by RCC pile foundations/open foundations.

ii) Structural Steel with Metalizing for Sub structure (Pier, Pier Cap, & portals etc.,) and Super structure (Girders, bracings & Diaphram with shear connectors, etc).

iii) In situ RCC deck slab over sacrificial decking sheets as a permanent form work for deck slab.

iv) Approaches to flyover with RE panels.

v) Down ramps at Sanjay Nagar for traffic from Basaveshwara circle side and Vasantha Nagar, Yeshwanthpura side for traffic from Airport side.

b. Underpass

i. Construction of 3 nos. of RCC unidirectional under passes with RCC trough shaped approaches at

1. Chalukya junction
2. Palace Road junction &
3. Cunningham road junction

ii. RCC grade concrete for all structural components of underpasses such as raft, Box walls, Cover Slab as well as for crash barrier.

iii. Wearing coat of Mastic & BC for approaches as well as Box portions.

iv. Signage, road marking as per MoRTH standards.

v. Electrification etc., as per MoRTH standards.

vi. Drainage system including NP-2, NP-3 & NP-4 pipes and RCC drains with inspection chambers at saddle points of underpasses for drainage.

vii. Shifting & relocation of utilities under supervision of concerned departments.

viii. Traffic diversion and development of alternate routes in consultation with traffic police authority.

c. Grade level Road work

i) Road works include new construction as well as overlay in existing roads, junction improvements, new median constructions, Island works, Grade level drainage and footpath works, Utility ducts provision, road signage, road marking, Dismantling works and Electrification etc., as per MoRTH standards.

ii) Being a busy traffic road, barricading the construction area, traffic diversion, construction and maintenance of alternate roads, safety of pedestrians & vehicles during construction etc., are also in the scope. Protection & strengthening of the adjacent existing structures by suitable measures such as sheet piling, anchoring etc during construction, utility shifting & relocation, water proofing of the structures in contact with the ground are in the scope of this tender.

d. BDA reserves the right to instruct contractor for this work to interface with other contractors to integrate Hebbal flyover widening in co-ordination work.

2.0 Eligible Tenderers

2.1 Tenderers shall not be under a declaration of ineligibility for corrupt or fraudulent practices issued by the Government of India or Government of Karnataka or Government of any country or Government enrolled company.

2.2 Bidders blacklisted in Government of India/ Government of Karnataka /By any other State/By any other country are not eligible to bid.

2.3 No Corporate Debt Restructuring (CDR) company can participate either directly or JV Partner and Profit after Tax should be positive for "last five years" (i.e. 2010-11 to 2014-15). The applicant either directly or as JV partner should not have declared "loss" in the last five years.

2.4 The Tenderer is subjected to be disqualified and liable for black listing and forfeiture of EMD, if he is found to have misled or furnished false information in the forms/statements/certificates in proof of qualification requirement.

2.5 Tenderer shall furnish a declaration stating that the information / data furnished as part of their bid is true and correct. Subsequently, if it is found incorrect such bidder will be black listed and further action will be initiated

2.6 Tenderer shall be any individual, firm, agency registered with KPWD/BDA/BBMP/NHAI/MES/Railways, or other Central / State agencies in the construction business with qualification set forth in clause 3 below. Tenderers not registered with any of the above organizations can get registered with BDA before submitting the tender. Any entity which

has been barred by Govt. department/agency from participating in projects (BOT or otherwise) and the bar subsists as on the application due date, would not be eligible to submit an application, either individually or as member of joint venture.

2.7 Joint venture (JV) with maximum of two partners is allowed provided the lead partner can fulfill at least 75% of all the qualification requirements. One of the partners should be an Indian company having its registered office in India, and should qualify minimum 25% of the requirement. Both partners should not have been disqualified or any of their contract terminated by any Government agency during last five years.

2.8 If any foreign firm participates in the bidding either individually or as JV partner, they should furnish certificate of proof of their existence, experience certificates issued by the authorities duly authenticated by the Indian Embassy in their country at the time of filing the tender. If the firm's existence certificate or experience certificates are in the vernacular, it must be translated into English by an authorized agency and it shall also be got authenticated from the Indian Embassy in their country and furnished along with the bid. In the absence of authentication from the Indian Embassy, the bid offered by them either individually or as a JV partner shall not be considered. The firm shall ensure that the key personal proposed to be engaged at the time of tender are invariably deployed at site during execution of work.

3.0 Qualification of the Tenderer

3.1 All Tenderers shall provide the requested information accurately and as required and set out in sufficient detail in Section 3: Qualification information.

3.2 To qualify for bid for this contract, the Tenderer shall demonstrate that he has the following in his name, in the last five financial years (i.e.2010-2011 to 2014-2015):

A. a) Achieved, in at least two financial years of last 5 years, a minimum annual financial turnover (in all classes of Civil Engineering construction works only) of **INR 2650 Crores.**

***Please note*:**

In case of Joint Venture, lead partner of Joint Venture group should have minimum annual turnover not less than INR 1965 Crores in any 2(two) years during last 5 financial years (2010-11 to 2014-15) updated by giving 10% simple weightage per year, only for Indian contracts to bring them to 2014-15 price level.

b) Satisfactorily completed in last 5 years as a prime contractor, at least two major projects of value not less than 50% each of the amount put to tender out of which,(major project means buildings, flyovers, jetties, industrial plants with structural steel).

i) One Steel flyover or concrete Bridge/Viaduct in any of the metro cities having length not less than 3.4 kms (abutment to abutment)

ii) Above said structure under shall be steel or concrete or precast segmental.

iii) Cost of above major projects mentioned at 3.2 A (b) shall not be less than INR 650 Crores in single work / stretch.

c) Executed in any one year, the following minimum quantities of work

i) Piling work (dia not less than 900mm) ..... 19000 Rmt.

B. Annual capacity of Structural steel executed at least 65000 MT.

Note:

1. Manufacturing capacity for the required grade of steel of at least the same quantity required for the proposed project or should have a letter of commitment from a manufacturer / s of the required grade of steel of the same quality required for the project.
2. It is not necessary that work of piling and structural steel are executed in the same project/contract, in the same year.
3. "Executed" means even ongoing project/works, where required length of piling or required quantity of structural steel works physically completed and same is supported by client certificate(s)

C. The tenderer should be net profit making in last 5(five) financial years (2010-2011 to 2014-2015)

Note: 1) For eligibility criteria at Sl. No. 3.2 A and B stated above, percentage participation of lead JV member shall be considered.

2) For eligibility criteria at Sl. No. 3.2 C stated above, percentage participation of lead JV member shall be considered.

3.3 The Tenderer shall also take care of all the temporary or unchartered utilities including shifting.

3.4 The tenderer should demonstrate the

a) availability (Min 50% owned or balance 50% by hire/lease agreement) of the following key and critical equipment for this work:

i. Hydraulic rotary rig - 2 Nos
ii. Automatic Submerged Arc Welding (SAW) gantries with necessary accessories - 2 Nos
iii. Crane of 50MT capacity - 8 Nos
iv. Fully Automatic and computerized batching and mixing plant 30cum/hr - 2 Nos
v. Gantries for fabrication yard - 6 Nos

b) The tenderer or his identified sub-contractor should posses required valid electrical licence for executing Road electrification works and should have executed similar electrical works totalling to Rs. 9.00 crores in any one year.

c) Shifting of utilities shall be done as per standard specifications of the department concerned with the supervision through authorised certified agencies of respective departments.

d) Present net worth of the company shall not be less than INR 393 Crs [30% of the project cost]

e) Net block of assets shall not be less than INR 393 Crs. [30% of the project cost]

3.5 To qualify for a package of contracts made up of this and other contracts for which tenderers are invited in this IFT, the Tenderer must demonstrate having experience and resources to meet the aggregate of the qualifying criteria for the individual contracts.

3.6 Experience and resources of sub-contractors of Tenderer shall not be taken into account in determining the Tenderer's compliance with the qualifying criteria except for other allied technical work such as Electrical works. In such a case, sub contractors shall comply with Clause 3.2(b) and Clause 3.3 of ITT.

3.7 Tenderers who meet the above specified minimum qualifying criteria, will only be qualified, if their available tender capacity is more than the total tender value. The available tender capacity will be calculated as under:

Assessed available tender capacity = (A*N*1.5 - B)

Where,

A = Maximum value of works executed in any one year during the last five years taking into account the completed as well as works in progress. (Updated to FY 2014-2015 price level)

N = Number of years prescribed for completion of the works for which tenders are invited.

B = Value, at FY 2014-2015 price level, of existing commitments and on-going works to be completed during the next 24 months. (Including Monsoon period)

Note: - The statements showing the value of existing commitment and ongoing works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the respective employer in charge, not below the rank of an Executive Engineer or equivalent.

3.8 Even though the Tenderers meet the above criteria, they shall be immediately disqualified if they are found to have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements;
- record of poor performance such as, but not limited to, abandoning the works, not properly completing the contract, inordinate delays in completion.
- litigation history, financial failures.

3.9 Other details can be seen in the Tender document and for any clarification contact Executive Engineer, Infrastructure Division-3,BDA., Mobile No. +91 9945630116

Executive Engineer
Infrastructure Division-3, BDA,
T. Chowdaiah Road,
Kumara Park West,
Bengaluru - 560 020.
Mob: +91 9945630116.

SECTION 2

INSTRUCTIONS TO TENDERERS (ITT)

SECTION 2: INSTRUCTIONS TO TENDERERS (ITT)

TABLE OF CLAUSES

A. GENERAL

1. Scope of Tender

1.1 The Executive Engineer, Infra structure division -3, BDA, T. Chowdaiah Road, Kumara Park West, Bengaluru (referred to as Employer in these documents) invites tenders on international competitive bidding basis following Two Cover Tender procedure, from eligible tenderers, for the construction of works (as defined in these documents and referred to as "the Works") detailed in the Table given in the Invitation for Tenders (IFT). The Tenderers may submit tenders for any or all of the works detailed in the table given in Section 1, IFT.

1.2 The brief scope of work includes

a. Steel Flyover

v) Construction of Six lane Steel Flyover from Basaveshwara Circle to Hebbal Flyover via. Le-Meridian Hotel and Mekhri Circle in Bengaluru. Steel piers supported by RCC pile foundations/open foundations.

vi) Structural Steel with Metalizing for Sub structure (Pier, Pier Cap, & portals etc.,) and Super structure (Girders, bracings & Diaphragm with shear connectors, etc).

vii) In situ RCC deck slab over sacrificial decking sheets as a permanent form work for deck slab.

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v) Down ramps at Sanjay Nagar for traffic from Basaveshwara circle and, Vasantha Nagar , Yeshwanthpura side for traffic from Airport side.

b. Underpass

i. Construction of 3 nos. of RCC unidirectional under passes with RCC trough shaped approaches at
   1. Chalukya Junction &
   2. Palace Road Junction
   3. Cunningham road junction

ii. RCC grade concrete for all structural components of underpasses such as raft, Box walls, Cover Slab as well as for crash barrier.

iii. Wearing coat of Mastic & BC for approaches as well as Box portions.

iv. Signage, road marking as per MoRTH standards.

v. Electrification etc as per MoRTH standards.

vi. Drainage system including NP-2, NP-3 & NP-4 Pipes and RCC drains with inspection chambers at saddle points of underpasses for drainage.

vii. Shifting & relocation of utilities under supervision of concerned departments.

viii. Traffic diversion and development of alternate routes in consultation with traffic police.

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i. Road works include new construction as well as overlay in existing roads, junction improvements, New median constructions, Island works, Grade level drainage and footpath works, Utility ducts provision, road signage, road marking, Dismantling works and Electrification etc as per MoRTH standards.

ii. Being a busy traffic road, barricading the construction area, traffic diversion, construction and maintenance of alternate roads, safety of pedestrians & vehicles during construction etc are also in the scope. Protection & strengthening of the adjacent existing structures by suitable measures such as sheet piling, anchoring etc during construction, utility shifting & relocation, water proofing of the structures in contact with the ground are in the scope of this tender.

d. BDA reserves the right to instruct contractor for this work to interface with other contractors to integrate Hebbal flyover widening in co-ordination work.

2. Eligible Tenderers

2.1 Tenderers shall not be under a declaration of ineligibility for corrupt or fraudulent practices issued by the Government of India or Government of Karnataka or Government of any country or Government enrolled company.

2.2 Bidders blacklisted in Government of Karnataka/ Government of India/By any other State/By any other country are not eligible to bid.

2.3 No company under Corporate Debt Restructuring (CDR) can participate either directly or JV Partner. Profit after Tax should be positive for at least two years out of "last five years"(i.e. 2010-11 to 2014-15). The applicant either directly or as JV partner should not have declared "loss" for three or more financial years in the last five years.

2.4 The Tenderer is subjected to be disqualified and liable for black listing and forfeiture of EMD,if the tenderer is found to have misled or furnished false information in the forms/statements/certificates in proof of qualification requirement.

2.5 Tenderer shall furnish a declaration stating that the information / data furnished as part of their bid is true and correct. Subsequently, if it is found incorrect such bidder will be black listed and further action will be imitated

2.6 Tenderer shall be any individual, firm, agency registered with KPWD/BDA/BBMP/NHAI/MES/Railways, or other Central / State agencies in the construction business with qualification set forth in clause 3 below. Tenderers not registered with any of the above organizations can get registered with BDA before submitting the tender. Any entity which has been barred by Govt. department/agency from participating in projects (BOT or otherwise) and the bar subsists as on the application due date, would not be eligible to submit an application, either individually or as member of joint venture.

2.7 Joint venture with maximum of two partners is allowed provided the lead partner shall fulfill atleast 75% of all the qualification requirements. One of the partners should be an Indian company having its registered office in India.

2.8 The Tenderers should not have been disqualified or any of their contracts terminated by any Government agency during last five years.

2.9 If any foreign firm participates in the bidding either individually or as JV partner, they should furnish certificate of proof of their existence, experience certificates issued by the authorities duly authenticated by the Indian Embassy in their country at the time of filing the tender. If the firm's existence certificate or experience certificates are in the vernacular, it must be translated into English by an authorized agency and it shall also be got authenticated from the Indian Embassy in their country and furnished along with the bid. In the absence of authentication from the Indian Embassy, the bid offered by them either individually or as a JV partner shall not be considered. The firm shall ensure that the key personal proposed to be engaged at the time of tender are invariably deployed at site during execution of work.

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3.1 All Tenderers shall provide the requested information accurately and as required and set out in sufficient detail in Section 3: Qualification information.

3.2 To qualify for bid for this contract, the Tenderer shall demonstrate that he has the following in his name, in the last five financial years (i.e.2010-2011 to 2014-2015).

A. a) Achieved, in at least two financial years of last 5 years, a minimum annual financial turnover (in all classes of Civil Engineering construction works only) of **INR 2650 Crores.**

Please note:

In case of Joint Venture, lead partner of Joint Venture group should have minimum annual turn over not less than INR 1965 Crores in any 2 (two) year during last 5 financial years (2010-11 to 2014-15) updated by giving 10% simple weight age per year, only for Indian contracts to bring them to 2014-15 price level.

b) Satisfactorily completed in any two years of last 5 years as a prime contractor, at least two major projects (buildings, flyovers, jetties, industrial plants with structural steel) of value not less than 50% each of the amount put to tender out of which,

i) One of the project shall be flyover or Bridge in any of the metro cities having length not less than 3.4 kms (abutment to abutment)

ii) Above said structure under i) shall be steel or concrete or precast segmental.

iii) Cost of above structure under i) shall not be less than INR 650 Crores in single work / stretch.

c) Executed in any one year, the following minimum quantities of work

i) Piling work (dia not less than 900mm) ..... 19000 Rmt.

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Note:

1. Manufacturing capacity for the required grade of steel of at least the same quantity required for the proposed project or should have a letter of commitment from a manufacturer / s of the required grade of steel of the same quality required for the project.
2. It is not necessary that work of piling and structural steel are executed in the same project/contract.
3. "Executed" means even ongoing project/works, where required length of piling or required quantity of structural steel works physically completed and same is supported by client certificate(s)

C. The tenderer should be net profit making in 3 (Three) financial years during last 5(Five) years (2010-2011 to 2014-2015)

Note: 1) For eligibility criteria at Sl. No. 3.2 A and B stated above, percentage participation of lead JV member shall be considered.

2) For eligibility criteria at Sl. No. 3.2 C stated above, percentage participation of lead JV member shall be considered.

3.3 The Tenderer shall also take care of all the temporary or unchartered utilities including shifting.

3.4 The tenderer should demonstrate the

a) availability (Min 50% owned or balance 50% by hire/lease agreement) of the following key and critical equipment for this work:

i. Hydraulic rotary rig - 2 Nos
ii. Automatic Submerged Arc Welding (SAW) gantries with necessary accessories - 2 Nos
iii. Crane of 50MT capacity - 8 Nos
iv. Fully Automatic and computerized batching and mixing plant 30cum/hr - 2 Nos
v. Gantries for fabrication yard - 6 Nos

b) Shifting of utilities shall be done as per standard specifications of the department concerned under the supervision of the corresponding service providers through authorised certified agencies of respective departments.

c) Present net worth of the company shall not be less than INR 393 Crs [30% of the project cost]

d) Net block of assets shall not be less than INR 393 Crs. [30% of the project cost]

3.5 To qualify for a package of contracts made up of this and other contracts for which tenderers are invited in this IFT, the Tenderer must demonstrate having experience and resources to meet the aggregate of the qualifying criteria for the individual contracts.

3.6 Experience and resources of sub-contractors of Tenderer shall not be taken into account in determining the Tenderer's compliance with the qualifying criteria.

3.7 Tenderers who meet the above specified minimum qualifying criteria, will only be qualified, if their available tender capacity is more than the total tender value. The available tender capacity will be calculated as under:

Assessed available tender capacity = (A*N*1.5 - B)

Where,

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B = Value, at FY 2014-2015 price level, of existing commitments and on-going works to be completed during the next 24 months. (Including Monsoon period)

Note: - The statements showing the value of existing commitment and ongoing works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the respective employer in charge, not below the rank of an Executive Engineer or equivalent.

3.8 Even though the Tenderers meet the above criteria, they shall be immediately disqualified if they are found to have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as, but not limited to, abandoning the works, not properly completing the contract, inordinate delays in completion.
- litigation history, financial failures.

4. One Tender per Tenderer

4.1 Each Tenderer shall submit only one tender for one package. A Tenderer who submits or participates in more than one Tender (other than as a sub-contractor or in cases of alternatives that have been permitted by the employer) will cause all the proposals with the Tenderer's participation to be disqualified.

5. Cost of Tendering

5.1 The Tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will, in no case, be responsible and liable for those costs.

6. Site visit

6.1 The Tenderer or a representative of the Tenderer, at the risk and responsibility of the Tenderer must make a physical visit to and examine the Site of Works and its surroundings, and obtain all information that may be necessary for preparing the Tender and entering into a contract for construction of the Works. The Tenderer shall visit the Site at his own expense.

B. Tender documents

7. Content of Tender documents

7.1 Tender documents shall have all the Sections given under 'Contents of Tender Document' in this document.

8. Clarification of Tender Documents

8.1 A prospective Tenderer requiring any clarification with respect to the tender documents may notify the Employer in writing or by cable (hereinafter "Cable" includes telex and facsimile) at the Employer's address indicated in the invitation to tender. The Employer will respond to any request for clarification which he receives earlier than 15 days prior to the deadline for submission of tenders. Copies of the Employer's response will be forwarded or through e-portal to all purchasers of the tender documents, including a description of the enquiry but without identifying its source.

8.2 Pre-tender meeting:

8.2.1 The Tenderer or his authorized representative is invited to attend a pre-tender meeting which will take place at the office of the Employer at a date and time as mentioned in the e-procurement portal.

8.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage

8.2.3 The Tenderer is requested to submit any questions in writing or by cable to reach the Employer not later than one week before the meeting.

8.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of enquiry) and the responses given will be transmitted without delay to all purchasers of the tender documents. Any modification of the tender documents listed in sub-clause 7.1 which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 9 and not through the minutes of the pre-tender meeting.

8.2.5 Non-attendance at the pre-tender meeting will not be a cause for disqualification of a Tenderer.

8.2.6 Employers replies are shall form part & parcel of agreement.

9. Amendment of Tender documents

9.1 Before the deadline for submission of tenders, the Employer may modify the tender documents by issuing addenda and notifying the same to all purchasers of the tender documents.

9.2 Any addendum thus issued shall be part of the tender documents and shall be posted online in the e-procurement portal which Tenderers should download.

9.3 To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend as necessary the deadline for submission of tenders on-line through e-procurement portal, in accordance with sub-clause 16.2 below.

C. PREPARATION OF TENDERS

10. Documents comprising the Tender

10.1 The tender submitted by the Tenderer shall be in two covers/folders and shall contain the documents as follows:

10.1.1 First Cover:/ Folder (Only online)

a) EMD; online payment through e-Procurement platform (scanned copy of Bank guarantee).
b) Qualification Information as per formats given in Section 3;
c) Tender transaction fee. Online payment through e-Procurement platform.
d) General eligibility criteria.
e) Document / evidence required from the tenderer.

10.1.2 Second Cover: (Only online)

a) The Tender in the format indicated in Section 4(I)
b) Priced Bill of Quantities (as per formats given in Section 9); online through e-procurement portal; and
c) Any other materials required to be completed and submitted by Tenderers in accordance with these instructions. The documents listed under Sections 3, shall be filled in without exception.

11. Tender prices

11.1 The contract shall be for the whole Works as described in sub-clause 1.2, based on the priced Bill of Quantities submitted by the Tenderer.

11.2 The Tenderer shall fill in rates and prices and line item total (both in figures and words) for all items of the Works described in the Bill of Quantities along with total tender price (both in figures and words). Items for which no rate or price is entered by the Tenderer will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any, shall be made online only before the submission of the tender

11.3 All duties, taxes, and other levies payable by the Contractor under the contract, or for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

11.4 The rates and prices quoted by the Tenderer shall be subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 40 of the Conditions of Contract.

11.5 Custom's duty to be added separately in the offer submitted by the tenderer.

12. Tender validity

12.1 Tenders shall remain valid for a period not less than **120 days** after the deadline date for tender submission specified in Clause 16. A tender valid for a shorter period shall be rejected by the Employer as non-responsive.

12.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the Tenderers may extend the period of validity for a specified additional period. The request and the Tenderers' responses shall be made in writing or by Cable. A Tenderer may refuse the request without forfeiting his EMD. A Tenderer agreeing to the request will not be required or permitted to modify his tender, but will be required to extend the validity of his EMD for the period of the extension, and in compliance with Clause 13 in all respects.

13. Earnest Money Deposit:

13.1 Earnest Money Deposit (EMD) - The Tenderer shall furnish as part of his tender, EMD as set out in the table below.

Up to INR 20.00 Lakh	2.5%.
INR 20.00 Lakh and above up to INR1.00 Crore	2% subject to a min. of INR 50,000.00.
INR 1.00 Crore and above up to INR 10.00 Crore	1.50% subject to a min. of INR 2,00,000.00
INR 10.00 Crore and above	1% subject to a min. of INR15,00,000.00

The Tenderer shall furnish Earnest Money Deposit (EMD) in the amount as mentioned in IFT for this particular Work. Further, out of the total EMD Amount only INR 1.00 Lakh (Rupees One Lakh only) shall be paid in the e – procurement portal using any of the following modes and the balance

amount shall be in the form of Bank Guarantee (BG) from Bengaluru branch of any Nationalised Bank. The scanned copy of the Bank Guarantee to be uploaded at the time of submission of bid documents and it will be considered for Technical bid evaluation and the original Bank Guarantee should be submitted to Office of The Executive Engineer, Infra structure division -3, BDA, T. Chowdaiah Road, Kumara Park West, Bengaluru, at the time of opening of the Technical bid or any other date & time specified in clause 13.3 of ITT for verification and the non-compliance of the same leads to the rejection of the Technical bid. Format for BG is attached in Form VIII.

Credit Card
Direct Debit
National Electronic Fund Transfer (NEFT)
Over the Counter (OTC)
OTC payment procedure:

If a Contractor chooses to make payment of EMD Over The Counter (OTC) in any of the designated bank branches listed in the e-Procurement web-site (www.eproc.karnataka.gov.in), the Contractor will need to log into e-Procurement system, access the tender for which the tender is being created and then select the OTC option under the payment section and print the Challan shown in that section. The printed Challan will have the unique tender reference number and the amount to be remitted. Along with the Challan, Contractor can choose to make the payment either in the form of cash or in the form of Demand Draft. Cheque payments will not be accepted. The Contractor is requested to specifically inform the bank officer to input the unique tender reference number printed in the Challan in the banking software. Upon successful receipt of the payment, the bank will provide a 16-digit reference number acknowledging the receipt of payment. This 16-digit reference number has to be inputted by Contractor in the payment section of its tender as payment confirmation before the tender is submitted (i.e.) as a pre-requisite for tender submission.

NEFT payment procedure:

If a Contractor chooses to make payment of EMD using Reserve Bank of India's (RBI) National Electronic Fund Transfer (NEFT) system, the Contractor will need to log into e-Procurement system, access the tender for which tender is being created and then select the NEFT option under the payment section and print the Challan shown in that section. The printed Challan will have the unique tender reference number, account details of Government of Karnataka and the amount to be remitted. The Contractor has to submit the printed Challan to its bank-branch (NEFT-enabled) and request for an account-to-account transfer, wherein the money will get transferred from the Contractors' bank account to GoK's bank account. The Contractor should ensure that NEFT transfer instructions are executed and the funds are wired to the Government of Karnataka's principal account before the last date for tender submission and preferably 24 hours before the last date for tender submission. If the contractor's bank transfers/wires the money after the last date for tender submission, the Contractor's tender will be liable for rejection. Upon executing the transfer, the contractor's bank will provide a reference number generated by NEFT software as confirmation of transfer, which has to be inputted by Contractor in the payment section of its tender as payment confirmation before the tender is submitted (i.e.) as a pre-requisite for tender submission. Also, the account number from which the funds were transferred has to be inputted in the e-Procurement system as part of its tender.

13.2 The Contractor’s tender will be evaluated only on confirmation of receipt of the EMD in the Government of Karnataka central pooling account held at the designated bank.

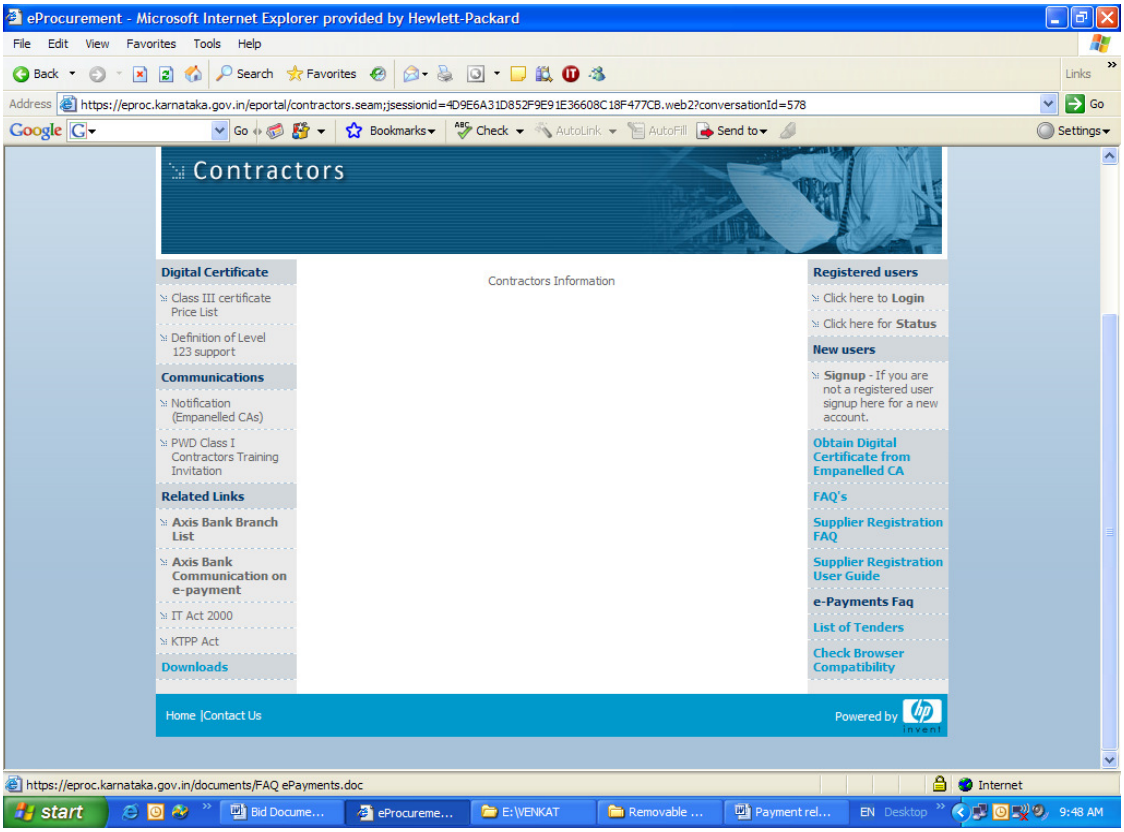
13.3 EMD amount will have to be submitted by the supplier/contractor taking into account the following conditions:

a. EMD for INR 1.00 Lakh shall be accepted only in the form of Electronic Cash (and not through Demand Draft or Bank Guarantee) and will be maintained in the Government’s Central Pooling Account at Axis Bank until the Work is awarded and EMD for the Balance Amount shall be in the

Form of Bank Guarantee from Bengaluru branch of any Nationalized Bank. Validity of EMD should be 45 days more than the tender validity period of 120 days i.e. one hundred and sixty five **(165) days** after the Deadline Date for Tender Submission specified in Clause 16. Further, the Original Bank Guarantee shall be submitted to the Office of the Executive Engineer, Infra structure division -3, BDA, T. Chowdaiah Road, Kumara Park West, Bengaluru by 03/12/2015.

The Tenderer's Bid will be evaluated only on Confirmation of Receipt of the Payment of EMD as indicated in Sub Clauses 13.1 and 13.3.

For details on e-Payment services refer to e-procurement portal for more details on the process.



TENDERER EXECUTIVE ENGINEER-ID-3

13.4 This EMD shall be in favour of the Commissioner, BDA, T. Chowdaiah Road, Kumara Park West, Bengaluru and shall be in the form of E- PAYMENT & BG.

13.5 Any tender not accompanied by an acceptable EMD and not secured as indicated in sub-clauses 13.1 and 13.3 above shall be rejected by the Employer as non-responsive.

13.6 The EMD of unsuccessful Tenderers will be refunded to the respective Bank accounts of the Tenderer registered in the e-Procurement system within 30 days of the end of the tender validity period specified in sub-clause 12.1.

13.7 The EMD of the successful Tenderer will be discharged when the Tenderer has signed the Agreement and furnished the required Security Deposit.

13.8 The EMD may be forfeited:

(a) if the Tenderer withdraws the Tender after tender opening during the period of tender validity;

(b) if the Tenderer does not accept the correction of the Tender Price, pursuant to Clause 24; or

(c) in the case of a successful Tenderer, if the Tenderer fails within the specified time limit to

(i) sign the Agreement; or

(ii) furnish the required Security Deposit

14. Format and signing of Tender

14.1 Tenderer shall submit the tender electronically before the submission date and time published in e-procurement portal.

D. SUBMISSION OF TENDERS

15. Sealing and Marking of Tenders

Tenderer shall submit the Tender document electronically before the submission date and time published. The document for submission shall be uploaded in PDF format and submitted in the order mentioned below.

1. Content sheet with name of folder / file, No of pages in each folder / file and size of the folder/file.

FIRST COVER /FOLDER (TECHNICAL PART)

2. As per Section 3 - Qualification information

a. Qualification information summary sheets.

b. Affidavit as per the format attached in Section 4.

c. Brief description of tenderer with the details of contact person for communication with BDA

d. Attested copy of Registration certificate of the contractor.

e. EMD as specified in the Table of IFT in the document.

f. Power of attorney for signing the tender as per the format attached in Section 4.

g. Work performed & quantity executed as per Table 1 & 2 with supporting certificates from client for the claims mentioned in above tables of qualification information.

h. Tables 3 A & 3 B of qualification information with supporting certificate from client &calculation sheet for available tender capacity.

i. Availability of machinery as per Table 3.4 of qualification information.

j. Experience & qualification of key persons as per Table 5 of qualification information.

k.Financial statement for past five F.Y. (2010-11 to 2014 -2015) contains balance sheet, profit & loss, statement of cash on hand, liquid assets, present net worth of the company, Net block asset of the company etc from Charted Accountant.

l. Line of credit and details of tenderer's bank with reference as per format attached in qualification information.

n. Litigation history as per Table 6. of qualification information.

o. Method adopted for construction program, bar chart, quality assurance program & Method adopted for construction safety as per clause 1.12 &1.13 of qualification information

p. Undertaking for the tender is valid for **120** days as per clause 1.13 of qualification information.

SECOND COVER/FOLDER (FINANCIAL PART)

a. Form of tender as per section 4 (I) of tender document.

b. Priced Bill of Quantity.

c. Any other materials required to be completed and submitted by Tenderers in accordance with ITT.

TENDERER EXECUTIVE ENGINEER-ID-3

Note: If any foreign firm participates in the bidding either individually or as JV partner, they should furnish certificate of proof of their existence, experience certificates issued by the authorities duly authenticated by the Indian Embassy in their country at the time of filing the tender. If the firm's existence certificate or experience certificates are in the vernacular, it must be translated into English by an authorized agency and it shall also be got authenticated from the Indian Embassy in their country and furnished along with the bid. In the absence of authentication from the Indian Embassy, the bid offered by them either individually or as a JV partner shall not be considered. The firm shall ensure that the key personal proposed to be engaged at the time of tender are invariably deployed at site during execution of work.

16. Deadline for submission of the Tenders

16.1 Tenders must be submitted on-line in the e-Procurement portal of the Employer before the notified date and time.

16.2 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause 9, in which case all rights and obligations of the Employer and the Tenderers previously subject to the original deadline will then be subject to the new deadline.

17. Late Tenders

17.1 In online e-Procurement system, you shall not be able to submit the Tender after the Tender submission time and date as the icon or the task in the e-procurement portal will not be available.

18. Modification and Withdrawal of Tenders

18.1 Tenderer has all the time to modify and correct or upload any relevant document in the portal till tender submission date and time, as published in the e-Procurement portal. In e-procurement portal the Contractor has the option of withdrawing the Tender by digitally signing to withdraw/cancel Tender before the Tender submission time/date.

18.2 Deleted

18.3 Deleted

18.4 Deleted

18.5 Deleted.

E. TENDER OPENING AND EVALUATION

19. Opening of First Cover/folder (Technical Part) of all Tenders and evaluation to determine qualified Tenderers:

19.1 The Employer will open online the First Covers of all the Tenders received through e-procurement portal, in the presence of the Tenderers or their representatives who choose to attend on the date and the place specified in the e-procurement portal. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day.

19.2 The Tenderers' names, the presence or absence of EMD (amount, format and validity), the submission of qualification information and such other information as the Employer may consider appropriate will be announced by the Employer at the time of opening.

19.3 The Employer shall prepare minutes of the Tender opening, including the information disclosed to those present in accordance with sub-clause 19.2.

19.4 The Employer will evaluate and determine whether each tender

(a) meets the eligibility criteria defined in ITT Clause 2;

(b) is accompanied by the required EMD as per stipulations in ITT Clause; and

(c) meets the minimum qualification criteria stipulated in ITT Clause 3. The Employer will draw out a list of qualified Tenderers.

20. Opening of Second Cover/folder (Financial Part) of qualified Tenderers and evaluation:

20.1 The Employer will inform all the Qualified Tenderers the time, date and venue fixed for the opening of the Second Cover containing the priced Tenders. The Employer will open online the Second Covers of qualified Tenderers at the appointed time and date (as indicated in the e-procurement portal) in the presence of the Tenderers or their representatives who choose to attend. In the event of the specified date of Second Cover opening being declared a holiday for the Employer, the Second Covers will be opened at the appointed time and location on the next working day.

20.2 The Employer shall prepare minutes of the Second Cover Tender opening.

21. Process to be confidential

21.1 Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may, at the sole discretion of the Employer, result in the rejection of his Tender and/or the Employer may take such other actions as it may deem fit and necessary.

22 Clarification of Tenders

22.1 To assist in the examination, evaluation, and comparison of Tenders, the Employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdown of unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Tender shall be sought, offered, or permitted.

22.2 Subject to sub-clause 22.1, no Tenderer shall contact the Employer on any matter relating to its Tender from the time of the Tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Employer, it should do so in writing, through the e-procurement portal.

22.3 Any effort by the Tenderer to influence the Employer in the Employer's Tender Evaluation, Tender Comparison or Contract Award Decisions may result in the rejection of the Tenderers' Tender.

23. Examination of Tenders and determination of responsiveness

23.1 Prior to the detailed evaluation of Tenders, the Employer will determine whether each Tender;

(a) has been digitally signed;

(b) is substantially responsive to the requirements of the Tender documents.

23.2 A substantially responsive Tender is one which conforms to all the terms, conditions, and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one

(a) which affects in any substantial way the scope, quality, or performance of the Works;

(b) which limits in any substantial way, inconsistent with the Tender documents, the Employer's rights or the Tenderer's obligations under the Contract; or

(c) whose rectification would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

23.3 If a Tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

24. Correction of errors

24.1 The Tenderer may modify the tender only before the last date for submission of the tender, as indicated on the e-procurement portal.

25. Evaluation and comparison of Tenders

25.1 The Employer will evaluate and compare only the Tenders determined to be substantially responsive in accordance with Clause 23.

25.2 In evaluating the Tenders, the Employer will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

(a) Making any Correction for Errors pursuant to Clause 24 and

(b) Deleted

25.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Tender evaluation.

25.4 The estimated effect of the price adjustment conditions under Clause 40 of the Conditions of Contract, Section 5, during the implementation of the Contract, will not be taken into account in tender Evaluation

25.5 If the tender of the successful Tenderer is seriously unbalanced in relation to the Employer's estimate of the cost of the work to be performed under the contract, the Employer may require the Tenderer to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause 29 be increased at the expense of the successful Tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful Tenderer under the contract.

F. AWARD OF CONTRACT

26. Award criteria

26.1 Subject to Clause 27, the Employer will award the Contract to the Tenderer whose Tender has been determined to be substantially responsive to the Tender documents and who has offered the lowest evaluated Tender price, provided that such Tenderer has been determined to be
(a) eligible in accordance with the provisions of Clause 2 of Section 2, and
(b) qualified in accordance with the provisions of Clause 3 of Section 2.

27. Employer's right to accept any Tender and to reject any or all Tenders

27.1 Notwithstanding Clause 26, the Employer reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the grounds for the Employer's action.

28. Notification of award and signing of Agreement

28.1 The Tenderer whose Tender has been accepted will be notified of the award by the Employer prior to expiration of the Tender validity period by, e-mail or facsimile or e-procurement portal or through letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed under the Contract (hereinafter and in the Contract called the "Contract Price").

28.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of Security Deposit in accordance with the provisions of Clause 29.

28.3 The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be kept ready for signature of the successful Tenderer in the office of Employer within 30 days following the notification of award along with the Letter of Acceptance. Within 20 days of receipt, the successful Tenderer is required to sign the Agreement and deliver it to the Employer.

28.4 Upon the furnishing by the successful Tenderer of the Security Deposit, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful.

29. Security Deposit

29.1 Within 20 days of receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Employer a Security Deposit in any of the forms given below for an amount equivalent to 7.5 % of the Contract price plus additional security for unbalanced tenders in accordance with Clause 25.5 of ITT and Clause 43 of the Conditions of Contract for the Works.

- Cash
- Banker's cheque/Demand draft/Pay Order in favour of the Commissioner , BDA, T. Chowdaiah Road, Kumara Park West, Bengaluru payable at Bengaluru
- The Bank guarantee in the form given in Section4.
- Specified small savings instruments pledged to ……

29.2 If the Security Deposit is provided by the successful Tenderer in the form of Bank guarantee, it shall be issued either by Nationalized / scheduled Bank.

29.3 The Security Deposit if furnished in cash or demand draft can, if requested, be converted to interest bearing securities at the cost of the successful Tenderer ("**contractor**").

29.4 Failure of the successful Tenderer to comply with the requirements of Clause 29.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the EMD.

30 Advance Payment

30.1 The Employer will provide the following advance payments on the contract price as stipulated in Clause 43 of the Conditions of Contract, subject to the maximum amount as stated in the Section 6, Contract Data. The recovery of advance payment is as stipulated of clause 42 of Conditions of contract.

Nature of Advance	Amount (Rs.)	Conditions to be fulfilled
Mobilization	5 % of the Contract price	a. On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period b. drawn before end of 20 % of Contract. c. The contractor shall furnish two Bank guarantees of 2.5% each, valid for full period of contract, d. Advance, bearing an interest of 12.%.
Machinery advance	5% of contract price	a. On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period. b. The contractor shall furnish two Bank guarantees of 2.5%

		each, valid for full period of contract, c. Limited to 90% for new and 50% of depreciated value for old equipment. d. After equipment is brought to site (provided the Engineer is satisfied that the equipment is required for performance of the contract). e. Advance is bearing an interest of 12 %
Secured advance for non- perishable materials brought to site	Upto 75% of cost of reinforcing Steel/Structural Steel and Bitumen supplied at site ,as assessed by the Engineer in charge.	Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks at his own risk and cost.

30.2 The agency shall maintain the account of machinery & materials procured for the project against advance amount and shall be fully responsible for variation in account , if any.

31. Corrupt or Fraudulent practices

31.1 The Government of Karnataka (GOK) requires that the Tenderers/Suppliers/Contractors, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, GOK:

(a) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(b) will declare any organization as ineligible, either indefinitely or for a stated period of time, to be awarded a GOK contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a GOK contract.

31.2 Furthermore, Tenderers shall be aware of the Termination provision stated in Clause 50 of the Conditions of Contract.

SECTION 3

QUALIFICATION INFORMATION

SECTION 3: QUALIFICATION INFORMATION

(SUMMARY SHEET)

The information to be filled in by the Tenderer hereunder will be used for purposes of computing Tender capacity as provided for in Clause 3 of the Instructions to Tenderers. This information will not be incorporated in the Contract.

1.1 a. Constitution or legal status of Tenderer: Copy attached (Yes/No)

b. Place of Registration: Copy attached (Yes/No)

c. Principal place of business: Copy attached (Yes/No)

d. Brief description of the Company including details of its main lines of business with details of individual (s) who will serve as the point of contact/ communication for BDA:
Details attached (Yes/No)

e. Power of Attorney for signing the tender: Copy attached (Yes/No)

1.2 Total value of works executed and payments received in the last five years (in INR Lakhs)

2010 - 11
2011 – 12
2012 – 13
2013 – 14
2014 - 15

Separate sheets certified by CA is attached (Yes/No)

1.3 Work performed (in the same organization name) on works of similar nature over during the five years specified in 1.2 above.

(Separate sheet should be added as per the table below with supporting experience certificate from the client) (Attached (Yes/No)

TABLE 1

Project Name	Name of the Employer*	Description of Work	Contract No.	Value of Contract INR Crores	Date of issue of work order	Stipulated period of completion	Actual date of completion*	Remark

* Attach certificate(s) from the Engineer(s)-in-Charge

1.4 Quantities of work executed as prime Contractor (in the same organization name) during the last five years specified in 1.2 above:
(Separate sheet should be added as per the table below with supporting experience certificate from the client)
Attached (Yes/No)

TABLE 2

Year	Name of Work	Name of Employer	Quantity of work performed)					Remarks (Indicate contract reference)
			Piling work – dia. Not less than 900 mm (Rmt)	Structural steel fabrication & Erection (MT)	RCC (m^3)	BC (m^3)	Flexible pavement (Km)	
2010								
2011								
2012								

2013								
2014								

1.5 Information on works for which Tenders have been submitted and works which are yet to be completed as on the date of this Tender.

TABLE 3. (A)

A) Existing commitments and on-going works: (Separate sheet should be added as per the table below with supporting certificate from the client)

(Attached (Yes/ No)

Description of works	Place	Contract No.	Name & Address of Employer	Value of Contract (INR C	Stipulated Period	Value of works* remaining to be completed	Anticipated Date of completion
1	2	3	4	5	6	7	8

*Attach certificate(s) from the Engineer(s)-in-Charge

TABLE 3 (B)

(B) Works for which tenders already submitted:

(Separate sheet should be added as per the table below with supporting certificate if any)

(Attached (Yes/No)

Description of works	Place	Name & Address of Employer	Estimated value of works (INR Crores)	Stipulated period of completion	Date when decision is expected	Remarks, if any
1	2	3	4	6	6	7

1.6 The following items of equipment are considered essential for successfully carrying out the works. The Tenderer should furnish all the information listed below. (Separate sheet should be added as per the table below)

(Attached (Yes/No)

TABLE 4

Item of	Requirement		Availability proposals			Remarks
Equipment	No.	Capacity	Owned / Assured ownership	Leased / hired	Age/ Condition	(from whom to be purchased)
Hydraulic rotary Rig	2	1.2m dia boring attachment				
Automatic Submerged Arc Welding (SAW) gantries with necessary accessories	2					
Cranes	8	50 MT				
* Fully Automatic and computerized batching and	2	30cum/Hr				
Gantries for fabrication yard	6					
* If the contractor intends to procure RMC, these items can be excluded						

1.7 Reports on the financial standing of the Tenderer, such as profit and loss statements and auditor's reports for the last five years; (Separate sheets certified by CA is attached (Yes/No))

1.8 Qualification and experience of the key technical and management personnel in permanent employment with the Tenderer and those that are proposed to be deployed on this contract, if awarded.

(Separate sheet should be added as per the table below)

(Attached (Yes/No)

TABLE 5

Position	Name	Qualific	Year of Experience (General)	Years of Experience in the proposed	Nos
Project Manager		B.E	10Yrs		1
Site Engineers – Civil, MEP		B.E (in	3 Yrs (in resp ectiv		4+1
Planning Engineer		B.E	5 Yrs Exp		2
Plant Engineer		B.E (Mech) or Dip (Mech.)	3 Yrs 7 yrs		2
Quality control Engr		B.E (Civil) Or Dip (Civil.)	3 Yrs Exp 7 yrs		2

Quantity Surveyor		B.E (Civil) or Dip (Civil.)	3 Yrs Exp 7 yrs		2
Safety Engineer		Dip (Civil./Mech.)	3 Yrs Exp		2
				Total	16 Nos

1.9 Name, address, and telephone, telex, and fax numbers of the Tenderers' bankers who may provide references if contacted by the Employer.

1.10 Evidence of access to financial resources to meet the qualification requirement specified in Section 2. ITT sub-clause3.3 (b): Cash in hand, Letter of Credit etc. List them below and attach certificate from the Banker in the suggested format as under:

BANKER'S CERTIFICATE

(Refer Clause 1.10 of qualification Information)

This is to certify that M/s. ……..…….. is a reputed company with a good financial standing. If the contract for this work, namely …….. **(Name of the work)** …….. Tender Reference No.… is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of INR… to meet the working capital requirements for executing the above contract

Sd/-
Name of the Bank,
Senior Bank Manger
Address: …….

1.11 Information on litigations in which the Tenderer is involved:

(Separate sheet should be added as per the table below)

(Attached (Yes/No)

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TABLE 6

Other Party (ies)	Employer	Cause of Dispute	Amount involved	Remarks showing Present Status

1.12 The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.
(Separate sheets should be added)

Attached (Yes/No)

1.13 Additional Requirements

Tenderer should provide any additional information required to fulfill the requirements of Clause 3.1 of the Instructions to the tenderers, if applicable.

(i) Affidavit as per the format given in qualification information (Attached (Yes/No)

(ii) Undertaking as per the format given qualification information. (Attached (Yes/No)

(iii) Methodology on Construction Safety. (Attached (Yes/No)

Note: If any foreign firm participates in the bidding either individually or as JV partner, they should furnish certificate of proof of their existence, experience certificates issued by the authorities duly authenticated by the Indian Embassy in their country at the time of filing the tender. If the firm's existence certificate or

experience certificates are in the vernacular, it must be translated into English by an authorized agency and it shall also be got authenticated from the Indian Embassy in their country and furnished along with the bid. In the absence of authentication from the Indian Embassy, the bid offered by them either individually or as a JV partner shall not be considered. The firm shall ensure that the key personal proposed to be engaged at the time of tender are invariably deployed at site during execution of work.

SECTION 4

FORMS OF TENDER, LETTER OF ACCEPTANCE, NOTICE TO PROCEED WITH THE WORK, AGREEMENT FORM, POWER OF ATTORNEY, AFFIDAVIT, UNDERTAKING BY THE CONTRACTOR & FORM FOR BG FOR EMD

SECTION 4: FORMS OF TENDER, LETTER OF ACCEPTANCE, NOTICE TO PROCEED WITH THE WORK, AGREEMENT FORM, POWER OF ATTORNEY, AFFIDAVIT, UNDERTAKING BY THE CONTRACTOR & FORM FOR BG FOR EMD

(I) FORM OF TENDER

Description of the Works: Construction of Six Lane Elevated Road from Basaveshwara Circle to Hebbal Flyover Via Le-Meridian Hotel And Mekhri Circle, In Bengaluru

.....

Tender No.

To : _____

Address : _____

_____

Dear Madam/Sir(s),

We offer to execute the Works described above in accordance with the Conditions of Contract accompanying this Tender for the Contract Price of..... (in figure)

..... (in words).

This Tender and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest of Tendersor any Tender you receive.

The advance payment required is INR. ..... Lakhs

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely “Prevention of Corruption Act 1988”.

We hereby confirm that this Tender complies with the Tender validity and EMD required by the Tender documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory: _____

Name of Tenderer _____

Address: _____

(II) Letter of Acceptance

(on the Letterhead of the Employer)

_____ [date]

To

_____ (Name and address of the Contractor)

_____

_____

Dear Madam/Sir(s),

This is to notify you that your Tender dated _____ for execution of the.....
.....for the Contract Price of INR
(.....
.....) [amount in words and figures], as corrected and modified in accordance with the Instructions to Tenderers is hereby accepted by our Agency.

You are hereby requested to furnish Security Deposit plus additional security for unbalanced tenders in terms of Clause 25.5 of ITT, in the form detailed in Clause 29.1 of ITT for an amount of INR-_____ within 20 days of the receipt of this letter of acceptance, which shall be valid up to 30 days from the date of expiry of Defects Liability Period i.e. up to _____and sign the contract, failing which action as stated in Para 29.4 of ITT will be taken.

TENDERER EXECUTIVE ENGINEER-ID-3

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

(III) ISSUE OF NOTICE TO PROCEED WITH THE WORK

(on the Letterhead of the Employer)

_____ [date]

To

———————————— (name and address of the Contractor)

————————————

————————————

Dear Madam/Sir(s),

Pursuant to your furnishing the requisite Security Deposit as stipulated in ITT Clause 29.1 and signing of the contract agreement for the construction of ....at Tender Price of INR ————, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

(IV) AGREEMENT FORM

Agreement

This agreement, made on the _____day of _____20_____, between _____ _____ (hereinafter called "the Employer") of the one part and _____ _____ _____ [name and address of contractor] (hereinafter called "the Contractor") of the other part (together shall be referred to hereinafter as Parties).

Whereas the Employer is desirous that the Contractor execute _____ _____ (hereinafter called "the Works") and the Employer has accepted the Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of INR _____

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the Conditions of Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and remedying the defects therein, the Contract Price or such other sum as may become

payable under the provisions of the Conditions of Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:

   i) Letter of Acceptance;
   ii) Notice to proceed with the works;
   iii) Contractor's Tender;
   iv) Contract Data;
   v) Conditions of contract (including Special Conditions of Contract);
   vi) Specifications;
   vii) Drawings;
   viii) Bill of Quantities; and
   ix) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____
was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said_____
_____

in the presence of:
Binding Signature of Employer _____
Binding Signature of Contractor_____

(V) POWER OF ATTORNEY FOR SIGNING OF APPLICATION

(Refer Clause 1.1e of qualification Information)

Know all men by these presents, We (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr/ Ms (name), son/daughter/wife of and presently residing at …….. , who is presently employed with us and holding the position of , as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our application for Qualification and submission of our tender for the ***** Project proposed or being developed by the ***** (the "Authority") including but not limited to signing and submission of all applications, tenders and other documents and writings, participate in Pre-Applications and other conferences and providing information/ responses to the Authority, representing us in all matters before the Authority, signing and execution of all contracts including the Concession Agreement and undertakings consequent to acceptance of our tender, and generally dealing with the Authority in all matters in connection with or relating to or arising out of our tender for the said Project and/ or upon award thereof to us and/or till the entering into of the Concession Agreement with the Authority.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, , THE ABOVE NAMED
PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS
DAY OF 2
For
……..

(Signature, name, designation and address)

Witnesses:

1.
(Notarised)
2.

Accepted

(Signature)

(Name, Title and Address of the Attorney)

Notes:

- *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant (s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- *Wherever required, the Applicant should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Applicant.*
- *For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Applicants from countries that have signed the Hague Legislation Convention 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Appostille certificate.*

(VI) AFFIDAVIT

(Refer Clause 1.13 of qualification Information)

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s___ _____ have abandoned any work on National Highways in India nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this tender

3. The undersigned hereby authorize (s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.

4. The undersigned understand and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department/ Project implementing agency.

(Signed by an Authorized Officer of the Firm)

Title of Officer

Name of Firm

Date

(VII) UNDERTAKING

(Refer Clause 1.13 of qualification Information)

I, the undersigned do hereby undertake that our firm M/s……. agree lo abide by this tender for a period 120 days for the date fixed for receiving the same and it shall be binding on us and may be accepted at any time before the expiration of that period.

(Signed by an Authorized Officer of the Firm)

Title of the Officer

Name of Firm

Date

(VIII). FORMAT OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT(EMD)

(Refer Clause 13 of ITT)

To: _____ [Name of Employer]

_____ [Address of Employer]

WHEREAS _____ [Name and Address of Tenderer] (hereinafter called "the Tenderer") has undertaken, in pursuance of Tender No. _____ dated _____ to submit _____ [name of Tender and Brief Description of Works] (hereinafter called "the Tender");

AND WHEREAS it has been stipulated by you in the said Tender that the Tenderer shall furnish you with a Bank Guarantee by a recognized Bank for the sum specified therein as Earnest Money Deposit (EMD) for compliance with his Obligations in Accordance with the Tender.

AND WHEREAS we have agreed to give the Tenderer such a Bank Guarantee.

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Tenderer, upto a total of INR_____ [Amount of Guarantee][1] INR_____ [in words] and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [Amount of Guarantee][2] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Tenderer before presenting us with the demand.

We further agree that no change or addition to or other modification of the Terms of the Tender or of the Works to be performed there under or of any of the Contract Documents which may be made between you and

the Tenderer shall in any way release us from any Liability under this Guarantee, and we hereby waive Notice of any such Change, Addition or Modification.

This Guarantee shall be valid until **45 days** from the Date of Expiry of the Tender Validity Period of 120 days.

Signature and Seal of the Guarantor:

Name of Bank:

Address:

Date:

[1] An Amount shall be inserted by the Guarantor, representing the percentage of the Tender Price specified in the Tender.

[2] An Amount shall be inserted by the Guarantor, representing the percentage of the Tender Price specified in the Tender.

SECTION 5

CONDITIONS OF CONTRACT

SECTION 5: CONDITIONS OF CONTRACT

TABLE OF CONTENTS

A. GENERAL

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Bold letters are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Tender.

Compensation events are those defined in Clause 38 hereunder.

The **Completion Date** is the date of completion of the Works, as certified by the Employer in accordance with Sub Clause 46.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.2 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The Contractor is a person or corporate body who's Tender to carry out the Works has been accepted by the Employer.

The **Contractor's Tender** is the completed Tender document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Corrupt practice means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.

Days are calendar days; **months** are calendar months.

A **Defect** is any part of the Works not completed in accordance with the specifications of the Employer set out in the Contract or such specifications communicated to the Contractor from time to time.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

Engineer shall mean a qualified civil engineer appointed by the Employer for the purposes of the Contract and named in Section 6, Contract Data or notified by the Employer from time to time.

Engineer-in-charge is a representative of the Employer (from the department of engineering) who is of an appropriate seniority and who will be responsible for supervising and administering the contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

Fraudulent practice means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the unjust benefit or advantage of the Contractor, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Employer and the public of the benefits of free and open competition.

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.

INR – Indian Rupee

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Operations and Maintenance Manual is documents containing instructions for operation, maintenance of the Works

Plant is a place where construction material is stored

Program of Construction is a sequenced scheduling of the Works under the contract

The **Site** is the area defined as such in the Contract Data.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Employer. The specifications include supplemental specifications, special provisions, and all written or printed agreements and instructions pertaining to the method and manner of performing the work or to the quantities and qualities of the materials to be furnished under the contract.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates, but shall be the same as or a date after the site possession date.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

"Temporary Works" means all temporary works of every kind required in or about the execution, completion or maintenance of he works and includes all temporary constructions such as, scaffolding, ladders, timbering, site offices, cement and other platforms and bins for stacking building materials, gantries, temporary tracks and roads, temporary culverts and, mixing platforms.

A **Variation** is an instruction given by the Employer which varies the Works.

The **Works** are documents prepared by the Employer and are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data. The Works shall contain name of the work, brief summary, estimated cost, locality and precise extents of the site.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Employer will provide instructions clarifying queries about the Conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority.

(1) Agreement
(2) Letter of Acceptance, notice to proceed with the works
(3) Bill of quantities
(4) Minutes of Meeting of Pretender Meeting
(5) Contractor's Tender
(6) Contract Data
(7) Conditions of Contract
(8) Specifications (including annexure)
(9) Drawings
(10) Any other document listed in the Contract Data as forming part of the Contract.

(11) Codes of practice

3. Law governing contract

3.1 The law governing the Contract is the Laws of India read along with the local laws of the State of Karnataka.

4. Employer's decisions

4.1 Except where otherwise specifically stated, the Employer will decide contractual matters between the Employer and the Contractor after consulting with the Contractor.

5. Delegation

5.1 The Employer may delegate any of its duties and responsibilities to agencies to perform specific tasks with respect to the Works, after notifying the Contractor and may cancel any such delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered.

7. Subcontracting (Deleted)

7.1 The Contractor may subcontract with the approval of the Employer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations and the Contractor shall be fully and solely liable for performance by such Sub-contractor, of all its obligations.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other Contractors, public authorities, utilities, and the Employer.

9. Personnel

9.1 The Contractor shall employ such technical personnel (of number and qualifications) as set out in the contract Data, subject to conformance with the qualification requirements set out in Clause 3.3 of Section 2. The technical staff so employed shall be available at site as may be stipulated by the Employer.

9.2 If the Employer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the Work.

10. Employer's and Contractor's risks

10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risk

11. Employer's risks

11.1 The Employer is responsible for the following risks:

a) Rebellion, riot, commotion or disorder unless solely restricted to employees of the Contractor or his Sub-Contractors arising from the conduct of the Works; or
b) A cause due solely to the design of the Works, other than the Contractor's design; or
c) Any operation of the forces of nature (in so far as it occurs on the Site) which an experienced contractor:

i. could not have reasonably foreseen; or

1. ii. could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures;prevent loss or damage to physical property from occurring by taking appropriate measures or
2. insure against such loss or damage

12. Contractor's risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract, other than the excepted risks set forth above, are the responsibility of the Contractor.

13. Insurance:

13.1 a) The Contractor shall, prior to commencing the works, effect and thereafter maintain insurances , in the joint names of the Employer and the Contractor, (cover from the first working day after the Start Date to the end of Defects Liability Period), in the amounts stated in the Contract Data :for loss of or damage to the Works, Plants and Materials and the Contractor's equipment;

b) for loss, damage, death and injury to third parties or their property arising out of the Contractor's performance of the Contract including the Contractor's liability for damage to the Employer's property other than the Works and

c) For death and injury to the Contractor's personnel except to the extent that liability arises from the negligence of the Employer, any Employer's representative or its employees.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Employer for his approval before the Start Date. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred. All payments received from insurers relating to loss or damage shall be held jointly by the Parties and used for the repair of the loss or damage, or as compensation for loss or damage that is not to be repaired.

13.3 If the Contractor fails to effect or keep in force any of the insurances referred to in the previous sub-Clauses or fails to provide satisfactory evidence, policies or receipts, the Employer may without prejudice to any other right or remedy, effect insurance relevant to such default and pay the premiums due and recover the same as a deduction from any other monies due to the Contractor. If no payment is due, the payment of the premiums shall be a debt due by the Contractor to the Employer.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Employer.

13.5 Both Parties shall comply with conditions of the insurance policies as per respective obligations specified in such policies and/or laws applicable thereto.

14. Site Investigation Reports:

14.1 The Employer shall make available to the Contractor the following documents as part of site investigation reports:

a) Location maps in GIS/CAD format

b) Detailed total station survey and drawings of existing conditions.

14.2 The Contractor, in preparing the tender, shall rely on any site investigation reports referred to in the Contract data, supplemented by any information available to the Tenderer.

15. Queries about the Contract Data

15.1 The Employer will clarify queries on the Contract Data.

16. Contractor to construct the Works

16.1 The Contractor shall construct the Works in accordance with the Specification and Drawings.

17. The Works to be completed by the Intended Completion Date

17.1 The Contractor will commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Employer, and complete them by the Intended Completion Date.

18. Approval by the Employer

18.1 The Contractor shall submit Specification and Drawings showing the proposed Temporary Works to the Employer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for the design of Temporary Works

18.3 The Employer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of the temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Employer before their use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Employer of such discoveries and carry out the Employer's instructions for dealing with them.

21. Possession of the Site

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and the same may be considered as a Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Employer and any person authorized by the Employer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where Materials or Plant are being manufactured/ fabricated/assembled for the Works.

23. Instructions

23.1 The Contractor shall carry out all instructions of the Employer which are in accordance with this Contract and which comply with the applicable laws.

24. Arbitration

24.1 If the Contractor is not satisfied with the Decision taken by the Employer, the Dispute shall be referred by either Party to Arbitration within 30 days of the notification of the Employer's Decision.

24.2 If neither Party refers the Dispute to Arbitration within the above 30 days, the Employers Decision will be final and binding.

24.3 The Arbitration shall be conducted in accordance with the Arbitration Procedure stated in the Special Conditions of Contract.

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B. TIME CONTROL

25. Program

25.1 Within the time stated in the Contract Data the Contractor shall submit to the Employer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. The Contractor understands that time is the essence of this Contract and in the event the Contractor is unable to complete the Contract within the stipulated time, the Employer shall be entitled to terminate this Contract under Clause 50 hereunder.

25.2 In the event of Employer's disapproval of the Program, the Contractor shall revise the Program as per the requirements of the Employer and re-submit the same to the Employer for approval. The Employer may require the Contractor, in case there are any Variations or Compensation Events to revise the Program in order to reflect such Variations or Compensation Events.

26. Extension of the Intended Completion Date

26.1 The Employer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the original Intended Completion Date.

26.2 The Employer shall determine the terms of revision of the Program or the Intended Completion Date, within 21 days of the Contractor asking the Employer for a decision upon the effect of a Compensation Event or Variation and submitting complete supporting information thereto.

27. Delays ordered by the Employer

27.1 The Employer may instruct the Contractor to delay the start or progress of any activity within the Works.

28. Management meetings

28.1 The Employer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the progress achieved and the plans for completion of the remaining work.

28.2 The responsibility of the parties for actions to be taken is to be decided by the Employer either at the management meeting or after the management meeting and stated in writing to be distributed to all who attended the meeting.

C. QUALITY CONTROL

29. Identifying Defects

29.1 The Employer shall, from time to time and upon completion of the Works, check the Contractor's work and notify the Contractor of any Defects that are found. The Employer may instruct the Contractor to search for a Defect and to uncover and test any work that the Employer considers may have a Defect and instruct the Contractor to rectify such Defect in terms hereof. Such tests and rectification shall not affect the Contractor's on-going responsibilities under this Contract and shall not be deemed to extend the intended Completion Date.

29.2 The Employer has the right to appoint third party agencies for quality check..

30. Tests

30.1 If the Employer instructs the Contractor to carry out a test not specified in the Specifications, to check whether any work has a Defect and in the event such test shows that there is a Defect, the Contractor shall bear all costs with respect to such test. If there is no Defect, the test shall be considered as a Compensation Event.

30.2 The tests stated in Tender SURE may be used as per the project work and type.

31. Correction of Defects

31.1 The Employer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins on the date of Completion and is defined in the Contract Data. The Defects Liability Period may be extended for a reasonable period of time beyond which the defect shall be deemed an Uncorrected Defect under Clause 32.

31.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified in such notice by the Employer.

32. Uncorrected Defects

32.1 If the Contractor has not corrected a Defect within the time specified in the Employer's notice, the Employer may assess the cost of having the Defect corrected and require the Contractor to pay such amount, notwithstanding any other remedies that the Employer may seek against the Contractor for correction of such Defect.

D. COST CONTROL

33. Bill of Quantities (BOQ)

33.1 The BOQ shall contain items for the construction, installation, testing, and commissioning of the Works.

33.2 The BOQ is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the BOQ for each item

34. Variations

34.1 The Employer shall have power to order the Contractor to do any or all of the following as considered necessary or advisable during the progress of the Works

a) Increase or decrease any item of work included in the Bill of Quantities (BOQ);
b) Omit any item of work;
c) Change the character or quality or kind of any item of work;
d) Change the levels, lines, positions and dimensions of any part of the work;
e) Execute additional items of work of any kind necessary for the completion of the works; and/ or
f) Change any specified sequence, methods or timing of construction of any part of the work.

34.2 The Contractor shall be bound to carry out the Works in accordance with any instructions in this connection, which may be given to him in writing by the Employer and such alteration shall not vitiate or invalidate the Contract.

34.3 Variations shall not be made by the Contractor without an order in writing by the Employer, provided that no order in writing shall be required for increase or decrease in the quantity of an item appearing in the BOQ so long as the work executed conforms to the approved drawings.

34.4 The Contractor shall promptly request in writing to the employer to confirm verbal orders and the officer issuing oral instructions shall confirm it in writing within 30 (Thirty) days, failing which the work shall be carried out as though there is no variation. In case variation is approved it shall be accompanied by BOQ failing which the Contractor shall be responsible for deviation if any. Further, approval of employer has to be obtained for any variation exceeding 5%.

35. Payments for Variations

35.1 Payment for increase in the quantities of an item in the BOQ up to 25% of that provided in the Bill of Quantities shall be made at the rates quoted by the Contractor.

35.2 For quantities in excess of 25% of the tendered quantity of an item as given in the BOQ, the Contractor shall be paid at the rate entered in or derived from the Schedule of Rates (applicable for the area of the work and current at the time of executing the item of work) plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of Contract.

35.3 If there is no rate for the additional, substituted or altered item of the work in the BOQ, efforts would be made to derive the rates from those given in the BOQ or the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) and if found feasible the payment would be made at the derived rate for the item plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of Contract

35.4 If the rates for additional, substituted or altered item of work cannot be determined either as at 35.1 or 35.2 or 35.3 above, the Contractor shall be requested to submit his quotation for the items supported by analysis of the rate or rates claimed, within 7 days.

35.5 If the Contractor's quotation is determined unreasonable, the Employer may order the Variation and make a change to the Contract Price which shall be based on Employer’s own forecast of the effects of the Variation on the Contractor's costs.

35.6 If the Employer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

35.7 Under no circumstances shall the Contractor suspend the work on the plea of non-settlement of rates for items falling under this Clause.

36. Submission of bills for payment

36.1 The Contractor shall submit to the Employer bills of the value of the work completed as per following stages less the cumulative amount paid previously. The Minimum Bill value claimed shall not be less than INR 35 Crores.

36.2 The Employer shall check the Contractor's bill and determine the value of the work executed which shall comprise of

(i) value of the quantities of the items in the BOQ completed and

(ii) valuation of Variations and Compensation Events.

36.3 The certification of bills will be done provided RA bills are submitted with relevant supporting documents. Even in the unlikely event of there being any delay in settlement of contractor's bills, the contractor is not eligible for any compensation for such delays.

36.4 The value of work executed shall be determined by the Employer.

36.5 The Employer may exclude any item paid in a previous bill or reduce the proportion of any item previously paid in the light of later information.

37. Payments

37.1 Payments shall be adjusted for deductions for advance payments, other than recoveries in terms of the Contract and taxes at source, as applicable under the law. The Employer shall pay the Contractor within 60 (Sixty) days of submission of bill. The Contractors shall be liable to pay liquidated damages for short fall in progress. For progress beyond the agreed Program, payment is subject to availability of grants.

37.2 Items of the Works for which no Rate or Price has been entered in, will not be paid for by the Employer and shall be deemed covered by other Rates and Prices in the Contract.

37.3 Payments to contractor shall be made by Cheques. Receipt of payments made on account of any work shall be signed by the contractor or any person having the Authority to receive payment on behalf of the contractor

38. Compensation events

38.1 The following are Compensation events, unless they are attributable to the Contractor:

a) The Employer does not provide access to a part of the Site by the Site Possession Date stated in the Contract Data.
b) The Employer orders a delay or does not certify or release drawings, specifications or instructions required for execution of works on time.
c) The Employer instructs the Contractor to uncover or to carry out tests upon work which is found to have no Defects upon completion of such tests.
d) The Employer provides instructions to deal with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
e) The effect on the Contractor of any of the Employer's Risks.
f) The Employer delays issuing a Certificate of Completion without just cause.
g) Other Compensation Events that may be listed in the Contract Data or mentioned in the Contract.

38.2 If a Compensation Event would cause additional cost or would prevent the work being completed by the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date extended, as required. The Employer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

38.3 As soon as information demonstrating the effect of each Compensation event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Employer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Employer shall adjust the Contract Price based on Employer's own forecast made in consultation with the Contractor. The Employer will assume that the Contractor will react competently and promptly to the event.

38.4 The Contractor shall not be entitled to compensation in the event the Contractor does not report the change in circumstances within a reasonable time or in the event non co-operation by the Contractor with the Employer has adversely affected the Employer's interests.

39. Tax

39.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

40. Price Adjustment

40.1 Contract price shall be adjusted for increase or decrease in rates & prices of major construction materials, like **cement, reinforcement steel, Structural steel & Bitumen** in accordance with the following principles and procedures and as per formulae given in the Contract Data

a) The price Adjustment shall apply for the work done from the date of commencement up to the end of original period of completion or extensions granted by the Employer and shall not apply to work carried out beyond the stipulated period of completion for reasons attributable to the Contractor;
b) Price Adjustment shall be admissible from the date of opening of tenders (original or extended)
c) The price adjustment shall be determined during each quarter from the formulae given in Contract Data.
d) Following expressions and meanings are assigned to the work done during the quarter:

R = Total value of work done during the quarter. It will exclude value for works executed under variations for which price adjustment (if any) will be worked out separately based on the terms mutually agreed.

40.2 To the extent that full compensation for any increase or decrease in costs to the Contractor is not covered by the provisions of this or other Clauses in the Contract, the unit rates included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

41. Liquidated damages

41.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities herein.

41.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Employer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

42. Advance Payments

42.1 The Employer shall make payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an unconditional bank guarantee in a form acceptable to the Employer issued by a Nationalized/Scheduled Bank in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will be charged @12% on the advance payment of mobalisation & machinery advances. Materiall advance is given upto 75% of f cost of major items supplied at site on actual bills. The following are the advances proposed.

Nature of Advance	Amount (Rs.)	Conditions to be fulfilled
Mobilization	5 % of the Contract price	a. On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period. b. drawn before end of 20 % of Contract period. c. The contractor shall furnish two bank guarantees of 2.5% each, valid for full period of contract, d. Advance, bearing an interest of 12%.
Machinery advance	5% of contract price	a. On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period. b. The contractor shall furnish two Bank guarantees of 2.5% each, valid for full period of contract, c. Limited to 90% for new and 50% of depreciated value for old equipment. d. After equipment is brought to site (provided the Engineer is satisfied that the equipment is required for performance of the contract). e. Advance is bearing an interest of 12 %
Secured advance for non- perishable materials brought to site	Upto 75% of cost of reinforcing Steel/Structural Steel and Bitumen supplied at site, as assessed by the Engineer in charge.	Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks at his own risk and cost.

42.2 The Contractor is to use the advance payment only to pay for Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other relevant documents to the Employer.

42.3 The mobalisation & machinery advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuation of the work done, variations, price adjustments, compensation events or liquidated damages The mobalisation & machinery advance advance loan shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 15 percent of the Contract Price or 4 months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 7.5% percent of the amounts of all Interim Payment Certificates until such time as the loan has been repaid, always provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clauses 17 and 26. Mobalisation & machinery advance is bearing an interest of 12%

Repayment of secured advance on non perishable materials shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid.] have been incorporated into the Works.

43. Security Deposit

43.1 The successful tenderer shall pay a total Security Deposit equal to an amount of 7.5% of the Contract value. The EMD of 1% on the estimated cost paid earlier will be adjusted towards the Security Deposit. The balance amount will be recovered at 6.5% of each running bills as further Security Deposit. **Alternatively,** Security Deposit (including additional security for unbalanced tenders) shall be provided

to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and type of instrument acceptable to the Employer.

43.1 The Security Deposit shall be valid until a date 30 days from the date of expiry of Defects Liability Period.

44. Cost of Repairs

44.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Liability Period shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. FINISHING THE CONTRACT

45. Completion

45.1 The Contractor shall request the Employer to issue a Certificate of Completion of the Works and the Employer will do so upon deciding that the Works are completed in accordance with the Contract.

46. Taking over

46.1 The Employer shall take over the Site and the Works within seven days of issuing a Certificate of Completion.

47. Final account

47.1 The Contractor shall supply to the Employer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer shall issue within 90 days a schedule that states the scope of the corrections or additions that are necessary.

If the Final Account is still not in terms of this Contract, after it has been resubmitted, the Employer shall decide on the amount payable to the Contractor based on the terms of this Contract and make such payment within 60 days of receiving the Contractor's revised account.

48. As-built drawings

48.1 The Contractor shall supply as-built drawings by the dates stated in the Contract Data.

48.2 If the Contractor does not supply the as-built Drawings by the dates stated in the Contract Data, or the Employer rejects the same, the Employer shall withhold the amount stated in the Contract Data from payments due to the Contractor. In case of rejection, the amounts shall be withheld until such drawings are amended and resubmitted for Employer's approval.

49. Operating and Maintenance Manuals

49.1 The Contractor shall supply Operating and Maintenance Manuals for the Works by the dates stated in the Contract Data.

49.2 If the Contactor does not supply the Operating and Maintenance Manuals by the dates stated in the Contract Data, or the Employer rejects the same, the Employer shall withhold the amount stated in the Contract Data from payments due to the Contractor. In case of rejection, the amounts shall be withheld until such manuals are amended and resubmitted for Employer's approval

50. Termination

50.1 The Employer may terminate the Contract if the Contractor causes a fundamental breach of the Contract.

50.2 Fundamental breaches of Contract include, but shall not be limited to the following:

a) the Contractor stops work for 45 days continuously when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Employer;

b) the Contractor becomes bankrupt or goes into liquidation other than for a reconstruction or amalgamation, in which case, the new entity so formed shall be liable and responsible for all obligations of the Contractor under this agreement;
c) the Employer gives Notice to correct a particular Defect and the Contractor fails to correct it within a reasonable period of time determined by the Employer;
d) the Contractor does not maintain security, as required by the Employer and stipulated herein;
e) the Contractor has delayed the completion of Works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract Data;
f) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract.

50.3 The Contractor may terminate the Contract if the Employer causes a fundamental breach of the Contract. Fundamental breach on the part of the Employer shall mean:
a) the Employer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within (30) days;
b) payment due to the Contractor is not paid by the Employer within 90 days of the date of the submission of the Bill by Contractor;

50.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

50.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and vacate the site with immediate effect by handing over possession to the Employer.

51. Payment upon Termination

51.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Employer shall prepare bill for the value of the work done less advance payments received up to the date of the bill, less other recoveries due in terms of the Contract, less taxes due to be deducted at

source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable by the Contractor to the Employer.

51.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Employer shall prepare bill for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract, and less taxes due to be deducted at source as per applicable law and make payment accordingly.

52. Property

52 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of Contractor’s default.

52. Release from performance

52.1 If the Contract is frustrated by any event entirely outside the control of either the Employer or the Contractor, the Employer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work immediately after receiving a certificate to this effect and shall be paid for all work carried out before the issuance of such certificate.

53. In case the death of the contractor

53.1 In case the death of the contractor after executing the agreement/commencement of the work, his legal heir, if an eligible registered contractor and willing, can execute and complete the work at the accepted tender rates irrespective of cost of the work.

F. SPECIAL CONDITIONS OF CONTRACT

1. Labour:

The Contractor shall make his own arrangements for and bear and pay all costs and expenses with respect to the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Employer, deliver to the Employer a return in detail, in such form and at such intervals as the Employer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Employer may require.

2. Compliance with labour regulations:

During continuance of the Contract, the Contractor and his sub contractors shall abide, at all times, by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, Employer shall have the right to deduct any money due to the Contractor including his amount of Security Deposit. The Employer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.
The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

3. Protection of Environment:

The Contractor shall take all reasonable steps to protect the environment, in the performance of this Contract, on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. During continuance of the Contract, the Contractor and his Sub-Contractors shall abide, at all times, by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

4. Arbitration (Clause 24)

4.1 The procedure for arbitration shall be as follows:

(a) Any dispute or difference or claim arising out of, or in connection with, or relating to the present contract or the breach, termination or invalidity thereof. Shall be referred and settled under the arbitration center – Karnataka (Domestic & International) Rules 2012, by one or more arbitrators appointed in accordance with its rules

(b) Arbitration proceedings shall be held at Bengaluru, Karnataka, India

(c) The cost and expenses of arbitration proceedings will be paid as determined by the Arbitrator. However the expenses incurred by each party in connection with the preparation, presentation, etc., shall be borne by each party itself.

(d) Performance under the contract shall continue during the arbitration proceedings and payments due to the Contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.

5. Facilities to be provided to Employer

OFFICE ACCOMMODATION, EQUIPMENT AND TRANSPORT REQUIREMENTS

5.1 SITE OFFICE ACCOMMODATION FOR THE EMPLOYER AND PROJECT MANGEMENT CONSULTANTS

5.1.1 The contractor has to provide the following:

i. Well furnished office accommodation of approx. 100 sqm (air-conditioned) for the Employer's representative (BDA) as per approved drawings.

ii. Two well furnished office accommodation of approx. 200 sqm (air-conditioned) including a conference hall for the Project Management Consultant's (PMC) Engineers as per approved drawings, each at site and fabrication yard.

5.1.2 The contractor has to provide the following furniture/ facilities for each office separately i.e. Employer's representative site office, PMC site office and Fabrication yard office but not limited to:

Sl. No.	Item	Nos.
1	Cabinet (Drawing)	1+1
2	Telephone with Answering facility	4 P & T line + 8 line Intercom with Instruments
3	Telephone (Mobile)	5 (iphone)
4	Digital Photocopy Machine (up to A3 Size)	1
5	Refrigerator (290 Liters.)	1
6	Hot Case	1

7	Drinking Water Dispenser (Hot & Cold)	2
8	Tea/Coffee Dispenser	1
9	Standby DG power	As required to run and maintain both the offices
10	Safety Helmets, Boots and any other safety device	As per Requirement
	Furniture	
1	Sofa Set	6 person seating
2	Tables	
	Size 1 (5'x3') with side drawer	5
	Size 2 (4'x2.5') with side drawer	5
3	Executive Chair	
	With full back	5
	With half back	10
4	Visitor Chairs	10
5	Meeting Room Chairs	20
6	Side units with tables	8
7	Filing cabinets	12
8	Lockers cabinet (12 lockers)	2
9	Steel Cupboards	10

5.1.3 The contractor is required to maintain the offices throughout the contract period and provide the following, but not limited to:

i. Pay all electricity, phone & water charges.
ii. Provide all stationery items and consumables for office use.
iii. Carry out necessary repairs to office and equipment as and when required.
iv. Take care of housekeeping activities.
v. Mineral water for dispenser.
vi. Supply of Tea, Coffee and refreshments.
vii. Crockery including cups and saucers for office use.

5.1.4 Fire extinguishers shall be provided in accordance with the recommendations of the Bengaluru City Fire Brigade.

5.1.5 The Contractor shall provide, erect and maintain appropriate name boards as specified for each of the offices. The wording on each name board and its location shall be agreed by the Engineer before it is erected.

5.1.6 The Contractor shall supply the following personnel as required for the use of each office.

Chainman / Staff men	2 No
Field Attendants	1 No
Office Assistants/secretary	1 No
Cad Operator	1 No.
Security and Watchmen	Round the clock

5.2 COMPUTER & RELATED ACCECERIOERS FOR SITE OFFICE

5.2.1 The Contractor shall provide new equipment and software as listed and maintain them for the exclusive use of the Employer's representative and Project Management consultants.

(a) Lap-top OR Computers (with computer table) as directed by Employer's representative - total 5 numbers [3 no for Employer's representative and 2 no for PMC]. The computers shall be Intel core-i7 or its latest generic descendent, running at a clock rate of not less than 2.0 GHz.; A minimum of 8 GB of Random Access Memory, which can be expanded to a minimum of 32 GB with licensed software MS-Office and AUTO CADD or 14. Hard disk size min 500 GB. 15" color LED monitor with all related accessories such as UPS, Keyboard, mouse, USB, card reader, Multimedia, Wi-Fi connectivity, Surge protection devices, 12 Nos of pen drives of 32 GB, 2 Nos of External Hard discs of 1TB etc

(b) Colour Printers - 5 nos. (A4 size -3 No, and A3 size – 2 No.),Two Printers and scanners of A3 & 3 Nos of A4 size shall be with a print speed of up to 8 pages a minute

(c) Computer shall have all necessary software provision as listed below but not limited to:

(i) **Latest Microsoft operating system with MS office, latest release,**

(ii) **AUTOCAD 2013 latest release for at least 3 users,**

(iii) **Anti-virus full version.**

(iv) **Operating system 8.1**

(iii) Project Management Package (Microsoft Project, latest version) – 3 users

(d) UPS system with sufficient power backup (with minimum backup time of 30 minute) to meet the sufficient power load in case of power disruption.

Note: These Items under Clause 5.2.1 above will be property of Contractor on expiry of the contract

5.2.2 DOCUMENTATION

5.2.2 .1 A COMPLETE SET OF DOCUMENTATION MUST BE SUPPLIED WITH EACH SYSTEM. THE DOCUMENTATION SHOULD BE SELF TUTORIAL IN NATURE AND BE READILY UNDERSTOOD BY NON-COMPUTER PERSONNEL.

THE FOLLOWING MANUALS MUST BE SUPPLIED WITH THE SYSTEM:

(i) Manual on how to operate the equipment; and

(ii) Manual on how to use the facilities and software provided by the supplier. (including languages and utilities).

5.3 TRAINING

5.3.1 UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, TRAINING SHALL BE PROVIDED FOR NOMINATED STAFF AS SPECIFIED BELOW, BY QUALIFIED AND COMPETENT STAFF FROM A TRAINING INSTITUTION:

(i) 2 days full-time training, for 5 persons, on hardware operation and Microsoft Windows for each system, including communication hardware where applicable; and

(ii) Not less than 2 days full-time training, for 5 persons for each application software package as given above.

5.4 TRANSPORT FOR THE EMPLOYER'S REPRESENTATIVE

5.4.1 Road Transport

The Contractor shall provide transport including driver, fuel & consumables as described below for the use of the Employer and the Engineer from the date of commencement of work until the issue of the taking over certificate by Engineer

a. Four vehicles of (TOYOTA - Innova) or similar with seating capacity for at least 5 persons in addition to the driver.

5.4.2 The vehicle shall not be more than 2 years old at the time of start of work and maintained by the Contractor in good roadworthy condition.

5.4.3 The vehicles shall be licensed and insured for use on the public highway and shall have comprehensive insurance cover for any qualified driver authorized by the Engineer together with any authorized passengers and the carriage of goods or samples.

5.4.4 The Contractor shall provide driver, fuel, oil and maintenance in conformity with the vehicle manufacturer's recommendations and all relevant toll and parking charges incurred in connection with the Works. The Contractor shall clean the vehicles inside and outside as required during the currency of the Contract.

5.4.5 Above vehicle shall be available round the clock. A suitable replacement shall be provided for any vehicle out of service for more than 24 hours.

5.4.6 The Contractor shall make available competent Hindi / English / Kannada speaking drivers fully licensed to operate the vehicles as and when required by the Engineer. The Contractor shall replace drivers/ vehicles at the request of the Engineer

Note: No Separate payment is admissible for providing the above office and equipments & same needs to be covered in Overheads of contractor.

6.0 CONSTRUCTION SAFETY

1.0 SAEFETY MEASURES AND REQUIREMENTS

1.1 General

1.1.1 **THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE SAFETY OF THE WORKS, HIS PERSONNEL, SUBCONTRACTORS' PERSONNEL, THE PUBLIC AND ALL PERSONS DIRECTLY OR INDIRECTLY ASSOCIATED WITH THE WORKS OR ON OR IN THE VICINITY OF THE SITE. THE CONTRACTOR SHALL TREAT SAFETY MEASURES AS A PROVISION IN ALL HIS ACTIVITIES THROUGHOUT THE EXECUTION OF THE WORKS.THE SAFETY MANUAL ATTACHED SHALL BE FOLLOWED AND COMPLETE COMPLIANCE IS OBLIGATORY.**

1.1.2 The provisions of the Contract regarding safety shall apply to and is binding upon the Contractor for any part of the Works and the persons employed by sub-contractors of any tier. The Contractor shall ensure that the requirements of the Contract in respect of safety are included in all sub-contracts placed by him.

1.1.3 The Engineer in charge reserves the right to order the immediate removal and replacement of any item of Contractor's Equipment or Temporary Works which, in his opinion, is unsatisfactory for its purpose or is in an unsafe condition.

1.2 LEGISLATION AND CODES OF PRACTICE

1.2.1 The Contractor shall comply with all safety and industrial health legislation.

1.3 SITE SAFETY PLAN

The Contractor shall, within 30 days of the date of issue of Letter of Acceptance, prepare and submit to the in charge for review his proposed safety plan for the safety of the workmen, equipment & material & the works

1.4 SAFETY PERSONNEL

1.4.1 The Contractor shall appoint a Safety In- charge whose duties throughout the period of the Contract shall be entirely connected with the safety and industrial health aspects of the Contractor's activities on the Site. The Safety In-charge shall be a suitably qualified and experienced person who shall supervise and monitor compliance with the Site Safety Plan. The Safety In-charge shall, in particular but without limitation, monitor various activities of the work in accordance with the requirements of the contractor's proposed Site Safety Plan.

1.4.2 The Contractor shall not undertake any works on the Site until the Safety In-charge has been nominated and commenced duties at site.

1.4.3 The Contractor shall not remove the Safety Officer from the site without the express permission of the Engineer in charge. Within fourteen (14) days of any such removal or notice of intent of removal, the Contractor shall nominate a replacement Safety Officer for the Engineer in charge's consent.

1.4.4 Safety In-charge should be authorized to cease operations and take urgent and appropriate action to make the Site safe and prevent unsafe working practices or other infringements of the Site Safety Plan or the statutory regulations.

1.4.5 Safety In-charge shall record all relevant matters concerning site safety, safety inspections, safety related incidents and the like. The site safety diary shall be reviewed and signed on a weekly basis by the contractor's project in-charge and shall be available at all times for inspection by the Engineer in charge.

1.4.6 The Contractor's Staff Organization Plan shall show direct links of communication and reporting between the Safety In charge and the Contractor's project In-charge. The Contractor's project In charge shall be directly accountable in all matters concerning site safety.

1.5 Site Safety Inspections

The Contractor will conduct site safety inspections at a regular frequency. The findings of the inspections shall be recorded on suitable forms which shall be kept available for inspection by the Engineer in charge.

1.6 Safety / Accident Reporting

1.6.1 The Contractor shall submit regular site safety reports to the Engineer in charge in accordance with the Site Safety Plan. Such reports shall be submitted as part of the Monthly Progress Report. Site safety reports shall comprehensively address all relevant aspects of site safety and industrial health regulation and, in particular, report on all site safety audits undertaken during the period covered by the report.

1.6.2 The Engineer in charge shall be notified by the Contractor immediately of occurrence of any accidents whether on-site or off-site in which the Contractor, its personnel or plant, or those of its sub-contractors are directly or indirectly involved and which results in any injuries to any persons. Such initial notification may be verbal and shall be followed by a written comprehensive report within 24 hours of the accident.

1.6.3 Additionally the Contractor shall notify the Engineer in charge in writing within twenty-four (24) hours of any incident occurring whether on-site or off-site at which the Contractor or any sub-contractors are involved and could have resulted in serious injuries to persons or significant damage to the Works.

1.7 Sub-Contractors

1.7.1 The Contractor shall also provide its sub-contractors with copies of the Site Safety Plan and shall incorporate into all sub-contract documentation provisions to ensure the compliance with such plan at all tiers of the sub-contracting. Contractor shall also be responsible for the safety of the work performed by its sub-contractor. Contractor's Safety In charge without prejudice to its other duties and responsibilities shall ensure, as far as is practically possible, that employees of sub-contractors of all tiers are conversant with appropriate parts of the Site Safety Plan and the statutory regulation.

1.8 Safety Equipment

1.8.1 The Contractor shall ensure that safety equipment and protective clothing, as described in the Safety Plan, is available and used on the site at all times and those measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing is incorporated into the Site Safety Plan.

1.8.2 The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guard-rails, working platforms, hoists, ladders and other means of access and egress, lifting, lighting, signage and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment that is damaged, dirty, incorrectly positioned or not in working order shall be repaired or replaced immediately.

1.9 First Aid

The Contractor shall establish, maintain, staff, and fully equip a first aid base as detailed below:

(a) The first aid base shall be located at the Contractor's principal works Area. The base shall consists of a treatment room fitted with one treatment couch, a hand basin, sterilizing equipment and lockable cupboards to contain sufficient medical supplies for first-aid for the Contractors workforce, the Engineer in charge's site supervisory staff, the Designated Contractors work force in the area and any visitors to the site. In addition, three stretchers shall be stored, available for instant use.. The first aid post shall be air-conditioned, with cooling capability sufficient to maintain the temperature of the inside of building at 20^{o}C.

(b) Portable first aid boxes including a stretcher will be maintained fully equipped at each of local site offices and work location where 20 or more persons work at a time. In each site office and location at least one employee of contractor trained in first aid should be available at all working hours for purpose of attending to emergencies.

(c) The contractor shall maintain necessary tie up with near by hospital to attend and give medical attention during emergencies.

(d) Periodical examination of the first aid facilities and protective and safety equipment provided shall be undertaken and proper records shall be maintained for their adequacy and effectiveness.

(e) A chart containing the names, addresses and telephone numbers of nearest authorized medical practitioners, hospitals, Fire Brigade and also of the officers in charge shall be displayed prominently along with the First Aid Box.

1.10 Site Publicity

The Contractor shall ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons regularly or occasionally on the Site. Posters, in regional language, Hindi and English, drawing attention to site safety, rescue and industrial health regulation shall be made or obtained from the appropriate sources and shall be displayed prominently in relevant areas of the Site. These posters shall be changed as deemed fit in order to ensure their continued impact.

1.11 Training

The Contractor shall conduct regular safety training and rescue training drills, the frequency, coverage and application of which shall be in accordance with the Site Safety Plan, The Contractor shall require that all sub-contractors' employees participate in relevant training courses appropriate to the nature, scale and duration of the sub-contract works.

1.12 Safety Devices

All plant and equipment used on or around the Site shall be fitted with appropriate safety devices which shall be operational at all times and shall be regularly inspected and tested. These shall include amongst others:

(A) EFFECTIVE SAFETY CATCHES FOR CRANE HOOKS AND OTHER LIFTING DEVICES.

(B) AN UP-TO-DATE TEST CERTIFICATE, FOR CRANES AND HOISTS.

(C) ALL PLANT AND EQUIPMENT USED ON OR AROUND THE SITE SHALL BE OPERATED BY SUITABLY TRAINED AND QUALIFIED PERSONNEL.

1.13 TESTING AND CERTIFICATION OF LIFTING GEAR

1.13.1 The Contractor shall provide and maintain safe mechanical cranes, hoists and conveying facilities for the lifting and transport of materials and shall comply with all relevant requirements of BS 7121, Code of Practice for Safe Use of Cranes. All cranes, hoists and the like shall be fitted with audible overload warning devices. All such equipment shall be regularly maintained in accordance with manufacturers'

recommendations and standards having regard to local legislation and recommendations from the appropriate statutory authority.

1.13.2 Prior to use on Site, all lifting appliances and lifting gear shall be tested to an approved safety margin and suitably identified in accordance with the requirements of the current legislation. The test certificate shall be submitted to the Engineer in charge as & when required

1.13.3 The safe working load shall be clearly and indelibly marked on all lifting appliances and lifting gear either by stamping or by the addition of permanently secured tag labels. Stamping shall not be permitted on any stress-bearing part.

1.13.4 The Contractor shall prepare and maintain an up-to-date register containing test certificates of all lifting and hoisting equipment used on the Works. The Contractor shall notify the Engineer in charge of the person responsible for maintaining this register. The register shall, from the commencement of construction, be available on Site for inspection by the Engineer in charge and Relevant Authorities.

1.13.5 Heavy plant or equipment which does not come under the jurisdiction of any local statutory legislation shall be subject to the testing and examination requirements as recommended by its manufacturer or in the absence of such, it shall be the responsibility of the Contractor to submit a standard or method of testing and examination to the Engineer in charge for review.

1.13.6 Competent operators with certificates certifying that the proposed operator has received training in the general principles of crane operation and specific training in the type of lifting or hoisting equipment he is required to operate shall be provided for the control of all lifting and hoisting equipment. At least one trained banks man shall be in attendance at each lifting or hoisting installation.

1.14 Fire Regulations and Safety

1.14.1 The Contractor shall provide and maintain all necessary temporary fire protection and fire fighting facilities on the Site during the construction of the Works, and shall comply with all statutory requirements of the

Fire Services Department. These facilities may include, , raw water storage tanks and portable fire extinguishers suitable for the conditions on the Site and potential hazards.

1.14.2 Oxy acetylene burning equipment will not be permitted in any confined space.

1.15 Safety Regulations for Electrical Installations

1.15.1 The Contractors shall, at his own expense, arrange for safety provisions as per safety codes of Indian Standards Institution, Indian Electricity Act and such other Rules, Regulations and Laws as may be applicable, as indicated below, in respect of all labour, directly or indirectly employed in the work for performance of the Contractors' part of this agreement.

1.15.2 While the Indian Electricity Rules 1956, as amended upto date, are to be followed in their entirety, particular attention is drawn to the variation clauses indicated in Appendix 'C'. Any installation or portion of installation which does not comply with these rules should be rectified immediately.

1.15.3 It shall be ensured that the control switches and distribution boards are duly marked, the distribution diagrams of sub-stations are prominently displayed, and the sub-station premises, main switch rooms and D.B enclosure are kept clean. Particular care should be taken to prevent the sub-station being used as store for inflammable materials, broken furniture, waste materials etc.

1.15.4 No inflammable materials shall be stored in places other than the rooms specially constructed for this purpose in accordance with the provisions of Indian Explosives Act.

1.15.5 Rubber or insulating mats should be provided in front of the main switch boards or any other control equipment of medium voltage and above.

1.15.6 Protective and safety equipment such as portable fire extinguishers rubber gauntlets or gloves, earthing rods, line men's belt, portable artificial respiration apparatus etc. should be provided in easily identifiable locations. Where electric welding or such other nature of work is undertaken, goggles shall also be provided.

1.15.7 Necessary number of caution boards such as “Man on Line, Don’t switch on” should be readily available in easily identifiable locations.

1.15.8 Electrical wiring and control switches should be periodically inspected and any defective wiring, broken parts of switches which will expose live parts, should be replaced immediately to make the installations safe.

1.15.9 No work shall be undertaken on live installations, or on installations which could be energized unless another person is present to immediately isolate the electric supply in case of any accident and to render first aid, if necessary.

1.15.10 No work on live L.T. bus bar or pedestal switchboards should be handled by a person below the rank of a licensed Wireman and such a work should preferably be done in the presence of the Contractor’s Engineer in charge.

1.15.11 When working on or near live installations, suitably insulated tools should be used, and special care should be taken to see that those tools accidentally do not drop on live terminals causing shock or dead short.

1.15.12 The Electrical Switchgear and distributions boards should be clearly marked to indicate the area being controlled by them.

1.15.13 Before starting any work on the existing installation, it should be ensured that the electric supply to that portion in which the work is undertaken is preferably cut off. Precautions like displaying cautions boards on the controlling switches, removing fuse carrier from these switches and these fuse carriers being kept with the person working on the installation, etc. should be taken against accidental energization. No work on H.T. main should be undertaken unless it is made dead and discharged to earth with an earthing lead of appropriate size. The discharge operation shall be repeated several times and the installation connected to earth positively before any work is started.

1.15.14 Before energizing an installation after the work is completed, it should be ensured that all tools have been removed and accounted, no person is present inside any enclosure of the switch board etc. any earthing connection made for doing the work has been removed,

1.15.15 Workmanship

Good workmanship is an essential prerequisite to be complied for this work. Skilled workers under competent supervision shall carry out entire work in the most workmanlike manner by skilled workers under competent supervision.

1.16 Dangerous Goods

The Contractor shall ensure that all gases, fuels and other dangerous goods are stored and handled in a safe manner and in accordance with the statutory regulations and as required by the Engineer in charge. The Contractor shall be responsible for obtaining the requisite licenses and permission to store and handle such substance.

1.17 Hazard and Risk Assessments

1.17.1 The Contractor shall, prior to the commencement of any operation carry out a detailed hazard and risk assessment. The results of such assessments shall be recorded and the records kept for inspection by the Engineer in charge.

1.17.2 The Contractor shall produce detailed method statements for all medium and high risk operations and shall submit them to the Engineer in charge for his consent prior to commencement of any task to which they relate.

1.17.3 The Contractor shall implement a Permit to Work system for all high-risk operations.

1.18 Explosives

Explosives shall not be used without prior written consent of the Engineer in charge.

1.19 Standby Equipment

The Contractor shall provide adequate stand-by equipment to ensure the safety of personnel, the Works and the public. These measures shall include as a minimum the following:-

(a) Stand-by pumping and generating equipment for the control of water;
(b) Stand-by equipment and spares for illumination of the Works; and
(c) Stand-by generating equipment and equipment for the lighting

1.20 Co-operation

The Contractor shall provide full co-operation and assistance in all safety surveillance carried out by the Engineer in charge or the Employer. Any breaches of the Site Safety Plan or the statutory regulations or other disregards for the safety of any person is sufficient reason for the Engineer in charge to exercise his authority to require the removal of contractor's / sub-contractor's person from the Site.

2.0 REQUIREMENTS FOR THE OUTLINE SITE SAFETY PLAN

2.1. General

The Contractor shall, within 30days of the date of issue of letter of acceptance , prepare and submit to the Engineer in charge for review his proposed safety plan which shall contain details of the following:-

- Statement of Contractor's Safety Policy
- **SENIOR MANAGEMENT RESPONSIBLE FOR SAFETY**
- Safety Staff, Duties and Responsibilities
- Policy & Procedures for Safe Condition of Contractors Equipment
-

2.2 It should also highlight procedures covering all safety and health aspects of the Works, including where appropriate but not limited to the following:-

(i) Housekeeping
(ii) Traffic control and transportation
(iii) Fire prevention precautions and fire fighting equipment

(iv) Working during night
(v) Excavation
(vi) Electrical equipment
(vii) Personal protection clothing and equipment
(viii) Cranes & hoists
(ix) Scaffolding and work platforms
(x) Ladders
(xi) Hazardous substances
(xii) Working at height
(xiii) Structural steel erection
(xiv) Lighting
(xv) Protection against falling objects;
(xvi) System for the protection of authorized and unauthorized visitors to the site; It must also detail the Contractor's proposals to ensure that construction methods do not compromise the Contractor's commitment to the Site Safety Plan or its compliance with the statutory regulations.

Note: Special attention must be given by the Contractor for the following points which would help in monitoring safe working condition during construction.

1. Must prepare and maintain Safety room (Visualization room) both at meeting room and also at the site and display all necessary documents like; Safety Policy and Safety commitment approved from Top Management, Total Organization Chart, Safety committee details, Safety Calendar, Safety violation details, Training Records, Work Permit Register, Site Layout, Emergency Evacuation Plan, Emergency Contact Numbers, Master Schedule, Monthly work Schedule, Weekly work Schedule, Daily work schedule, Manpower details, Health Records of workers, Daily, Weekly and Monthly Audit Reports along with actions taken for the same, Statistics Report, Near Miss and Accident Details with investigation report & countermeasure plan etc,
2. Safety committee should have enough experienced and qualified personnel
3. Should have experienced persons who can train people for carrying work in safe manner and maintain records

4. Should have experienced persons who can identify unsafe acts and unsafe conditions and take necessary actions for improving the same
5. Should give special focus for STOP 6 [Danger due to (1) Machines, (2) Big Objects, (3) Vehicles, (4) Drop from Height, (5) Electrical and (6) Fire.]
6. Should have experienced Auditors to carryout regular audits of construction activity - Daily, Weekly & Monthly.
7. Should have experienced persons to understand audit point and take necessary actions with required countermeasures for closing audit points.
8. Should have experienced persons who can check and certify safety of equipment & tools being used. Experienced persons who can impart specific work safety training.
9. Should have experienced persons who can give training on importance on use of PPEs and how to use PPEs.
10. Should have experienced persons who are capable of making risk assessment for all critical jobs and make necessary safety arrangement before starting the work.
11. Must have area wise Job leaders and Safety leaders
12. Must have enough House Keeping persons for maintaining 4S condition.
13. Should have display board showing daily, weekly & monthly safety activities
14. Must obtain work permit for all critical jobs on daily or weekly basis
15. Must train all related persons on Evacuation route plan in case of emergency and emergency contact numbers
16. Should have various display boards showing plan for implementation of safety during construction
17. Must carry out periodical health check up for all the persons and maintain records
18. Must have first aid room with required facility
19. Must maintain daily attendance records for all persons and persons should have ID card
20. ID card should indicate details on skill of the person for different jobs
21. Must have detailed list of PPEs (with IS standard) to be used for specific work
22. Must have Safety rules to be followed for all construction jobs
23. Must have safety standards to be followed for different jobs and applicable PPEs to be used
24. Must have work procedures (method statement) for all construction jobs

25. Must explain work procedures (method statement) to the client / PMC and obtain approval before starting the work
26. Must have work instruction sheet for all construction jobs
27. Work procedures & Work instruction sheets must be periodically reviewed and revised suitably and maintain records
28. Must report any accident / near miss events to Employer's concerned person immediately along with action taken to avoid such situations in future
29. Suitable fire preventive measures to be taken generally for the entire area and special focus on specific activities.
    Clean and hygienic working environment to be maintained

7.0 PENALTY & BONUS CLAUSES

7. 1 Penalty for Delay

a. After acceptance of the tender, the Engineer shall issue a written order to the successful Tenderer to commence the work. The Contractor shall enter upon or commence any portion of work only with the written authority and instructions of the Engineer. Without such instructions the Contractor shall have no claim to demand for measurements of or payment for, work done by him.

b. The time allowed for carrying out the work as entered in the tender shall be strictly observed by the Contractor. It shall be reckoned from the date of issue of work order to the Contractor. The work shall throughout the stipulated period of the Contract be proceeded with, with all due diligence (time being deemed to be the essence of the Contract on the part of the Contractor). To ensure good progress during the execution of the work, the Contractor shall be bound (in all cases in which the time allowed

for any work exceeds one month) to comply with the time schedule according to the programme of execution of the work as agreed upon and enclosed to the Contract. The Contractor shall make Work Scheduling and furnish planned monthly stipulated financial and physical progress for assessment of shortfall.

c. The progress of works shall be reviewed by the Engineer with the Contractor.

d. To the extent the shortfall is assessed, as due to the delay on the part of the Contractor a notice shall be issued to him by the Engineer or his authorized representative to make up the shortfall in the succeeding month. If the shortfall is not made up before the next review of progress of work, the Contractor shall be liable to pay penalty as indicated below.

e. In the event of the contractor failing to comply with these conditions (except for reasons beyond his control) he shall be liable to pay as penalty of an amount equal to one percent (1%) of such smaller amount as the Executive Engineer or higher authority (whose decision in writing shall be final) may decide of the said estimated cost of the whole work for every day that the due quantity of work remains incomplete; provided always that the total amount or penalty to be paid under the provisions of this clause shall not exceed 7 ½% of the estimated cost of the work as shown in the tender.

f. In the event of any of the above courses being adopted by the Engineer, the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased, or procured any materials, or entered into any engagements, or made any advances on account of, or with a view to the execution of the work and the performance of the Contract. And in case the Contract shall be rescinded under the provision aforesaid, the Contractor shall be entitled to recover or be paid any sum for any work therefore actually performed by him under this Contract, unless and until the Engineer shall have certified in writing the

performance of such work and the amount payable in respect thereof, and he shall only be entitled to be paid the amount so certified.

7.2 Liquidated Damages for Delay in Completion:

If the Contractor fails to complete the works within the time prescribed in the tender or approved extended time, then the contractor shall pay to the Employer 0.5% (Half percent) per week of the Value of contract subject to a maximum of 7.5% of the value of contract

7.3 Penalty and liquidated damages applicable concurrently

However, in the situation where both the clauses i.e. **7.1 &7.2** above becomes applicable together, the total of liquidated damages and penalty for delay shall be limited to 10% of the total value of the contract.

7.4 **Bonus for early completion**

If the Project Completion Date occurs prior to the Scheduled Completion Date*, the Contractor shall be entitled to receive a payment of bonus equivalent to 0.03% (zero point zero three percent) of the Contract Price for each day by which the Project Completion Date precedes the Scheduled Completion Date, but subject to a maximum of 3% (three per cent) of the Contract Price. However the payment of bonus, if any, shall be made only after the issue of the Completion Certificate. For the avoidance of the doubt, the Parties agree that for the purpose of determining the bonus payable hereunder, the Contract Price shall always be deemed to be the contract amount and shall exclude any revision thereof for any reason. The Parties also agree that bonus shall be payable only if each work for which Extension of Time has been granted is completed within respective Extended Time.

*Scheduled Completion Date: The mutually accepted time in the master schedule, in which the physical completion of the main structure, up& down ramps, underpasses, related road works at grade levels & all Electrification works including testing & commissioning in the project stretch in all respect to the satisfaction of the employer. Delay in testing & commissioning of equipments in the scope will be considered as delay in completion of project and contractor shall not be eligible for any bonus. Bonus will not be given for partial completion of any activities or achieving the milestones.

8. REPORTS, VIDEO COVERAGE & MODEL OF THE PROJECT TO BE SUBMITTED BY THE CONTRACTOR

8.1 The following reports, in agreed formats and frequency, shall be submitted by the Contractor at his own cost:

(a) Progress Reports
(b) Material Status Reports
(c) Equipment and Manpower Development Reports
(d) Any other Report desired by the Employer or the Engineer

8.2 The Engineer's monitoring team will have access to all the data/information of the Contractor, required for the assessment of the progress and monitoring. If necessary, the monitoring team will visit the Vendor/Contractor's works in order to assess the status of critical activities.

8.3 Periodic Project Status Review Meetings will be held by the Employer or the Engineer. The Contractor shall depute his Engineers/Managers at appropriate level as decided by the Engineer to attend the Review Meetings.

8.4 Progress photographs of the major events shall be submitted by the Contractor along with the Progress Reports. Video Recording of the progress of works shall be maintained from beginning till completion of work as directed by the Engineer. Nothing extra shall be paid to the contractor for this.

8.5 The Contractor shall provide additional inputs whenever there is a possible slippage in the completion schedule. Such additional inputs may require supplementing of equipment, personnel, work in excess of the normal work per day, work in excess of the normal work per week or other resources. Provisions under Sub-Clause 57.5 of General Conditions of Contract will be applicable in cases of delays due to Contractor.

8.6 The contractor shall supply a model of the project made using Plaster of Paris of approved make and quality & Scale to BDA free of cost within 20 days from the date of work order...

9.0 ARRANGEMENT OF TRAFFIC DURING CONSTRUCTION IN EXISING ROADS IN THE CONSTRUCTION AREA & IN ALTERNATE ROUTES PROPOSED

9.1 General

The Contractor shall take necessary and adequate measures to ensure uninterrupted traffic flow within the work area and enroute to borrow / dumping areas during the currency of the work. It shall be the responsibility of the Contractor to provide suitable and acceptable diversions for the passage of the traffic. Contractor shall ensure that at no time, his construction equipment interrupts the movement of the traffic on the road.

The Contractor shall prepare a comprehensive Traffic Management Plan and get it approved from BDA. He shall also draw a phased program for traffic arrangements / diversions and get it approved from the Engineer and Traffic Police well in advance with respect to every stage of construction.

If traffic diversions require construction of temporary roads and /or improvement of the existing roads, the design /drawings for the same including diversions of utilities etc (if required) shall be prepared by the contractor using specifications not inferior to that of the existing roads / utilities and get it approved from the Engineer and Traffic Police. Before taking up the work in a particular stretch, all the traffic diversion plans applicable to that particular area shall be implemented as per the approved plans / drawings and trial runs carried out to the entire satisfaction of Engineer / Traffic Police. If during trial runs some modifications are suggested, the same shall also be carried out before start of work.

9.2 Repairs & maintenance of existing roads, alternate routes & services in the project area

Contractor has to attend the repairs & maintenance of existing roads in construction area, proposed alternate routes for traffic diversion & relocated/ affected services.

SECTION 6

CONTRACT DATA

SECTION 6: CONTRACT DATA

Items marked "N/A" do not apply in this Contract. Clause Reference

The Employer is:

Name: BDA [1.1]

Address:

Name of authorized Representative: Executive Engineer,

Infrastructure Division -3
Bangalore Development Authority
Bengaluru – 560 020.

The name and identification number of the Contract is :

The Works consists of : Construction of Six Lane Elevated Road from Basaveshwara Circle to Hebbal Flyover Via Le-Meridian Hotel And Mekhri Circle, In Bengaluru. Tender Reference: …

The start date shall be the date of issue of notice to proceed with the work. [1.1]

The Intended Completion Date for the whole of the Works is 24 Months (including monsoon) with the following milestones [17, 2]

Sl.No	Milestone dates	Period from the date of issue of notice to proceed with the work	Financial Progress of work in %
1	Milestone 1	6 Months	10%
2	Milestone 2	9 months	25%
3	Milestone 3	12 months	40%
4	Milestone 4	15 months	60%
5	Milestone 5	18 months	75%
6	Milestone 6	21 months	90%
7	Milestone 7	24 months (finishing of the contract)	100%

The Site Possession Date is: ..... [21]

The Site is located between Basavewsara Circle and Hebbal in Bengaluru. [1.2]
and is defined in drawings nos. : RD-20 R (5)

The Defects Liability Period is 24 months after submitting Completion certificate. [31]

The Schedule of Operating and Maintenance Manuals [49]

The Methodology and Program of Construction [25]

Site Investigation reports [14]

The Schedule of Key and Critical Equipment to be deployed
on the work as per agreed program of construction. [25]

Insurance requirements are as under: [13]

No	Type of Cover	Minimum cover for Insurance
(i)	Works and of Plant and materials	The sum stated in the Agreement plus 20%
(ii)	Loss or damage to equipment	Full replacement cost
(iii)	Loss or damage to property of Third Party	Full replacement cost
(iv)	Personal injury or death insurance (a) for Third Party	INR 20 Lakhs covering minimum 4 persons.
	(b) for Contractor's employees or labour	In accordance with the statutory requirements applicable to Karnataka

Price Adjustment Formula;

R= Value of work as defined in Clause 40.1 of Conditions of Contract.

Price escalation is applicable to only major items like, Cement, Re steel, Structural steel & Bitumen

Adjustment for Cement Component:

(i) Price adjustment for increase or decrease in the cost of cement component procured by the Contractor shall be paid in accordance with the following formula.

$V_C = 0.85 \times P_C / 100 \times R \times (C_i - C_{o)} / C_o$,

Where,

VC = Increase or decrease in the cost of the work during the quarter under consideration due to changes in the rates for cement;

Co = The all-India average wholesale price index for cement (Ordinary Portland Cement) for the quarter preceding the date of opening of the tenders as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi;

Ci= The all-India average wholesale price index for cement (Ordinary Portland Cement) for the quarter under consideration as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

PC = Percentage of cement component of the work

Note: For the application of this Clause, index of Ordinary Portland Cement has been chosen to represent Cement Group

Adjustment for Re steel & Structural steel component:

(ii) Price adjustment for increase or decrease in the cost of steel procured by the Contractor shall be paid in accordance with the following formula.

VS = 0.85 X PS /100 X R X (Si – So)/So

Where

VS = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for steel;

So = The all India average wholesale price index for steel (M.S. Bars and rods) for the quarter preceding the date of opening of tenders as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

Si = The all India average wholesale price index for steel (M.S. Bars and Rods) for the quarter under consideration as published by the Office of Economic Advisor, Ministry of Commerce and Industry, New Delhi

PS = Percentage of steel component of the work

Note: For the application of this Clause, index of M.S. Bars and Rods, Structural steel has been chosen to represent steel group.

Adjustment of Bitumen Component:

(iii) Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

$V_B = 0.85 \times P_B/100 \times R \times (B_i - B_o)/B_o$,

Where,

VB = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rate for bitumen.

Bo = The official retail price of bitumen at the IOC /HPCL/BPL or any other depot at ……. on the day 30 days prior to the date of opening of tenders.

Bi = The official retail price of bitumen at the IOC/HPCL/BPL or any other depot at ……. for the 15th day of the middle calendar month of the quarter under consideration.

PB = Percentage of bitumen component of the work.

The following percentages will govern the price adjustment for the entire contract

1. Cement – P_C - 7 %
2. Re Steel – P_S - 13%
3 Str. Steel – Ps1 - 59%
4. Bitumen – P_B - 21%

TOTAL 100 %

If the period of execution is more than 6 months but less than or equal to 12 months for work costing more than INR 50 lakhs star rates in respect of specified materials (Cement, Reinforcement steel/Structural steel

and Bitumen) only shall be payable to the contractor based on the all India average wholesale price index for the said materials. The star rates adjustment shall be as per the increase or decrease in the index as applied to the said materials between the last date for receiving bids and the date of execution as per the approved programme of works submitted by the contractor at the time of execution of agreement which shall mandatorily be a part of the agreement.

Liquidated damages:

The liquidated damages for the whole of the works are
INR 5, 00, 000/- per day and that for the milestones are as under:

For Milestone 1: INR 5, 00, 000/- per day
[41]
For Milestone 2: INR 5, 00, 000/- per day
For Milestone 3: INR 5, 00, 000/- per day
For Milestone 4: INR 5, 00, 000/- per day
For Milestone 5: INR 5, 00, 000/- per day
For Milestone 6: INR 5, 00, 000/- per day
For Milestone 7: INR 5, 00, 000/- per day

The maximum amount of liquidated damages for the whole of the works is ten percent (10%) of final contract price.
[41]

The amounts of the advance payment are: [42]

Nature of Advance	**Amount (Rs.)**	**Conditions to be fulfilled**
Mobilization	5 % of the Contract price	a. On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period. b. drawn before end of 20 % of Contract period. c. The contractor shall furnish two bank guarantees of 2.5% each, valid for full period of contract, d. Advance, bearing an interest of 12%.
Machinery advance	5% of contract price	a.On submission of irreversible Bank Guarantee from local branch of Nationalized bank valued for full period of contract period. b. The contractor shall furnish two Bank guarantees of 2.5% each, valid for full period of contract, c. Limited to 90% for new and 50% of depreciated value for old equipment. d. After equipment is brought to site (provided the Engineer is satisfied that the equipment is required for performance of the contract). e. Advance is bearing an interest of 12 %
Secured advance for	Upto 75% of cost of reinforcing	Such materials have been delivered to site, and are properly stored and protected against

non- perishable materials brought to site	Steel/Structural Steel and Bitumen supplied at site, as assessed by the Engineer in charge.	damage or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks at his own risk and cost.

(The advance payment will be paid to the Contractor no later than 30 days after fulfillment of the above conditions).

Repayment of advance payment for mobilization & machinery advance payment. [42]

The mobilization & machinery advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuation of the work done, variations, price adjustments, compensation events or liquidated damages. The mobilization & machinery advance loan shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 15 percent of the Contract Price or 4 months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 7.5% percent of the amounts of all Interim Payment Certificates until such time as the loan has been repaid, always provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clauses 17 and 26. Mobilization & machinery advance is bearing an interest of 12%

Repayment of secured advance on non perishable materials shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid.] have been incorporated into the Works.

The date by which "as-built" drawings (in appropriate scale) in 2 sets both in the form of hard copy and soft copy are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be. [48]

The date by which Operating and Maintenance Manuals are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be. [48]

The amount to be withheld for failing to supply "as built" drawings or supply of Operation and Maintenance Manuals by the date required is INR 10 Lakhs.

The following events shall also be fundamental breach of the contract: [50]

1. The Contractor has contravened Sub-Clause 7.1 and Clause 9 of CC.

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be Thirty percent (30%) [51]

SECTION 7

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

All specifications are to be followed from KRBS (Karnataka Roads & Bridges Specification) latest version, MORTH 5th revision Specifications, CPWD Specification & all relevant IS codes.

For any item not covered by these codes

a) The relevant parameters from Euro/BS Codes of Practice shall be followed.

b) For items not covered by any of the above Standards and Specifications, Sound Engineering practice and provisions of relevant Codes of other nations shall be referred. In this regard decision of the Engineer in charge shall be final and binding.

1. SPECIFICATIONS FOR REINFORCED EARTH / SOIL STRUCTURES

1.1 General

a. All the specifications given in this section are additional to and supplementing the relevant clauses in MORT&H specifications for Road and Bridge Works (Fourth Revision) published by Indian Roads Congress, New Delhi reprinted in March 2002.

1.2 Description

This work shall consist of Reinforced Earth Structures as per patented Reinforced Earth Technology and consisting of precast discrete cruciform concrete facing, high adherence galvanised steel strips with accessories / fittings and backfill material in accordance with the specifications and in reasonably close conformity with the lines, grades design and dimensions shown on the approved drawings.

The guarantee period for the Reinforced Earth Structure shall be fifteen (15) years from the date of completion of the work irrespective of defect liability period of twenty four (24) months specified

elsewhere in the tender document. The contractor(s) shall furnish the guarantee bond as directed by the Engineer / Engineer's representative.

The work shall generally be done in conformity to the MORT&H specifications for Road and Bridge Works (Fourth Revision) published by Indian Roads Congress, New Delhi reprinted in March 2002, Section 703. The detailed design and drawings of the work done in accordance with the M.ORTH. specifications and in accordance to BS:8006:1995 "Strengthened / Reinforced Soils and Other Fills" meeting the ultimate and serviceability limit state requirements as per French Standard AFNOR NF P 94-220 wherever relevant. The Design will confirm to the details indicated in 4.10 (a), full traffic impact loads of vehicle safety barrier system and earthquake loads as per IS 1893:1984.Patentee's Specifications shall also be incorporated wherever relevant as per approved pattern / approved make Reinforced Earth structure shall be adopted.

The designs and drawings shall be got approved from the Engineer / Engineer's representative before execution of work.

1.3.0 Materials

1.3.1 Precast Concrete Facing

Precast concrete facing elements shall conform to the details and dimensions shown on the approved drawing. Shape, size of the block/panels and patterns shall be as approved by the Engineer / Engineer's Representative. Concrete shall be of grade shown on the drawings and shall conform to the requirements specified in section 1700 "Structural Concrete".

The grade of concrete shall be minimum M-35.

Reinforcement shall be placed as designed and shall conform to the requirements specified.

(a) Casting

The elements shall be cast on a flat area. Tie-strips connecting pins, PVC pipes and lifting anchors shall be set in place to the dimensions and tolerances shown on the drawing and tie-strips guides shall be set on the rear face, prior to casting. The concrete in each unit shall be placed without interruption and shall be compacted by the use of an approved vibrator supplemented by such hand-tamping as may be necessary to ensure that the concrete reaches into the corners of the forms and prevent formation of stone pockets or cleavage planes. Clear form oil of the same manufacturer shall be used throughout the casting operations.

(b) Curing

The precast elements shall be cured for a sufficient length of time as approved by Engineer / Engineer's Representative so that the concrete develops the required compressive strength. Only fresh potable water shall be used for curing.

(c) Removal of forms

The forms shall remain in place until they can be removed without damaging the elements. The scheme of removal of formwork shall be as per relevant MORT&H specifications for Road and Bridge Works (Fourth Revision) published by Indian Roads Congress, New Delhi reprinted in March 2002.

(d) Scribing

The date of manufacture and batch number shall be clearly scribed on the rear face of each unit/block/panel.

(e) Concrete finish

The front (exposed) face of the elements shall have the finish approved by the Engineer / Engineer's Representative. The rear face shall have the finish of unformed surface and shall be roughly screened to eliminate open pockets of aggregates.

(f) Tolerances

All elements shall be manufactured within the following tolerances:

- All dimensions : within 5 mm
- Evenness of the front face : ± 5 mm over 1500mm
- Difference between lengths of two diagonals : 10 mm max.
- Thickness : ± 15 mm

(g) Handling, Storage and Transporting

All elements shall be handled, stored and transported in such manner as to eliminate the danger of chipping, cracks, fracture and excessive bending stresses. Elements in storage shall be supported on firm blocking located adjacent to the tie-strips to avoid bending.

(h) Acceptability

Acceptability of the precast elements shall be determined on the basis of compression tests, as per MORT&H specifications for Road and Bridge Works (Fourth Revision) published by Indian Roads Congress, New Delhi reprinted in March 2002 and visual inspection. A minimum of one sample of 6 cubes shall be taken for each lot of 5 cubic meters or part thereof produced per day. 50% of these cubes shall be cured in the same manner as the elements and tested to determine when the elements can be placed in the structure. Elements shall be acceptable for placement in the structure if the strength at 7 days, or before, exceeds 75% of the 28 days requirements.

(i) Rejection

Elements shall be subject to rejection in case of failure to meet any of the requirements specified above. In addition, defects which indicate imperfect moulding, or defects indicating honeycombed or open textured concrete, shall be sufficient cause for rejection.

1.3.2 Levelling Concrete

A levelling concrete pad shall be provided under walls. Concrete shall have a minimum grade M-20. Maximum size of aggregates shall be 20mm. The pad shall be cured for at least 48 hours before placing panels.

1.3.3 High Adherence hot dip galvanised earth reinforcing and Tie Strips

Shapes and dimensions of these elements shall be as shown on the approved drawings. Tie strips and high adherence reinforcing strips shall be hot rolled. Their physical and mechanical properties shall conform to European norm EN 10025 or equivalent IS 2062. Reinforcing and tie strips shall be hot-dip galvanised (not less than 140μ) to conform to the minimum requirements of ISO standard 1460 & 1461 equivalent to IS 4759.

Reinforcing and tie strips shall be cut to the lengths and tolerances shown on approved drawings. Holes for bolts shall be punched in the locations shown. They shall be carefully inspected to ensure they are true to size and free from defects that may impair their strength or durability.

These requirements shall also generally conform to MORTH specifications.

1.3.4 Fasteners

Bolts and nuts shall be hexagonal in shape and high strength screw conforming to European norm E25100 CLASS 10.9 or equivalent IS. They shall be 12mm in diameter 30mm in length hot-dip galvanised in conformity with ASTM A153 or equivalent IS.

1.3.5 Joint Fillers

Fillers of vertical joints between panels shall be flexible open cell polyurethane foam strips or non-woven fabric strips (the latter used as joint cover instead of filter) as approved by Engineer / Engineer's Representative. Bearing pads for horizontal joints between panels shall be made of elastomer with vulcanized EPDM.

1.3.6 Drainage

Drainage shall be very strictly followed as per the manufacturer's drawing and specifications in detail. The Reinforced Earth backfill is considered a self-draining media, having sufficient permeability to relive hydrostatic pressures. However, water logging in the reinforced fill increases the pore pressure coefficient thereby resulting in tensile forces in Reinforced Earth Structure, reducing the stability of structure.

Wherever, there is a probability of such occurrence, drainage outlets at the bottom level joints of panels with provision of non-woven geotextile backing shall be provided along the facia for drainage redundancy. The retained fill shall have drainage bay 19.5mm to 9.1mm well graded crushed aggregate to allow free draining of the reinforced fill along with the retained fill. The panel joints above 300mm of existing ground level shall be filled with joint fillers as per Item 8.3.6,8.3.7

Backfill Requirements for Approach (Between retaining walls and Returns)

The properties of materials for design purpose shall be as below:

i) Saturated Density - 2.0 T/m3
ii) Ø - 32º
iii) C - 0

These values shall be checked at site and critical values amongst the one shown above and encountered in the field taken in the design.

Backfill materials used in the Reinforced Earth volume shall be reasonably free from organic or otherwise deleterious materials and shall conform to the following mechanical and physico-chemical requirements.

(a) Mechanical requirements

Sieve size	**Percent passing**
250mm	100%
100mm	more than 75%
75 micron	less than 15%

Coefficient of uniformity Cu = (D60/D10) > 2

Acceptance limits for materials with more than 15% passing 75 micron are related to the percentage of particles smaller than 15 microns as follows:

- materials with more than 15% passing 75 micron sieve but less than 10% of particles smaller than 15 microns are acceptable.

- materials with more than 15% passing 75 micron sieve and more than 20% of particles smaller than 15 microns are inadequate and shall not be used except as specified in (e) below.

- materials with more than 15% passing 75 micron sieve and 10 to 20 % of particles smaller than 15 microns are acceptable provided that the internal friction angle is not smaller than 32°.

(b) Physico-Chemical Requirements

Materials with a resistivity of 5000 Ωcm or more are readily acceptable, based on a standard test as directed by the Engineer / Engineer's Representative.

Materials with resistivity less than 1000 Ωcm are inadequate and shall not be used except as specified in (e) below.

Materials with resistivity between 5000 Ωcm and 1000 Ωcm are acceptable provided that in water extracted from soil-water mix, the content of chlorides does not exceed 200ppm, the content of Sulphates does not exceed 1000ppm, and the pH value is in the range of 5 to 10.

The foundation soil physico-chemical requirements should also meet the above criteria. If not, special consideration will be given to the design of reinforcing strips and facing panels.

(c) Quality Control

For every 300 Cum. of backfill material, or whenever the approved source is changed, one sieve analysis and one measurement of resistivity and angle of internal friction shall be carried out. The results will indicate what further tests are needed, if any.

(d) Water for Compaction

Water of minimum resistivity exceeding 700 Ωcm shall be used for compaction.

(e) Materials not conforming to the above

Materials not conforming to the above requirements may be used with the written consent of Engineer / Engineer's Representative after carrying out test. Such materials shall be tested for their functional properties to assure that they are consistent with the parameters used in the design calculations.

(f) Compaction

Compaction of fill material shall be 95% Proctor Density below road crust, 97% Proctor Density for sub-grade and 98% Proctor Density for sub-base and base.

1.3.8 CONSTRUCTION REQUIREMENTS

a) Excavation

Excavations shall be in accordance with the requirements of General and Special Specifications and in reasonably close conformity to the limits and construction stages shown on the drawings.

b) Foundation Preparation

The foundation for Reinforced Earth Structures shall be graded level for a width equal to or exceeding the length of reinforcing strips or as shown on the drawings. Prior to wall construction, if required by the Engineer / Engineer's Representative, the foundation shall be compacted with a smooth wheel vibratory roller. Any foundation soils found to be unsuitable shall be removed and replaced.

c) Erection

Precast concrete panels shall be placed vertically with the aid of a light crane. For erection, panels are handled by means of lifting devices set into the upper edge of the panels. Panels shall be placed in successive horizontal lifts in the sequence shown on the drawings as backfill placement proceeds. As fill material is placed behind a panel, the panels shall be maintained in vertical position by means of temporary wooden wedges placed in the joint at the junction of the two adjacent top rows of panels during construction. As construction proceeds, and a fourth row is erected, the lowest row of wedges can be removed and so on.

External bracing may also be needed for the initial lift. However, bracings shall be placed in an area not more than 1.50 metre wide beyond the outer face of panels.

Vertical tolerances (plumb) and horizontal alignment tolerance shall not exceed 25mm when measured along a 3 meters straight edge. The maximum allowable offset in any panel joint shall be 25mm.

d) Backfill Placement

Backfill placement shall follow closely the erection of each lift of panels. At each reinforcing strip level, backfill should be roughly leveled before placing and bolting the strips. Reinforcing strips shall be placed normal to the face of the wall or as shown on the drawings. The maximum layer thickness shall not exceed 200 mm. The Contractor shall decrease this thickness if that is necessary to obtain the specified density.

At the end of each day's operation, the Contractor shall shape the last level of backfill as to permit runoff of rainwater away from the wall face. Backfill shall be compacted in accordance to the project specifications for embankment except that the minimum required compaction shall be 100% to 98% $\pm$ 1of maximum density as specified and shall determined by the standard test and that the moisture content shall be plus or minus 2% of the Optimum Moisture Content as determined. Backfill compaction shall be accomplished without disturbance or distortion of reinforcing strips and panels. Compaction in a strip of the 1.0 meter wide adjacent to the backside of the wall facing shall be achieved by the use of a manually operated vibrating compactor, such that adverse edge stresses are not transferred to the facing panels during construction.

e) SUPERVISION

A technical representative of the patentee shall be present on site throughout during the casting and erection phases to ensure that the quality of the works performed by the Contractor is in accordance to the specifications.

All expenses relative to his presence on site shall be borne by the Contractor.

1.3.9 APPROVAL OF PROPRITRY PRODUCY/PROCESS/SYSTEM

"Only proprietary products proven by International usage in comparable projects with minimum 25 years similar experience shall be permitted to be used. Fully authenticated details of licensing and collaboration arrangement shall be submitted by the manufacturer of product, where relevant at the time of tender submission by the contractor"

1.3.10 Painting

External side shall have two coats of anti carbonate painting over one coat of compatible primer of approved quality and shade.

1.3.11 Ancillary Works

Provisions of granular filter media in the reinforced earth as per specifications and HDP perforated drainage pipe covered with geofabric material and connecting at appropriate location to the surface drain.

1.3.12 Filter Media

a Filter media shall be as per drawings using 40mm and down size granite/ basalt/trap

b. Laying & compaction of filter media

The filter material shall be well packed to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutments, retaining walls, etc. to the full height

c. Density of Compaction

i. Dry Densities to be aimed at the compaction shall be chosen with due regard to factors such as the soil type, height of embankment, drainage conditions, position of the individual layers and types of plant available for compaction.

ii. Each compacted layer shall be tested in the field for 98% maximum dry density (MDD) and accepted before the operations for next layers are begun.

1.3.13 Soil Stabilization

Soil stabilization shall be done by densifying the soil with displacement type sand pile. Sand piles shall be of 75 mm dia. Spaced at 45 cm c/c, in the area required, by driving 75 mm dia pipe to a depth as detailed in the drawing, removing the same and filling the bore holes with compacted sand, inclusive of all materials, labor, tools, tackles etc complete.

Measurements for payment: The measurement for facia panels shall be in sq. meters. The measurement for foundation for facia and capping beam shall be in cubic meters. Measurement for compacted earth fill shall be in cubic meters.

Rate: Rate shall include cost of labor, plant hire, material striate and handling expenses, for completing the works. Rate for providing reinforcing elements shall include material cost all transportation costs and storage of the same as per special provisions. The rate shall also include cost of laying of the reinforcing elements including all overlaps, jointing or stitching, heat bonding or extension.

Rate for facia fixing shall include cost of joints, all necessary temporary formwork, scaffolding and all lifts and leads, if any, as shown in the drawing, unless otherwise specified to the treated separately along with foundation or slope/wall kerb at the top of slope or wall. Rate for bed block and capping beam shall include all items.

Rate for soil fill shall include compaction as desired in requisite layers through mechanical means, cost of hire or labour for plant operation dressing and leveling slopes, including special measures for edge reinforcements as shown in the drawing.

2. SPECIFICATIONS FOR STRUCTURAL STEEL

STRUCTURAL STEEL WORKS

CONTENTS

1.0 General, Scope of Structural steel fabrication

These specifications shall be read in conjunction with all relevant latest Indian standards, Karnataka Roads and Bridges Specifications (KRBS), MORTH Specifications Rev. 5, CPWD specifications 2009 with correction slips/amendments up to date, and other relevant reference specifications described in the section 1.1 and 1.4 of these specifications. In absence of Indian standards, appropriate British or International standards to be referred.

All structural steel welding works i.e. substructure works - pier and pier cap, portal frames, superstructure works - longitudinal girders, diaphragm girders etc except obligatory spans super structure works (which are designed as box girders) needs be necessarily made using Submerged arc welding (SAW) method in accordance with IS 4353:1995 - Submerged arc welding of mild steel and low alloy steels - Recommendations.

For obligatory spans which are designed as structural steel box girders and if pre fabrication of such elements is not feasible due transportation constraints, then such elements could be pre fabricated on site using Gas metal arc welding (GMAW) usually called CO_2 Welding method at particular site, subject prior approval of Structural consultant and Engineer-in-charge. All such CO^2 shall confirm to requirements of IS 10178: 1995 (Re-affirmed 2006)

Metal arc welding, manual welding shall not be allowed, except otherwise for relatively small weld lengths, where SAW and CO2 welding are practically not feasible subject to prior approval of design consultant and Engineer-In-Charge

Applicability of different welding methods for various structural members shall be as per the table hereunder

Sl . No.	**Welding method**	**Applicable for following structural members**
1	Submerged Arc Welding [SAW]	Pier, Pier cap, Portal Frames, Longitudinal girders, Diaphragm girders and all other structural works related super structure and sub structure.
2	CO_2 welding	For super structure works of obligatory spans, which are planned as box girder and are practically not feasible (due to transport and other constraints) to be fabricated at yard and transport to site.

3	Manual Arc welding	For non structural works such as hand rails on crash barrier, pedestrian hand rails, tack welding etc.

All structural steel fabrication, transportation and erection works specifically needs to comply with latest versions of following codes.

IS 1024:1999 - Use of welding in bridges and structures subject to dynamic loading -Code of practiceThe Contractor will provide all materials and equipment required to complete the works in every respect, whether such materials are required as part of the permanent structures or temporary for fabrication or erection or maintenance including specifically structural steel plates, flats, bars, welding rods, rivets, bolts and nuts, paint, welding sets in the shop and at site, all workshop facilities including automatic SAW (Submerged arc welding) gantries with necessary accessories, CO^2 welding sets with all necessary accessories, derricks, cranes, pulley blocks, wire ropes, hemp or manila ropes, winches, erection cleatsand temporary braces or supports and all other materials required to deliver theWorks complete in every respect.

All labour required for fabrication and erection for any cleaning, making good, rectifying, hauling, metalizing, painting and for any other ancillary work required to complete fabrication and erection.
The Contractor shall observe all safety requirements for erection of structural steelwork as covered in IS: 7205.

1.1. Shop Drawings :

1.1.1. The Engineer will supply to the Contractor design drawings showing sizes of all structural members and typical connection details.

1.1.2. Should there be any discrepancy in the drawings the Contractor is to refer the matter to the Engineer. The Contractor shall further provide a drawing showing the accurate setting out to line and level of all the anchor bolts intended for the work in sufficient time for their inclusion in the work so as to maintain the construction program.

1.1.3. The Contractor is to prepare all the necessary fabrication shop drawings and these shall be submitted to the Engineer in duplicate (both in soft copy and hard copy) and be approved by him before fabrication is commenced. All such drawings shall show the dimensions of all parts, method of construction, welding, details of splicing and bolting. A further set of all approved fabrication drawings 10 copies shall be supplied by the Contractor for use of the Engineer as required.

1.1.4. Approval by the Engineer of drawings or any other particulars submitted by the Contractor shall not relieve the Contractor of full responsibility for any discrepancies, errors or omissions therein. The Contractor shall at his own expense supply such additional copies of his working drawings as are required for the use of the interested parties

1.2 Material :

1.2.1 Structural Steel

All structural steel shall be of tested quality and shall conform to one of the following standards:

IS: 226 Structural steel (Standard Quality)

IS: 2062 Structural steel (Fusion welding quality)

IS: 961 High Tensile Structural Steel (Ordinary)

IS: 1161 Steel Tubes for Structural purposes

IS: 4923 Hollow Steel Sections for Structural use

The Contractor shall supply to the Engineer copies of the manufacturer certificate that the steel brought to the site for incorporation in the works is of a quality fully complying with the specification. Further, Contractor shall arrange for third party testing of the steel samples as per IS: 1608 - 1599.

Structural steel used for temporary works should also meet the above requirements; Pitted/rusted steel having its x-sectional area shall not be used.

1.2.2 Welding Electrodes and Welding wire :

Welding electrodes used for the works shall conform to IS: 814/latest and shall be supplied by manufacturer approved by the Engineer and shall be of the grade approved by the Engineer. All

Electrodes shall be kept under dry conditions. Any electrode which has part of its flux coating broken away or is damaged shall be rejected.

Welding wires and flux used for SAW welding works shall conform to IS: 3613 and IS:7280 /latest and shall be supplied by manufacturer approved by the Engineer and shall be of the grade approved by the Engineer. All Electrodes shall be kept under dry conditions. Any electrode wire which is broken away or is damaged shall be rejected.

Welding wires used for CO^2 welding works shall conform to IS: 6419 and IS: 6560/latest and shall be supplied by manufacturer approved by the Engineer and shall be of the grade approved by the Engineer. All Electrodes shall be kept under dry conditions. Any electrode wire which has part of it broken away or is damaged shall be rejected.

Welding rods used for manual arc welding works shall be of low hydrogen electrodes ESAB 7018 or approved equivalent. All Electrodes shall be kept under dry conditions. Any electrode which has part of it broken away or is damaged shall be rejected.

1.2.3 High Strength Friction Grip Bolts and Nuts :

All High Strength Friction Grip bolts and nuts of grade 8.8 only shall be procured from approved vendors. High Strength Friction Grip Bolts and nuts used for the works shall unless otherwise specified be galvanized bolts and nuts with double washers on both sides supplied by manufacturer approved by the Engineer and shall conform to IS:1367.

All bolts and nuts shall be tightened using pneumatic torque wrenches to the specified torque levels as per relevant Indian or international standards.

1.2.4 For all other material required for the works, the approval of the Engineer shall be obtained by the Contractor prior to the procurement and use of the material in the works.

1.1.1 Storage of Materials

1.1.1.1 General

All materials shall be so stored as to prevent deterioration, and to ensure the preservation of their quality and fitness for the work. If required by the Engineer, the materials shall be stored under cover the suitably painted for the protection against weather. Any material, which has deteriorated or has been damaged shall be removed form site and replaced by new members, as directed by the Engineer at no extra cost and time.

A. Steel to be used in fabrication shall be stored in separate stacks clear of the ground, section wise and lengthwise.

B. The storage area shall be kept clean and properly drained. Structural steel shall be so stored and handled to such a manner that members are not subjected to excessive stresses and damage. Girders and beams shall be placed in upright position. Long members shall be supported on closely spaced skids to avoid unacceptable deflection.

1.1.1.2 Storage Yard

A. The Contractor shall be required to establish to suitable yard, at an approved location at site for storing the fabricated steel structures and other materials which will be delivered to site. The yard shall have proper facilities such as drainage and Lighting including access for cranes, trailers and other heavy equipments.

B. The Contractor shall have been deemed to have visited the site, prior to submission of his tender, to acquaint himself with the availability of land and the development necessary by way of filling, drainage, access roads, fences, sheds etc., all of which shall be carried out by the Contractor at his own cost and as directed by the Engineer.

1.1.1.3 Covered Store

All structural steel items, field connection materials, paints etc. shall be stored on racks and platforms, off the ground in a properly covered building by the Contractor.

Fabrication and Metalizing yard

Contractor shall set up a fabrication and metalizing yard for exclusive for storing, cutting fabricating, welding and metalizing works in close vicinity of project site.

Fabrication yard to be equipped with all necessary equipments, power supply required for cutting, welding and metalizing works.

Minimum size of the yard shall not be less than 17.50 Acres

All works of cutting, welding needs to be mechanised to extent possible.

List of minimum equipments to be maintained is as below:

- Submerged arc welding gantry -3 Nos
- Plasma cutting equipment - 2 Nos
- Crane mounted gantries - 3 Nos
- Metalizing sets - 2 nos
- Field testing lab - 1 No.
- Welding testing equipments - 1 set
- Site office for fabrication yard with all furniture, and computer and other facilities

All cutting, welding and metalizing works to be carried out in covered yards.

Contractor shall be responsible for setting up, maintaining and watch & ward of the yard and lastly dismantling and clearing off the yard after completion of the work.

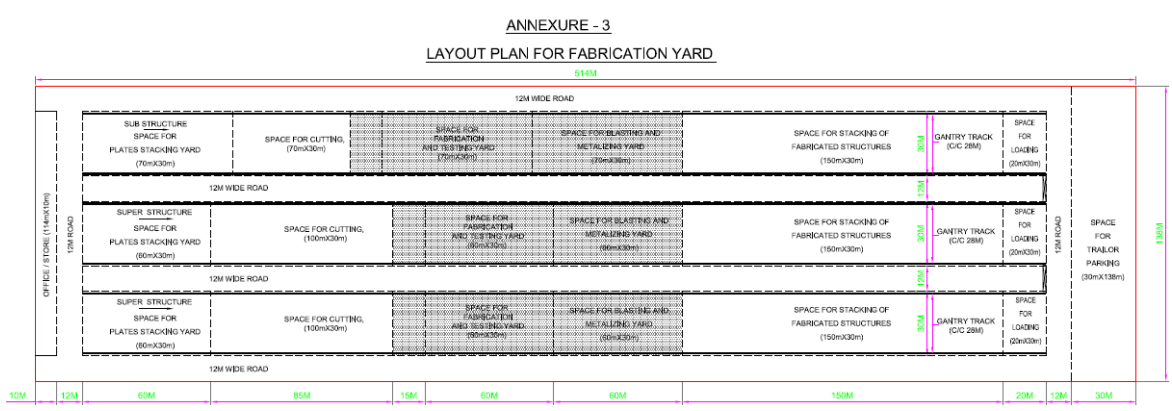
All precautions to be taken to ensure Health, Safety and Environment requirement laid by statutory bodies.

No separate payment/claim is admissible for towards cost of setting up and maintaining and clearing off the fabrication yard and same needs to absorbed in rates quoted for structural steel works.

A typical layout of Fabrication yard attached for better understanding and reference only.

ANNEXURE - 3

LAYOUT PLAN FOR FABRICATION YARD



DETAILS OF AREAS

SL.NO	DESCRIPTION	SUB STRUCTURE		SUPER STRUCTURE		
		SIZE	AREA	Nos.	SIZE	AREA
1	SPACE FOR PLATES STACKING	70mX30m	2100 Sqm	2	60mX30m	3600 Sqm
2	SPACE FOR CUTTING	70mX30m	2100 Sqm	2	100mX30m	6000 Sqm
3	SPACE FOR FABRICATION AND TESTING	70mX30m	2100 Sqm	2	60mX30m	3600 Sqm
4	SPACE FOR BLASTING AND METALIZING	70mX30m	2100 Sqm	2	60mX30m	3600 Sqm
5	SPACE FOR STACKING OF FABRICATED STRUCTURES	150mX30m	4500 Sqm	2	150mX30m	9000 Sqm
6	SPACE FOR LOADING	20mX30m	600 Sqm	2	20mX30m	1200 Sqm
7	SPACE FOR OFFICES, TOOL ROOMS ETC.	10mX114m	1140 Sqm	–	–	–
7	SPACE FOR PARKING	30 mX138m	4140 Sqm	–	–	–
7	ROAD ALL ALONG THE YARD	12 M WIDE	–	–	–	–
	TOTAL AREA	70932 Sqm (17.5 Acres)				

TOTAL AREA = 17.5 ACRES

TOTAL COVERED PORTION AREA = 12750 Sqm.

1.3 Workmanship and Fabrication

1.3.1 For all the works, workmanship shall be of first class quality, throughout, in conformity with IS: 800-latest, and true to line, level and dimension as shown in the drawings or instructed by the Engineer.

1.3.2 As far as possible the steel plates shall be procured on "cut to size basis" from approved steel vendors in order to minimise the cutting wastages and for fast tracking the fabrication process. All metal plates cutting shall be done using plasma cutters fitted with CNC (computer numerical control) machine. Hand held manual plasma cutting is allowed subject to prior approval from Design consultant and Engineer-In-Charge for small extents where plasma steel plate cutting is not practically feasible. Hand held flame cutting shall not be permitted.

1.3.3 All work shall be welded in shops. The pieces shall be manipulated to ensure down hand welding for all shop joints as far as possible. All parts to be welded shall be arranged so as to fit properly on assembly. After assembly and before the general welding is to commence the parts are to be tack welded with small fillet or butt welds as the case may be. The tack welding must be strong enough to hold the parts together but small enough to be covered by the general welding. The welding procedure shall be so arranged that the distortion and shrinkage stresses are reduce to a minimum. Hole drilling shall be done using automatic CNC drilling machines. Holes for bolts shall be drilled to conform to clause 10 of IS: 7215 (1974). Punching of holes will not be permitted. All drilling shall be free from burrs. No holes shall be made by gas cutting process. All parts assembled for bolting shall be in close contact over the whole surface and all bearing stiffeners shall bear tightly at top and bottom without being drawn or caulked. The component parts shall be so assembled that they are neither twisted not otherwise damaged as specified cambers if any shall be provided. Drilling done during assembling shall not distort the metal or enlarge holes. The butting surfaces at all joints shall be so cut and milled so as to butt in close contact throughout the finished joints.

1.3.4 All welding for the sub structure and super structure works shall be carried out by submerged arc welding (SAW) confirming to IS: 4353 (latest version) and shall be in accordance with Indian standard IS 1024:1999 - Use of welding in bridges and structures subject to dynamic loading - Code of practice and IS: 1024, IS: 1261 and IS: 9595 [Metal arc welding of carbon and carbon manganese Steels - Recommendations].

The Engineer may at his discretion order periodic tests of the welder and/or of the welds produced by them. All such tests shall be carried out by the Contractor at his cost.

1.3.5 All welding for the works shall be carried out by Submerged arc welding (SAW) in accordance with IS 4353:1995 - Submerged arc welding of mild steel and low alloy steels - Recommendations and shall be in accordance with IS:816, IS:819, IS:1024, IS:1261 and IS:9595. The Engineer may at his discretion order periodic tests of the welder and/or of the welds produced by them. All such tests shall be carried out by the Contractor at his cost.

1.3.6 Safety requirements should conform to IS: 7205, IS: 7273 and IS: 7269 as applicable and should conform to safety, economy and rapidity.

1.3.7 All joints required in structure to facilitate transport or erection shall be shown on the drawings or as specified by the Engineer. Should the Contractor need to provide joints in locations other than those specified by the Engineer he shall submit his proposals and obtain the prior sanction of the Engineer for such joints. The lengths of structural shall be the maximum normally available in the market, jointing of shorter length in order to make up lengths required shall not be permitted.

1.3.8 Each piece of steel work shall be marked distinctly before delivery, indicating the position and direction in which it is to be fixed. Three copies of a complete marking plan are to be supplied to the Engineer before erection commences.

1.3.9 In the case of welded fabrication any distortion remaining in the member after welding operations are completed shall be rectified by and/or at the expense of the Contractor to the approval of the Engineer.

1.3.10 All members of girders and diaphragm girders shall be straight throughout their length, unless shown otherwise on the drawings, and shall be accurately set to the lines shown on the drawings. Sheared edges of gussets or other members to be straightened and dressed where necessary.

1.3.11 Templates and jigs used throughout the work shall be all steel. In cases where actual materials have been used as templates for drilling similar pieces, the Engineer shall decide whether they are fit to be used as parts of the finished structure.

1.4 Testing of Welds :

All welds shall be subjected to testing in following order

- Initially 100% thorough visual inspection.
- Further liquid penetration test at suspected location (minimum 5% of weld length) as per IS: 3658 - Code of practice for liquid penetrant flaw detection.
- Further necessary tests as per IS: 3600 Method of Testing Fusion Welded Joints and Weld Metal in Steel: based on the need and direction of Engineer in charge.

In addition to above following tests also shall be applicable

1. Butt welds - Radiographic testing of 5% of welds as per IS 1182.
2. Fillet welds - Ultrasonic testing of 1 in 20 positions decreased to 1 in 50 if failures are less than 1 in 10.

1.5 Protection of Steel Works (IS:8629) :

1.6 All fabricated structural steel components of steel flyover such as pier, pier cap, portal frames, super structure elements such as longitudinal girders, diaphragm girders needs to be protected from atmospheric corrosion by metalizing (as per technical specifications of Metalizing described elsewhere), the steel surfaces soon after the completion of fabrication activity in the fabrication yard.

1.7 For other items of work (such as hand rail, pedestrian hand rail, etc) for which, metalizing is not proposed needs to be painted

a) Painting work shall be carried out in accordance with IS: 8629 (Parts I to III). Painting shall be applied under the temperature requirement specified by the manufacturer.

b) The steel work, prior to delivery, shall be cleaned form scale, rust, dirt and grease etc., but means of chipping, scraping and wire brushing using skilled operators as described in the painting systems below. The cleaning shall proceed each day over the extent of surfaces which can be painted on that day. The paint shall be applied by brushing or spraying as per approval of the Engineer..

c) Site weld locations shall be left free from paint within 50mm of the weld position, and contact surfaces in connection using High Strength Friction Grip Bolts shall not be painted. Immediately after completion of erection all damaged paint shall be scraped off and made good to the approval of the Engineer.

d) The Steelwork specialist shall also clean down and apply one coat of primer to all site bolts, site bolted connections and site weld locations and the paint work generally shall be left in sound condition for any subsequent painting.

e) All paints and primers shall be of best quality and in original sealed containers as packed by the paint manufacturer conforming to the relevant Indian Standards and shall be procured directly from the manufacturers. All paint to be used shall be stored under cover in such conditions as will preserve it from extreme of temperature and the paint shall be used and applied strictly in accordance with the manufacturer's instructions.

f) In addition, the following specification shall apply to the shop painting of contact and inaccessible surfaces:

a. Surfaces to be painted shall be thoroughly cleaned from scale, rust, dirt, grease etc. by means of sand/grit/shot blasting or other equivalent means.
b. Surfaces which are to be brought permanently into close contact or made inaccessible either in the shops or upon erection shall, after cleaning, be given two coats of Red Lead Priming Paint. The surfaces shall be brought into contact while the paint is still wet.
c. Contract surfaces in connection using High Strength Friction Grip bolts shall not be painted or oiled and shall be free from dirt, loosed scale, burrs, pits and any other defects which would prevent the solid seating of the parts and would interfere with the development of friction between them.
d. All enclosed surfaces of box members shall be completely sealed by oiling or by coating with approved bitumen paint and all such members and tubes shall have their ends closed by suitable plates welded in position.

g) Surfaces in contact during shop assembly shall not be painted. Surfaces which cannot be painted, but require protection, shall be given a rust inhibitive grease conforming to IS:958 (1975), or solvent deposited compound conforming to IS:1153 (1975) or IS:1674 (1960), or treated as specified in the drawings.

h) Surfaces to be in contact with concrete shall not be painted.

i) The painting system to be used shall be as mentioned in the next Table.

1.8 Transportation and Erection & Site Work :

1.8.1 The Contractor shall be responsible for safe and deformation free transportation of all structural members to site. Due care shall be exercised to ensure protective coating on structural steel the not damaged during the transportation loading and unloading. Nylon slings are must for handling and erection. Use of other types of ropes and steel cradles is banned. Soft wood cradle only needs to used for during the transportation and stacking.

1.8.2 The Contractor shall be responsible for checking the alignment and level of foundation and correctness of foundation bolt centres, well in advance of starting erection work, and shall be responsible for any consequences for non-compliance thereof. Discrepancies if any shall immediately be brought to the notice of the Engineer for his advice.

1.8.3 The structure should be divided into erectable modules as per the total scheme. This should be pre-assembled in a suitable yard/platform and its matching with members of the adjacent module checked by trial assembly before erection.

1.8.4 Immediately prior to erection any rust in the paint area shall be removed by power wire brushing to a standard equivalent to SA 2.5.

1.8.5 During erection the rough handling of fabricated materials such as bending, straining or pounding with sledges shall be avoided. Any damage to the structure during transportation or erection shall be immediately rectified by the Contractor at his own cost. The straightening of bend edges of plates, angles and other sections shall be done by methods which will not cause fracture.

1.8.6 Following the completion of the straightening, the surface of the member shall carefully be inspected for damage and got approved by the Engineer before further use.

1.8.7 The Contractor shall be responsible for accurately positioning, levelling and plumbing of all steelwork and placing of every part of the structure in accordance with the approved drawings and to the satisfaction of the Engineer. All stanchion base, beam and girder bearings etc. shall be securely supported on suitable steel packs. All reference and datum points shall be fixed near the work site for facilitating the erection work.

1.8.8 All equipment used by the Contractor shall be sufficient for the purpose and for the erection of the steel work, in the time specified in the contract. Any lifting or erecting machinery shall be to the approval of the Engineer and shall be removed from the site if he considers such appliances dangerous or unsuitable for their functions. The approval of the Engineer shall not relieve the Contractor of the responsibilities for the loads to which the erection equipment shall be called upon to carry. Adequate arrangement shall be made to resist wind loads and lateral forces arising at the time of erection.

1.8.9 The Contractor is entirely responsible for the stability of the structure during erection and shall arrange that sufficient tack bolts, braces or guy ropes are used to ensure that work will remain rigid until final bolting, riveting or welding is completed. The Contractor shall supply and fix, without extra charge, any temporary bracing which may be necessary.

1.8.10 All steelwork shall be erected in the exact position as shown on the drawings. All vertical members shall be truly vertical throughout and all horizontal members truly horizontal, fabrication being such that all parts can be accurately assembled and erected. No permanent bolting, welding or grouting shall be done until proper alignment has been obtained and checked by the Engineer.

1.8.11 At stanchion splices and at other positions where concrete cover to the steel is liable to be restricted, bolts will be placed with their heads on the outside of the members.

1.8.12 All field assembly bolting and welding shall be executed in accordance with the requirements for shop fabrication excepting such as manifestly apply to shop conditions only. Where steel has been delivered painted the paint shall be removed before field welding for a distance of at least 50mm on either side of the joints. The number of washers on permanent bolts shall not be more than two for the nut and one for the bolt head.

1.9 Rectification of damaged materials :

Any error in shop work which prevents the proper assembly and lifting up of the parts by moderate use of drift pins or reaming or cutting shall be immediately reported to the Engineer and his approval of the method of rectification obtained in writing. Wrongly fabricated material whose erection in the field necessitates extra work shall be the responsibility of the contractor. The entire costs of such operation including the replacement of defective members, if required, shall be borne by the contractor.

1.10 Inspection :

1.10.1 The contractor shall inform the Engineer of the progress in fabrication and as to when individual pieces are ready for inspection. All gauge templates necessary to satisfy the Engineer shall be supplied by the contractor. The Engineer may at his discretion check the results obtained at the contractor's works by independent tests and the cost of such tests shall be borne by the contractor.

1.10.2 Structural steel and components viz. bolts, nuts, washers, welding consumables, etc. should be tested for mechanical and chemical properties as per the requirement of the relevant IS or any other specified codes/standard.

1.10.3 During Inspection, the component/member shall not have any load or external restraint.

1.10.4 Contractor shall procure, maintain and make available all necessary testing apparatuses, Inspection kits to facilitate quick and accurate testing such as vernier caliper, screw gauge, DFT meter/ Elcometer, Metal Flaw Detectors (list is not exhaustive) and any other testing equipment required by Engineer.

1.11 Grouting of steel bases :

1.11.1 Before grouting of pier bases, the contractor shall take the following action :

a Inform the Engineer.

b Clean all holes, openings, recesses and the top of foundations of all dirt, mud, water, oil or other extraneous matter.

c A frame shall be placed in position around the base plate with a provision for placing or injecting grout.

d The contractor shall provide screed bars or mild steel flats and fix them in mortar.

e Holes shall be provided on the stanchion bases for escape of air.

1.11.2 Grouting of steel beams, steel pier, bases and bearings and encasement of steelwork will be carried out by the contractor after the steelwork has been finally aligned and levelled and approval of the Engineer obtained.

1.11.3 The bolt sleeves shall be grouted as a separate operation using neat cement grout of a creamy consistency, which shall be poured in so as to completely fill the holes. "Non-shrink" cements, additives of approved makes shall be used for all grouting operations.

1.11.4 The space between the top of the foundations and the underside of the base plate shall be completely filled with a "Non-shrink Group Conbextra GP2 of M/s Fosroc or approved equivalent" and finished flush with edge of the base plate, either :

a. Mixed as a stiff mortar well rammed into place from all sides.

b. Mixed as thickly as possible consistent with fluidity and poured under a suitable head and tamped until the space has been properly filled.

1.12 Holding down and Anchor bolts :

1.12.1 The holding down and anchor bolts should conform to the requirements laid down in IS: 5624 or as directed by the Engineer.

1.12.2 Installation: Individual bolts in groups of holding down bolts shall be positioned accurately within a tolerance of + 6mm. The bolts shall be set vertically to a tolerance of not more than 1 in 250.

1.12.3 During the casting of concrete the contractor shall ensure that space between the bolt and sleeves is kept clean after removal of shuttering. The contractor shall provide and fix timber plugs to maintain this space in a clean condition. The projecting threads of bolts shall be protected by approved wrapping materials.

1.12.4 Grouting of bolt tubes shall be carried out after the steelwork or equipment have been aligned, plumbed and levelled.

1.13 Tolerances :

1.13.1 All tolerances shall be in accordance with IS: 7215 unless otherwise specified.

1.13.2 The maximum deviation for line and level shall be + 3.0mm for any part of the structure including for location of column centres.

1.13.3 The maximum deviation from plumb for columns shall be +3.0mm in 10.0m height subject to a maximum of +6.0mm in a total height of 30.0m.

1.13.4 The deviation at the centre of the upper chord member from vertical plane running through the centre of the bottom chord shall not be more than 1/1500 of span but in no case more than 10.0mm. The lateral displacement of top chord at centre of span form vertical plane running through centre of supports shall not be more than 1/250 of the depth of truss but in no case more than 20.0mm.

P A R T - 2

2 .0 STRUCTURAL STEEL ERECTION WORK

2 Deleted

3 Deleted

3.1.1 Scope of Specification

This specification covers the scope of work for structural steel erection works, submittals by the Contractor, applicable codes of practice and the specifications for the materials to be used, including steel, bolts and nuts, washers etc. and the storage thereof.

This Specification also covers the transportation, delivery to site, storage and erection of structural steelwork at site. This includes plant and equipment requirements, installation of fabricated steel work in position and grouting all complete as per drawings, specifications and other provisions of the Contract.

3.1.2 Scope of Work

The scope of work for the contractor in respect of structural steel erection work shall cover, but shall not be limited to the following:

A. Preparation of complete erection sequence drawing with method statement based on the suggested erection scheme(s) as proposed by contractor, required for all the permanent and temporary structures including launching nose / truss.

B. Submission by the contractor, for examination by the Engineer, detailed particulars of the proposed method of erection of the superstructure steelwork, together with complete calculations relating to strength and deflection. If the erection scheme necessitates the strengthening of the permanent

steel work, the contractor shall submit, for approval of the Engineer, the methods he proposes for making good the permanent steelwork after removing the temporary work. The contractor shall also submit the design and fabrication drawings incl. detailed calculations of launching nose / truss, counter weight, all temporary supports, staging, braces etc. required for safe erection, for approval of the Engineer.

C. Providing all construction and transport equipment, tools, tackle and consumables, materials, labour and supervision required for the erection of the structural steelwork.

D. Receiving, unloading, checking and moving to erection location, guarding and upkeep of fabricated steelwork and other consumable materials and fasteners at site.

E. Compiling and furnishing detailed bill of materials of fabricated parts received from the fabricator.

F. Loading, Transportation and unloading of all fabricated structural steel materials from storage yard to erection site, handling, assembling, bolting, welding and satisfactory installation of all fabricated structural steel materials in proper location, according to approved erection drawings and / or as directed by the Engineer.

G. Setting out, aligning, keeping in plumb, bolting, welding and securely fixing the fabricated steel structures in accordance with the erection scheme, or as directed by the Engineer.

H. Requisite, site planning to all fabricated steelwork, as per requirements of related specification of the painting.

I. Carrying out all major modifications of the fabricated steel structures, as directed by the Engineer, including but not limited to the following:

i) Removal of bends, kinks, twists etc. for parts damaged during transport and handling.

ii) Cutting, chipping, filing, grinding etc. as required or preparation and finishing of site connections.

iii) Drilling of holes which are either not drilled at all or are wrongly drilled.

3.1.3 Submittals

i. On commencement of the Project, the Contractor shall submit the following:

i) Prior to the technical submittals, the contractor shall submit the proposed overall schedule for documentation such as calculations, erection drawings, shop / working drawings for all temporary structures etc. It is highlighted that structural steel member dimensions indicated in tender drawings are tentative only, and may be modified during final design stage.

ii) A detailed list of all constructional Plant & Equipment, such as cranes, derricks, winches, welding sets, erection tools etc. their make, model, present condition and location, available to the contractor and the ones he will employ on the job to maintain the progress of work in accordance with the contract.

iii) The total number of experienced personnel of each category, like fillers, welders, riggers etc., which he intends to deploy on the work.

ii. The contractor shall submit a detailed erection programme for completion of the work in time and in accordance with contract. This will show, in a Performa approved by the Engineer, the target programme, with details of erection proposed to be carried out in each week, details of major equipment required and an assessment of required strength of various categories of workers.

iii. The contractor shall submit complete design calculations for any alternatives sections (for permanent structure) proposed by him, for approval of the Engineer. Use of any alternative section shall be subjected to approval of the Engineer. However, no escalation in unit rates of work shall be allowed for such cases.

3.1.4 Furnishing of information

A. Design drawings shall be furnished to the contractor and all such drawings shall form part of these Specifications.

B. The Engineer reserves the right to make changes in the design drawings even after release for preparation of shop drawings to reflect addition, omission & modifications in data / details and requirements. Contractor shall consider such changes as part of these Specifications and the contract, and no claims shall be entertained on this account.

C. Design drawings, approved by the Engineer, will show as appropriate the salient dimensions, design toads, sizes of members, location of openings at various levels and other necessary information required for the preparation of fabrication drawings, designs and erection details.

D. It shall be clearly understood that the drawings of the Engineer are design drawings. The typical detail of connection, cuts, notches, bends etc where shown in the design drawings are only for general guidance of the contractor. The contractor shall design and develop all such details based on the design forces and functional requirements.

E. In case of variations between design drawings and specifications, the decision of the Engineer shall be final. Should the contractor, find any discrepancy in the information furnished by the Engineer, same shall be immediately brought to the notice of Engineer for resolution. The contractor shall obtain clarifications on discrepancies from Engineer before proceeding with the work.

F. No detailed erection or shop drawings for temporary structures will be accepted for examination by the Engineer unless the same, have first been completely checked by the contractor's qualified structural engineer (independent agency to be appointed by contractor) and are accompanied by an erection plan showing the location of all pieces detailed. The contractor shall check and ensure that

detailing of connections is carefully planned to obtain ease in erection of structures, including field-welded connections and / or bolting.

G. No fabrication work shall be started by the contractor without prior approval of Engineer on the relevant drawings. Approval by the Engineer of any of the drawings shall not relieve the contractor of his responsibility to provide correct design of connections, workmanships, fit of parts, details, materials and errors or omissions of all work shown thereon. The approval of Engineer shall constitute approval of the size of members, dimensions and general arrangement, but shall not constitute approval of the connections between members and other details.

H. Drawings, for approval, shall be submitted by the contractor in an orderly manner commensurate with erection sequence and approved construction programme.

I. The contractor shall furnish ten prints of all approved final drawings including soft copy in CD ROM for interface / field use and record purpose.

J. The drawings prepared by the Contractor, and all subsequent revisions thereof shall be at the cost of the Contractor, and no separate payments shall be made for the same. Revisions shall incorporate all modifications, field changes, substitutions etc. effected. The rates / prices quoted for fabrication work shall be deemed to include the cost of such drawing work.

K. All the drawings shall be prepared in metric units. The drawings should preferably be of A-1 standard size, and the details shown therein shall be clear and legible. These drawings shall include but shall not be limited to the following:

    i) Assembly drawings, giving exact sizes of the sections to be used and identification marks of the various actions.

    ii) Shop details of temporary structures together with detailed calculations.

iii) Detailed shop drawings for proper co-ordination with the concrete components to which the steel members shall be connected, as required.

iv) Any other drawings or calculations that may be required for proper completion of the works and clarification of the works of substituted parts thereof.

v) All 'as-built' drawings.

3.2 STRUCTURAL STEEL WORK-ERECTION

3.2.1.1 Submittals

A. Ref. Specification for Structural Steel work Erection - General (Clause 3.2.1 above)

B. The contractor shall submit for approval a full description of his proposed erection method including sequence of erection, use of temporary supports, connection details and erection camber diagram and design calculations covering various stages of erection process.

3.2.2 Execution

3.2.2.1 Delivery, Storage & Handling

A. Before the shop assembly is dismantled, all members and sections shall be appropriately marked with paint or grooved with their identifications numbers a detailed in shop drawings. The Contractor's representative shall be present during all the shop assemblies (wherever fabrication will be done). It's dismantling and marking operations.

B. The Contractor shall deliver the fabricated structural steel materials to site, with all necessary field connection materials, in such sequence as will permit the most efficient and economical performance of the erection work. As per scheduled programme, the Engineer may, at his discretion prescribe or control the sequence of delivery of materials.

C. Fabricated parts shall be handled and staked in such a way that on damage is caused to the components. Measures shall be taken to minimize damage to the protective treatment on the steelwork. All work shall be protected from damage in transit. Particular care shall be taken to stiffen free ends, prevent permanent distortion and adequately protect all machined surfaces. All bolts, nuts, washers, screws, small plates and articles shall be suitably packed and identified.

3.2.2.2 Plant and Equipment

All erection tolls and plant and equipment proposed to be used shall be efficient dependable duly certified by independent third party and in good working condition, and the suitability and adequacy of such shall be determined by the Engineer. The Contractor shall, in his technical proposal submittal, specify the plant and equipment proposed by him for erection of structural steelwork at site.

3.2.2.3 Storage

Materials to be stored shall be placed on skids above the ground and shall be kept clean and properly drained.

3.2.2.4 Method and Sequence of Erection

The method and sequence of erection shall have the prior approval of the Engineer. The contractor shall arrange for the most economic method and sequence consistent with the drawings and Specifications and such information as may be furnished to him prior to the execution of the Contract. The erection of steelwork shall be planned so as to ensure safe-working conditions at all times. The Contractor shall be solely responsible for enhancing the safety of his construction activities at site.

3.2.2.5 Assembly & Erection

A. During erection, the members and sections shall be accurately assembled as shown in the approved shop drawings and by following the match marks. The material shall be carefully handled so that no section will be bent, broken or otherwise damaged. Hammering which will damage or distort the members shall not be done. Bearing surfaces and surfaces to be in permanent contact shall be cleaned before the members are assembled. Splices and field connections shall have 50% of the holes filled with bolts and balance 50% with cylindrical erection pins before bolting with high-strength bolts. Filling-up bolts shall be of the same nominal diameter as the high-strength bolts, whereas the cylindrical erection pins shall be 1 mm or larger in diameter.

B. The correction of minor misfits involving harmless amounts of reaming, cutting and chipping will be considered a legitimate part of the erection. However, any error in the shop fabrication or deformation resulting from handling and transportation which prevents the proper assembling and fitting up of parts by the moderate use of drift pins …… amount of reaming and slight chipping or cutting, shall be reported immediately to the Engineer and his approval of the method of correction obtained. The contractor shall be responsible for all misfits, errors and injuries and shall make the necessary corrections and replacements.

C. The straightening of plates, angles, other shapes and built-up members, when permitted by the Engineer, shall be done by methods that will not produce fracture or other damages. Distorted member shall be straightened by mechanical means or, if approved by the Engineer, by the carefully planned and well supervised applications of a limited amount of localized heat. Each application will be subject to the approval of the Engineer.

D. The responsibility in respect of temporary bracing and guys shall rest with the Contractor until the structural steel is located, kept in plumb, leveled, aligned and grouted with the tolerances permitted under the Specifications, and the permanent bracing / framing system has been installed.

E. The temporary guys, braces, false work and cribbing shall not be the property of the Engineer / Employer and will be removed by the Contractor, with the approval of the Engineer, without any change, once the permanent framing system has been installed to the satisfaction of the Engineer and when the temporary bracing, guys etc. can be removed without any potential danger / damage to the erected structure.

3.2.2.6 Setting Out

A. Positioning and leveling of all steelwork, keeping in plumb and placing of every part of the structure, with accuracy, shall be in accordance with the approved drawings and to the satisfaction of the Engineer. The Contractor shall check the positions and levels of the anchor bolts etc. The contractor shall check the positions and levels of the anchor bolts etc. before concreting and ensure that they are properly secured against disturbance during pouring operations. The Contractor shall remain responsible for correct positioning and shall set proper screed bars to maintain proper level. No extra payment shall be made on this account.

B. No permanent field connections by bolting shall be carried out until proper alignment and guides for keeping in plumb have been attached.

3.2.2.7 Field Bolting

A. Bolts shall be inserted in such a way that they remain in position under gravity, even before fixing the nut. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled all joint surfaces including those adjacent to the washers shall be free of scales. They shall be free of dirt, loose scales, burns and other defects that would prevent solid seating of the parts.

B. Holes for turned bolts to be inserted in the field shall reamed in the field drilling and remaining for turned bolts shall be done only after the parts to connected are assembled. Tolerances applicable in the fit of the bolts shall in accordance with relevant Indian Standard Specifications.

C. All high tensile bolts shall be tightened to provide the required minimum Torque as per relevant Indian Standards / Specifications when all fasteners the joint are tight.

D. The manufacture and use of high strength friction grip bolts shall comply with all the requirements of IS: 3757 (1985)

E. Load indicating bolts or washers may be used, subject to the approval of Engineer.

1. Requirements stipulated under bolting shall apply for field bolts. Field bolts, nuts and washers shall be supplied by the authorized fabricators of the structural member in excess of the nominal numbers required. Only HSFG bolts of class 8.8 shall be used.

2. At the time of assembly the surfaces in contact shall be free of paint or any other applied finish, oil, dirt, loose rust, loose scale, burrs and other defects which would prevent solid seating of the parts or would interface with the development of friction between them.

3. In any other surface condition, including a machined surface, is specified, it shall be the responsibility of the Contractor to work within the slip factor specified for the particular case.

4. Each bolt and nut shall be assembled with washers of appropriate shape, quality and number in cases where plane parallel surfaces are involved. Such washers shall be placed under the bolt head or the nut, whichever is to be rotated during the tightening operation. The rotated nut or bolt head shall be tightened against a surface normal to the bolt axis, and the appropriate tapered washer shall be, used when the surfaces are not parallel. The angle between the bolts

axis and the surface under the non-rotating component (i.e., the bolt head or the nut) shall be 90 + 3 degree. For angles outside these limits, a tapered washer shall be placed under the non-rotating component. Tapered washers shall be correctly positioned.

5. No gasket or other flexible material shall be placed between the holes. The holes in parts to be joined shall be sufficiently well aligned to permit bolts to be freely placed in position. Driving of bolts is not permitted. The nuts shall be placed so that the identification marks are clearly visible after tightening. Nuts and bolts shall always be tightened in a staggered pattern and where there are more than four bolts in any one joint, they shall be tightened from the centre of the joint outwards.

6. If, after final tightening, a nut or bolt gets slackened off for any reason, the bolt, nut and washer or washers shall be discarded and not used again.

3.2.2.8 Holes, Cutting and Fitting

A. No cutting of sections, flanges, webs and clients, rivets, bolts, welds etc. shall be done unless specifically approved and / or instructed by the Engineer.

B. The erector shall not cut, drill or otherwise after the work of other trades, or his own work to accommodate other trades, unless such work is clearly specified in the contract, or directed by the Engineer. Wherever such work is specified the Contractor shall obtain complete information as to size, location and number of alternations, prior to carrying out any work.

3.2.2.9 Drifting

A. Correction of minor misfits will be considered as permissible. For this, light drifting may be used to draw holes together and drills shall be used to enlarge holes, as necessary to make connections.

Reaming, that weakens the member or makes it impossible to fill the holes properly or to adjust accurately after remaining, shall not be allowed.

B. Any error in shop work which prevents the proper assembling and filling of parts by moderate use of drift pins and reamers shall immediately be brought to the attention of the Engineer, and approval of the method of correction obtained. The use of gas cutting torches at the erection site is prohibited.

3.2.2.10 Grouting

A. The positions to be grouted shall be cleaned thoroughly with compresses air jet and wetter with water, and any accumulated water shall be removed. Grouting shall be carried out under expert supervision; takings care to avoid air locks. Edges shall be finished properly.

B. Whatever method of grouting is employed, the operation shall not be carried out until the steelwork has been finally aligned and leveled. Immediately before grouting, the space under steel is thoroughly cleaned. Where packings are to be left in place, they shall be placed such that they are completely covered with grout.

C. The grout to be used shall be Non-shrink grout Conbextra GP-2 M/S Fosroc or approved equivalent.

D. All steel in foundations shall be solidly encased in Portland Cement Concrete of minimum characteristics strength at 28 days as specified in the drawings, subject to a minimum of 35 N/mm^2. A minimum cover of 100 mm shall be provided to all steelwork where surrounding concrete is in contact with soil.

3.2.2.11 Inserts and Embedment's

Various steel insets and embedment's are required under the contract to be fabricated, positioned and secured firmly into place inside the formwork prior to concrete being poured. There are also requirements of jointing, threading, bolting and welding insets and embedment's of different concrete and structural steel elements in order to establish structural continuity and connection. Great care shall be exercised by the contractor in executing all aspects of the work related to inserts and embedment's, including tolerances, so that the final assembly of the concrete elements can meet satisfactorily the continuity and contiguity requirements intended in the structure.

3.2.2.12 Metalizing after Erection

A. The damaged surfaces of metalizing due to transportation, handling and erection, shall be metalized using portable metalizing equipment after the structure is erected, leveled, kept in plumb, aligned in its final position, and accepted by the Engineer. Touch up with Zinc rich/Aluminum rich painting as substitute for metalizing is not acceptable.

B. Metalizing shall not be done in frost or foggy weather, or when humidity is such as to cause condensation on the surfaces to be metalized. Before, commencing metalizing of steel, all surfaces to be painted shall be dried and thoroughly cleaned from all loose scale and rust using power driven steel brushes.

C. Surfaces which will be inaccessible after field assembly, shall receive the full-specified protective treatment of metalizing before assembly. Bolts and fabricated steel members, which are galvanized or otherwise treated, shall not be Metalized.

D. The contractor shall be responsible for any damage caused to other components of the structure including the substructure in particular, he shall take all necessary precautions to minimize concrete splash onto complete… steelwork or rust staining of concrete due to erected steel work

and clean and / or repair all stains and other damages to completed work prior to tests on completion.

3.2.2.13 Final Cleaning up

Upon completion of erection, and before final acceptance of the work by the Engineer, the Contractor shall remove, free to cost, all false work, rubbish and all temporary works, resulting from or in connection with the performance of his work.

4.00 ADDITIONAL SPECIFICATIONS FOR ERECTION

Girder erection for longer and regular spans:

- Preferably no road traffic blocking will be used. Multiple day / night short blocks of 1h to 1h30 minutes maximum are acceptable to ensure safety subject to approval of Engineer.
- Erection scheme shown in Tender drawings is suggestive only. Contractor has to provide his own proposed Erection scheme and supporting calculations with the offer.
- Contractor has to provide principles of nose / truss connection details in tender.
- Truss design composite girder requirements will govern over nose / launching equipment requirements.
- Contactor will submit and get approval from Engineer of the detailed design of the full lifting equipment and scheme before starting the launching.
- Contractor will coordinate with Bangalore Traffic Police, other departments such as KPTCL, BSNL, BESCOM, BWSSB and Engineer before and during the erection contractor to develop detailed traffic diversion scheme.
- Tentative allowable bearing pressure for temporary supports foundation concrete blocks shall be assumed at 10 tonnes / sqm.
- For location of storage and fabrication yard relevant clause of N.I.T shall be referred. Contractor shall indicate and justify in tender the proposed total needed yard area for the purpose.

- Any necessary precaution by proper and secure fixing shall be taken by the contractor to prevent the fall of any object onto the road below during the whole erection period.
- A minimum 15 m clear width (4 lanes) shall be kept during the whole construction period. These lanes can be obtained as 4 or 2+2.

5 MODE OF MEASUREMENT

1. The unit rate shall include the following:

i. The pricing must include for all rolling margins, extras for length and size, allowance for waste, complete fabrication, delivery and erection, and caulking the gap between base plate and foundation, and painting as specified in the item. Unless otherwise specified, the final coats of paints, however, will be measured and paid separately on the basis of tonnage fabricated and erected.

ii. Any temporary support, strutting, tying or anchor bolts, black bolts, fasteners, welding required to withstand the stresses of erection and carrying of plant are to be included in the price.

iii. The payment for the steelwork will be for the weight of the steelwork actually erected, i.e. plates, rolled sections, shear connections, cleats, splice plates.

iv. Unless otherwise specified, foundation and anchor bolt assemblies including grouting shall not be measured separately including nuts and washers.

v. Procurement of all materials, machinery, labour, testing, inspection, supervision including setting up of fabrication yard, transportation to site

vi. Erection of fabricated parts (fabrication and transportation of various parts / components including HSFG bolts / nuts / washers from workshop to storage yard)

vii. Receiving, unloading and keeping in safe custody and upkeep of all fabricated parts including HSFG bolts / nuts / washers at storage yard.

viii. Loading, transportation and unloading of all fabricated structural steel materials including HSFG bolts / nuts / washers from site storage yard to erection site, handling, assembling, bolting,

welding if necessary and satisfactory installation of all fabricated structural steel materials in proper location according to approved erection drawings and / or as directed by the Engineer.

ix. Tightening of HSFG bolts for the field erection of fabricated parts using pneumatic torque wrenches.

x. Preparation of complete detailed erection drawings and detailed calculation based on suggested erection sequence and design drawings as given by Engineer or alternative scheme proposed by contractor and approved by Engineer.

xi. Preparation of complete detailed fabrication drawings for all temporary structures such as temporary nose, staging, temporary support, bracing required for all permanent and temporary structures.

xii. All tools, plants and equipments / machinery

xiii. All other consumables including fuel and lubricants etc.

xiv. All safety and protection arrangements to be made at site / storage yards for road users, public and workmen.

xv. Metalizing treatment for the structural steel surface

2. Mode of measurement :

Dimensions of the steelwork will be taken correct to 1 mm and the net weight of metal in the fabricated structure on the basis of unit weight of the steel used in the works approved by the Engineer worked out on site or from the actual shop working drawings as decided by the Engineer. In calculating the weights of gusset plates, payment will be made for the least enclosing parallelogram or triangle. For structural sections the weight will be calculated on lengths actually used with no deduction for splay cut or mitred end. In case of imported sections, the weights chargeable shall be the weight according to the relative standards of the country of origin. Full weight of the bolts and nuts will be paid for as per Indian Standard Codes weights without any deduction for shanks, etc. No account shall be taken of the weight of weld in calculating the weight of steelwork. Erection packing plates bedded in mortar and wedges shall not be measured but shall be included in the rates. No deduction shall be made for

openings less than 0.1m^2 in area measured in plane for bolt holes. The weight of sheet steel, plate, strips and rolled sections shall be taken from relevant Indian Standards.

THE STRUCTURAL WORK WHICH IS TEMPORARY IN NATURE AND/OR WHICH IS REQUIRED FOR ERECTION PURPOSES SHALL NOT BE MEASURED

3.2.3 Applicable Codes of Practice

The following specifications, standards and codes are included as part of this Specification. All Standards, specifications, codes of practice current on the date of signing of agreement and referred to herein shall be applicable.

	IS:226	Structural steel (Standard Quality)
	IS:800 (2007)	Code of Practice for General Construction in Steel.
	IS:808 (1989)	Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle sections.
	IS:812 (1989)	Glossary of terms relating to welding and cutting of metals
	IS 813 (1986)	Scheme of symbols for welding
	IS:814 (2004)	Covered Electrodes for Manual Metal Arc Welding of Carbon & Carbon - Manganese Steel.
	IS:816 (1969)	Code of Practice for Use of Metal Arc welding for General Construction in Mild Steel.
	IS:817 (1969)	Code of Practice for Training and Testing of Metal Arc Welders.
	IS:817/Part 1 1992)	Code of Practice for Training of Metal Arc Welders.
	IS:818 (1968)	Code of Practice for Safety and Health requirements in electric and gas welding and cutting operations

	IS:822 (1970)	Code of procedure for inspection of welds
	IS:919 (1993)	ISO System of Limits & Fits (Part 1 & Part 2)
	IS:1024: 1999	Use of welding in bridges and structures subject to dynamic loading - Code of Practice
	IS:1148 (2009)	Hot Rolled Rivet Bars (up to 40 mm) for Structural Purposes.
	IS:1179 (1967)	Equipment for eye and face protection during welding
	IS:1182 (1983)	Recommended Practice for Radio Graphic Examination of Fusion Welded Butt joints in steel plates.
	IS:1261 (1959)	Code of practice for seam welding in mild steel up to 8mm
	IS: 1363 (2002)	Hexagon Head Bolts, Screws and Nuts of Product grade C. (Part 1,2&3)
	IS:1364 (2002/2003)	Hexagon Head Bolts, Screws and Nuts of Product grade A & B. (Part 1 to 6)
	IS: 1367	Technical Supply Conditions for Threaded Steel Fasteners. (All parts)
	IS: 1852 (1985)	Rolling & Cutting Tolerances for Hot-Rolled Steel Product
	IS: 2016 (1967)	Plain Washers
	IS: 2062 (1992)	Steel for General Structural Purposes.
	IS: 2595 (1978)	Code of Practice for Radio Graphic Testing.
	IS: 3600 (1985)	Methods of Testing Fusion Welding joints (Part 1 to Part 9)

	IS: 3613 (1974)	Acceptance Tests for Wire Flux Combinations for Submerged Arc Welding
	IS: 3658 (1981)	Code of practice for Liquid Penetrant Flow, Detection.
	IS: 3757 (1985)	High Strength Structural Bolts
	IS: 4000 (1992)	High Strength Bolts in Steel Structures Code of Practice.
	IS: 4353 (1967)	Recommendations for Submerged Arc Welding of Mild Steel and Low Alloy Steel.
	IS: 4943 (1968)	Assessment of Butt and Fillet Fusion Welds in Steel Sheet, Plate and Pipe.
	IS: 5334 (1981)	Code of Practice for Magnetic Particle Flow Detection of Welds.
	IS: 5369 (1975)	General requirements for Plain Washers and Lock Washers.
	IS: 5372 (1975)	Taper Washers for Channels.
	IS: 5374 (1975)	Taper Washers for I Beams
	IS: 6623 (1985)	Specifications for High Strength Structural nuts.
	IS: 6649 (1985)	Specifications for hardening and tempering washers for high strength structural nuts.
	IS: 6755 (1980)	Double Coil Helical Spring Washers
	IS:7205 (1974)	Safety code for erection of structural steelwork
	IS: 7215 (1974)	Tolerances for Fabrication of Steel Structure.
	IS: 7318 (1974) (Part I)	Approval Test for Welders when welding procedure approval is not required - fusion welding of steel.
	IS: 7969 (1975)	Safety code for handling and storage of building materials

	IS: 8500 (1974)	Structural steel - Micro alloyed (Medium and high Strength Qualities)
	IS: 8910 (1978)	General requirements of Supply of Weldable Structural Steel.
	IS: 9595 (1980)	Recommendations for Metal Arc Welding of Carbon & Carbon - Manganese Steels.

SPECIFICATIONS FOR METALIZING WORKS

CONTENTS

1.0 DESCRIPTION OF WORK:

This work shall consist of surface preparation, application of a thermal sprayed metal coating (metalizing) and all other work described herein. All work shall be done at the steel fabrication shop unless otherwise noted.

2.0 SCOPE OF WORK

These specifications cover the requirements of material, consumables, workmanship, protective and safety measures etc., of metalizing works in general.

3.0 APPLICABLE CODES AND SPECIFICATIONS.

The latest editions of the following standards and regulations shall apply. In case of contradiction between standards, the decision of the engineer-in-charge on this matter shall be final.

3.1 Indian Standards:

1) IS: 209 : Specification for zinc.
2) IS 2590: Specification for primary aluminium ingots for re-melting for general engineering purposes.
3) IS 5905: Sprayed aluminium and zinc coatings on Iron and Steel specification
4) IS 6586: Metal spraying for protection of iron and steel – recommended practice.

3.2 American Society for Testing and Materials (ASTM):

1. ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air
2. ASTM D4417, Standard Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel
3. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
4. ASTM B - 833 Standard specifications for zinc/aluminium

3.3 American Welding Society (AWS):

1. ANSI/AWS A-5.33 Specification for Alloy Wires, Cored, Wires, and Ceramic Rods for Thermal Spraying.
2. ANSI/AWS C2.18 Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminium and Zinc and Their Alloys and Composites.

3.4 Society for Protective Coatings (SSPC): These are offered here as a guide to the process of metalizing.

1. SSPC-AB 1 – Mineral and Slag Abrasives.
2. SSPC-AB 2 – Specification for Cleanliness of Recycled Ferrous Metal Abrasives.
3. SSPC-AB 3 – Newly Manufactured or Re-Manufactured Steel Abrasives.
4. SSPC-CS 23.00/NACE No. 12/AWS C2.23M – Thermal Spray Metallic Coating Systems.
5. SSPC-SP 1 – Solvent Cleaning.
6. SSPC-SP 5 – White Metal Blast Cleaning.
7. SSPC-SP 11 – Power Tool Cleaning to Bare Metal.
8. SSPC-PA Guide 3 – A Guide to Safety in Paint Application.
9. SSPC-Vis 1 – Visual Standard for Abrasive Blast Cleaned Steel.

4.0 MATERIALS AND CONSUMABLES:

4.1 Abrasive shall be hard and sharp in order to produce an angular surface profile and shall conform to IS 4683: Specification for chilled iron shot and grit for use in foundries. Acceptable abrasives shall be angular steel grit. Silica sand shall not be used. Steel shots and crushed slag are not acceptable.

A sample of the abrasive shall be submitted to the Engineer two weeks prior to surface preparation for testing and approval.

4.2 All supplies such as aluminum, zinc and other materials specified shall be supported by manufacturers test certificates showing that the materials meet the requirements of these specifications. The purity of zinc shall be 99.95% and that of aluminium be 99.50%.

4.3 The Engineer– in-charge shall specify a sealer coat for metalized steel, taking into account the susceptibility of common paints and primers to saponification by zinc and aluminium. The specified sealer shall comply with the requirements. The Engineer-in-charge may order additional tests and the contractor shall carry out such tests at approved laboratory/agency at his own cost.

5.0 Workmanship:

5.1 Workmanship shall be in accordance with the best current metalizing practice. The methods followed in handling, positioning, metal spaying and finishing of members and any other operations shall be performed in such a way as not to adversely affect the structural members in any way. The machinery and equipment as well as the method of working, shall be approved by the Engineer-in-charge.

5.2 The metalizing work shall be carried out exclusively by operator who pass the two following qualifying tests:

5.2.1 The Contractor shall prepare a freshly blast- cleaned, steel test plates, approximately 300 mm x 300 mm x 8mm per operator. Each operator shall apply three coats of the specified thickness on one plate. The Engineer shall test it for thickness of coat, grain size and texture, loose material etc. If these tests are satisfactory, then only an adhesion test shall be performed on the test plate.

5.2.2 The Engineer shall cut through the coating with a sharp knife or chisel, and if the metalizing or any part of it can be lifted from the base metal 6 mm or more ahead of the cutting blade without actually cutting the metal, the surface preparation will be deemed improper and the coating will be considered unsatisfactory. Any operator who does not pass this test shall not be allowed to spray.

5.3 The Engineer shall issue a qualification certificates to the successful operators. Each certificate shall carry the photograph of the operator. An operator shall carry his certificate with him during all hours of work, for purpose of verification.

6.0 SURFACE PREPARATION:

The following extract from SSPC are offered for reference and guidance.

6.1 Surface preparation shall be accomplished in accordance with the requirements of SSPC Surface Preparation Specifications SP1 for Solvent Cleaning and SP 10 for Near White Blast Cleaning. Unless otherwise specified, the surface preparation shall result in 50 to 100 microns blast profile as determined by the Engineer.

6.2 Abrasive shall be hard and sharp in order to produce an angular surface profile. Acceptable abrasives shall be angular steel grit. Silica sand shall not be used. Steel shot producing a rounded surface profile are not acceptable. However, the steel can be pre-blasted with shot provided that the entire surface is re-blasted with angular abrasive. A sample of the abrasive shall be submitted to the Engineer two weeks prior to surface preparation for testing and approval.

6.3 Prior to surface preparation, the Contractor shall prepare a test section on a representative section of the structural steel. The test section shall be prepared using the same equipment, materials and procedures as the production preparation. The Contractor shall prepare the test section surface to the specified level in accordance with the SSPC visual standards supplied by the Engineer. Only after a test section area has been approved shall the Contractor proceed with surface preparation operations. The test section shall be 1 sq. m. The average surface profile produced by the Contractor's surface preparation procedures will be determined at the beginning of the work and as required by the Engineer using a profile–depth tape and micrometer. Profile depth tape measurements shall be retained and included with QA documents. Single measurements less than 50 microns, or greater than the specified maximum for the metalizing system used will be considered unacceptable. Areas having unacceptable measurements will be further tested to determine the limits of the deficient area. If unacceptable profiles are provided, work will be suspended. The Contractor shall submit a plan for the

necessary adjustments to ensure the correct surface profile on all surfaces. The Contractor shall not resume work until notified in writing by the Engineer.

6.4 The visual standards shall be used in addition to the plans and specifications to determine the degree of conformance with the appearance requirements and to determine acceptance of surface preparation. Additional compensation will not be allowed to the Contractor for preparation of test sections. Abrasive suppliers shall certify that abrasives are not oil contaminated and shall have a water extract pH value within the range of 6 to 8. All surfaces prepared with abrasives which are oil contaminated or have a pH outside the specified range shall be cleaned with solvent cleaner or low pressure water as directed by the Engineer and re-blasted by the Contractor at his expense. If the surface is degraded or contaminated subsequent to surface preparation and prior to metalizing, the surface shall be re-blasted before metalizing. All surface cleaning shall be approved by the Engineer prior to metalizing.

7.0 STORAGE AND PROTECTIVE ARRANGEMENT DURING METALIZING PROCESS:

a) No dragging of steel shall be permitted during/after metalizing process. After metalizing the steel shall be stored 30 cm above ground on suitable packing to avoid damage during the monsoons. Metalized Steel shall be stored in the order of erection with erection marks visible. Storage areas shall be prepared and maintained by the Contractor.

b) Adequate handling facilities shall be available at Storage place. During handling care to be taken than metalizing coat shall not be damaged and if so damaged shall be immediately made good.

c) For storage and stacking only soft wooden cradles shall be used. Metal/other hard cradles are prohibited.

d) For lifting and erection only nylon slings shall be used. Metal/other hard cradles are prohibited.

e) The rates quoted by the Contractor shall include the following:

(i) Surface preparation for metalizing by abrasive blasting using hardened steel grit to Swedish standard SA 2½. Copper slag or any other material shall not be considered equivalent to hardened Steel grit.

(ii)Thermal spraying by electric arc process with Zinc & Aluminum in the ratio of 85:15 to a thickness of minimum 150 microns.

iii) After steel has been erected, all burrs, damage to metalized surface due to lifting, shifting and erecting shall receive metalized thickness of minimum 150 microns.

iv) Before metalizing, the surface shall be dry and free from dust, dirt, scale and grease. No metalizing shall be applied until these have been approved by the Engineer.

8.0 METALIZING PROCESS:

8.1 This procedure governs the methods, requirements and procedures for applying thermal sprayed metal onto new steel surfaces. The process consists of melting metal and spraying it onto a prepared surface by means of compressed gas. All steel surfaces shall be metalized unless otherwise noted.

Scheme for Metalizing shall be as per table below:

Description	**External Surfaces**	**Internal surface (Those surfaces which will become inaccessible after fabrication and/or erection)**
Surface preparation	Abrasive blast cleaning to minimum SA-2.5 near - white blast cleaning	Abrasive blast cleaning to minimum SA-2.5 near - white blast cleaning
1st Undercoat	First coat of Metalizing to a thickness of 50 microns	First coat of Metalizing to a thickness of 50 microns

2nd Undercoat	Second coat of Metalizing to a thickness of 50 microns	Second coat of Metalizing to a thickness of 50 microns
Finish coat	Finish coat of Metalizing to a thickness of 50 microns	Finish coat of Metalizing to a thickness of 50 microns
First coat of Sealer	As per manufacturer's specification and not less than 40 Microns	As per manufacturer's specification and not less than 40 Microns
Second coat of Sealer	As per manufacturer's specification and not less than 40 Microns	As per manufacturer's specification and not less than 40 Microns

8.2 The wire used for metalizing shall be 85/15, zinc/aluminum as per ASTM B-833, Standard Specification for zinc wire for thermal spraying (metalizng).

8.3 Before any metalizing is done, the Contractor shall prepare a test section for each batch or lot of wire supplied. The Contractor shall submit to the Engineer a steel plate approximately 12 inch x 12 inch (300 mm x 300 mm) to which the metal has been deposited to the specified thickness, as checked with a magnetic or Eddy Current Gauge, for acceptance by the Engineer as to grain size and texture of the sprayed metal. The test plate will be used to determine the acceptance of the finished job.

The Engineer will perform the following test for adhesion on the metalized surface of the test plate. He/she will cut through the coating with a knife or chisel, if the metalizing or any part of it can be lifted from the base metal 6 mm or more ahead of the cutting blade without actually cutting the metal, the surface preparation will be deemed improper and the coating will be considered unsatisfactory.

8.4 Two locations on each beam shall also be tested for adhesion as outlined above. All areas tested shall be repaired and re-metalized according to this specification. In the event the Contractor's coating is inferior to the sample, he shall be required to correct the coating by an acceptable repair method to produce a surface comparable to the approved test section. The metalizing unit shall be a gun manufactured by an established domestic company. The gas or arc type is acceptable and recommended. The equipment shall be used according to manufacturer's recommendations. No surface shall be sprayed which shows any sign of rust,

scale or moisture. All metalizing shall be applied within a maximum of four hours of the blasting. Spraying shall be done in a block pattern not to exceed 600 mm on a side with overlapping passes to ensure uniform coverage. To produce the required thickness and uniformity, a minimum of two passes are required, overlapping and at right angles to each other. The gun shall be held at such a distance from the work surfaces that the metal is still plastic on impact 125 mm - 230 mm. The coating shall be firmly adherent and free from uncoated spots, lumps or blisters, and have a fine sprayed texture. The Contractor is required to provide facilities to protect the finished metalized surface from damage during the blasting and thermal spraying work operations on adjacent areas. All damaged coated areas shall be properly repaired and remetalized by the Contractor. Surfaces not intended to be metalized shall be suitably protected from the effects of cleaning and metalizing operations. To the maximum extent practicable, metalizing shall be applied as a continuous film of uniform thickness free of pores. All thin spots or areas missed in the application shall be re-metalized. The Engineer shall be notified a minimum of one week prior to starting surface preparation and/or metalizing. The Engineer will inspect completed sections of metalizing prior to acceptance. The coatings shall be checked for thickness by means of an approved thickness gauge. The Contractor shall be required to add metalizing to any areas failing to register minimum thickness before any oxidation of the surface occurs.

8.5 Weather Conditions**:**

The surfaces to be metallized after surface preparation must remain free of moisture and other contaminants. The Contractor shall control his/her operations to ensure that dust, dirt or moisture do not come in contact with surfaces prepared that day. In addition to the metallizing system's manufacturer's written instructions for surface preparation, and metallizing, the following conditions shall apply. (When in conflict, the most restrictive conditions shall govern).

(1) The minimum steel and air temperatures shall be 40 F (4 C). Metalizing shall not be applied to steel which is at a temperature that will cause blistering, porosity or otherwise detrimental to the life of the metallizing. Metallizing shall not be applied in rain, wind, snow, fog or mist, Metalizing shall not be applied to wet, damp or frosted surfaces. Metalizing shall not be applied when the relative humidity is above 85%.

(2) Metalizing will not be permitted when wind velocities are greater than 15 MPH (24 kph). These conditions will be verified by the Engineer at locations representative of the surfaces to be cleaned, and metallized. Work accomplished under unfavorable weather conditions will be considered unacceptable and complete re-cleaning and metalizing of these areas will be required at the Contractor's expense.

8.6 Equipment:

All cleaning equipment shall include gauges capable of accurately measuring fluid and air pressures and shall have valves capable of regulating the flow of air and or water as recommended by the equipment manufacturer. The equipment shall be maintained in proper working order. Metallizing and surface preparation equipment shall utilize filters, traps or separators recommended by the manufacturer of the equipment and shall be kept clean to prevent oil, water, dried paint and other foreign materials from being deposited on the surface. The filters, traps and separators shall be cleaned or drained by means, and at intervals, recommended by the manufacturer of the equipment. Pressure type abrasive air blasting equipment shall be capable of supplying a minimum of 100psi (690 kPa) pressure and 250 CFM (120 L/S) capacity with all air blast nozzles being used. If blast nozzle orifice sizes larger than 3/8 inch (9.5 mm) are being used, the minimum capacity of the equipment shall be increased in accordance with the recommendations of SSPC Good Painting Practice, Volume 1, Chapter 2.4, Table 1. The pressure will be measured at the blast nozzle. The equipment shall be capable of providing the minimum required pressure and volume, free of oil, water and other contaminants. Diesel or gasoline powered equipment shall be positioned or vented in a manner to prevent deposition of combustion contaminants on any part of the structure.

Prior to beginning all metallizing operations, air equipment shall pass the requirements of ASTM D 4285. This test will be repeated as determined by the Engineer.

9.0 TESTING AND MEASURING INSTRUMENTS.

The contractor, at all times, make available 4 (four) sets of the following instruments for use by the Engineers. One set of be kept at the fabrication yard, two sets at the erection site office and a third set as spare. Any damaged, defective or expended item shall be replaced by the contractor without delay.

1. Coating thickness gauge, magnetic type, to IS 3203-1982.
2. Testex tape.

3. Surface profile gauge.
4. Pull – off adhesion tester to ASTM D 4541.
5. RH- Dew point meter.
6. 150 mm Steel straight edge and hardened steel scriber as described in IS 5905:2006, section 6.5.1

10.0 QUALITY CONTROL:

The Contractor shall conduct a quality control program which ensures that the work accomplished complies with these specifications. The quality control program shall consist of:

1. Qualified personnel to manage the program and conduct quality control tests.
2. Proper quality measuring instruments.
3. Quality Control Plan.
4. Condition and quality recording procedures.

The personnel managing the quality control program shall have considerable experience and knowledge of metallizing and industrial coatings and the measurements needed to assure quality work. The personnel performing the quality control tests shall be trained in te use of the quality control instruments. These personnel shall not perform metallizing and surface preparation.

The Contractor shall supply all necessary equipment to perform quality control testing of weather conditions, equipment, surface preparation and profile, metallizing thickness. These instruments shall be calibrated by the Contractor's personnel in accordance with the equipment manufacturer's recommendations.

The Contractor shall implement a Quality Control Plan approved by the Engineer including; a schedule of required measurements and tests as outlined herein, procedures for correcting unacceptable work and procedures for improving surface preparation, and metallizing quality as a result of quality control findings. The Contractor shall use forms supplied by the Engineer to record the results of quality control tests. These reports shall be available at the work site for review by the Engineer.

The purpose of the quality control program is to assist the Contractor in the proper performance of the work. Quality control tests performed by the Contractor will not be used as the sole basis for acceptance of the work.

11.0 Painting of Metalized Structural Steel:

11.1 When Painting all or portions of the metalized structural steel is specified it shall be done as per specification.

12.0 SPECIAL INSTRUCTIONS:

Metalizing date: At the completion of the work, the Contractor shall stencil in contrasting color paint the date of metalizing the bridge. The letters shall be capitals, not less than 2 inches (50 mm) and not more than 3 inches (75 mm) in height. The stencil shall contain the word "METALIZED" and shall show the month and year in which the coating was completed followed by “CODE” and the appropriate code number for the paint system applied. “W” is the code for Shop applied metalizing and field applied Epoxy/Polyurethane and “AC” for Shop applied metalizing and field applied Acrylic/Acrylic. This shall be stenciled on the outside face of an outside stringer near one end of the bridge, or at some equally visible surface near the end of the bridge, as designated by the Engineer. If multiple systems are being applied to the structure then multiple Stencils are appropriate. Removal of all debris, rust and waste generated by this work from the job site is the Contractor's responsibility.

The cost of all work outlined above, shall be included in the bid, and no extra payment shall allowed.

13.0 POST ERECTION INSPECTION OF METALLIZING SURFACE:

13.1 Preliminaries:

The Contractor shall furnish at his own expenses, the necessary non-inflammable staging and hoisting or equipment required for the post erection checking work and shall remove and make them away after the completion of the job. The contractor shall also provide necessary passage ways, fences, safe belts,

helmets, lights and other fittings to the satisfaction of the Engineer and for protection of his men and materials.

13.2 Approval of Metalizing Scheme for the post erection repairs:

The contractor shall carry out all repair works to damaged metalizing surface during transportation, erection and post erection work in the sequence required by the Engineer. The method of metalizing and repair scheme shall be same as original metalizing specified in table 4 g), subject to the approval of the Engineer and shall be modified as required by the Engineer. This, however, will not relieve the contractor of the responsibility for safe and expeditious completion of the work, its quality and accuracy.

Use of Zinc rich/Aluminum rich paint for repairing damaged surface is prohibited.

13.3 Workmanship:

Each spray operator shall be qualified to metallize according to ANSI/AWS C2.18-93.Any operator who does not show evidence of qualification shall not be allowed to spray.

a) Unless specified herein, all metalizing work will be carried out in accordance with the latest edition of following Indian Standards

- IS 5905: Sprayed Aluminum and zinc coatings on Iron and steel specification
- IS 6586: Metal spaying for protection of Iron and Steel - Recommended practice

a)The Engineer shall be immediately informed of any errors observed/found in the metalizing the steel which prevents proper assembling and fitting up of parts in field by a moderate amount of repairing.

13.4 Measurement & Tolerance:

Thickness of metalizing will be checked using coating thickness gauge such as elcometer.
The minimum local thickness of metalizing shall not be less than 99% of specified thickness at any point on finished surface.

13.5 Metalizing to the inaccessible surfaces:

All surfaces that become inaccessible after erection also shall be metalized as per specification.

14.0 MEASUREMENTS & RATES:

The rates quoted by the contractor shall include surface preparation by abrasive blasting, thermal spraying of zinc and aluminium by electric arc process, sealer coat over metalized surface, post erection repairs, cleaning etc. The costs of all processes mentioned above are included in structural steel item. No separate measurement and payment is admissible for metalizing work.

15.0 LIST OF APPROVED MAKE

15.1 **CIVIL**

Sl.No.	Item		Make
1.	Reinforcement Steel		SAIL / TATA / RINL /Tiscon or equivalent from primary producers.
2.	a)Structural Steel		SAIL / TISCO /JSW or Approved Equivalent
	b) Anchor bolts		**Macaulay/DYWIDAG**
3.	Ready mix concrete		L & T / RMC INDIA or Approved Equivalent

4.	Elastomeric Bearings		Manufacturers listed in MORT&H and approved by GHMC
5.	Expansion Joints		Manufacturers listed in MORT&H and approved by GHMC
6.	Anticarbonate Painting		MC-Bauchemie / Fosroc or approved equivalent
7.	Pre-Stressing Steel		Tata Steel or approved equivalent
8.	RE Panel		Reinforced earth India Pvt Ltd or approved equivalent
9.	Cement		Ultratech / Coromandal / ACC / Birla
10.	Construction chemicals		Fosroc / Sika / BASF/ Cera-Chem or Approved Equivalent
11.	Water proofing compound		Xypex, DCP, Fosroc / Sika / BASF

15.2 ELECTRICAL

1	MCCB		Legrand/ABB/Schneider
2	MCB		Legrand/Schneider/ ABB
3	Earth leakage relay		Prok DV or any other approved make
4	Contactors		ABB / L&T / Siemens
5	Timer		L & T / Legrand / Siemens
6	1.1 KV LT Armoured UG Cable 1.1 KV LT Un armoured UG Cable		Polycab /Havells/ Unistar universal Finolex / SBEE / Walna / Anchor
7	Copper Conductor FRLS PVC Insulated wires		Finolex/ Havels/SBEE/Anchor/Walna
8	Double Compression glands & Lugs		Dowells/ Comet/ HMI.
9	Luminaire		Schreder /Philips//GE/CG

10	Street light Poles		Philips/ Bajaj/ CG/Valmont
11	Feeder Pillar		Dynam/RJMS/Power Control Equipments/ powerplus
12	FRLS PVC Conduits		Universal/ VIP/ Nelco/National
13	MS Conduits		GI Bharath/ Supreme
14	Other items		Prior approval shall be taken from BDA Engineer –in- charge.

SECTION.8

TENDER DRAWINGS

(ATTACHED SEPARATELY)

SECTION.9

BILL OF QUANTITIES

(ATTACHED SEPARATELY)