**Philippine Bidding Documents**

***Upgrading of Maparat Water System- MEO***

**PID NO. 2023 - 096**

Government of the Republic of the Philippines

**Sixth Edition**

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**TABLE OF CONTENTS**

[Glossary of Terms, Abbreviations, and Acronyms 4](#_Toc46930021)

[Section I. Invitation to Bid 7](#_Toc46930022)

[Section II. Instructions to Bidders 10](#_Toc46930023)

[1. Scope of Bid 11](#_Toc46930024)

[2. Funding Information 11](#_Toc46930025)

[3. Bidding Requirements 11](#_Toc46930026)

[4. Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices 11](#_Toc46930027)

[5. Eligible Bidders 12](#_Toc46930028)

[6. Origin of Associated Goods 12](#_Toc46930029)

[7. Subcontracts 12](#_Toc46930030)

[8. Pre-Bid Conference 12](#_Toc46930031)

[9. Clarification and Amendment of Bidding Documents 13](#_Toc46930032)

[10. Documents Comprising the Bid: Eligibility and Technical Components 13](#_Toc46930033)

[11. Documents Comprising the Bid: Financial Component 13](#_Toc46930034)

[12. Alternative Bids 14](#_Toc46930035)

[13. Bid Prices 14](#_Toc46930036)

[14. Bid and Payment Currencies 14](#_Toc46930037)

[15. Bid Security 14](#_Toc46930038)

[16. Sealing and Marking of Bids 14](#_Toc46930039)

[17. Deadline for Submission of Bids 15](#_Toc46930040)

[18. Opening and Preliminary Examination of Bids 15](#_Toc46930041)

[19. Detailed Evaluation and Comparison of Bids 15](#_Toc46930042)

[20. Post Qualification 15](#_Toc46930043)

[21. Signing of the Contract 16](#_Toc46930044)

[Section III. Bid Data Sheet 17](#_Toc46930045)

[Section IV. General Conditions of Contract 19](#_Toc46930046)

[1. Scope of Contract 20](#_Toc46930047)

[2. Sectional Completion of Works 20](#_Toc46930048)

[3. Possession of Site 20](#_Toc46930049)

[4. The Contractor’s Obligations 20](#_Toc46930050)

[5. Performance Security 21](#_Toc46930051)

[6. Site Investigation Reports 21](#_Toc46930052)

[7. Warranty 21](#_Toc46930053)

[8. Liability of the Contractor 21](#_Toc46930054)

[9. Termination for Other Causes 21](#_Toc46930055)

[10. Dayworks 21](#_Toc46930056)

[11. Program of Work 22](#_Toc46930057)

[12. Instructions, Inspections and Audits 22](#_Toc46930058)

[13. Advance Payment 22](#_Toc46930059)

[14. Progress Payments 22](#_Toc46930060)

[15. Operating and Maintenance Manuals 22](#_Toc46930061)

[Section V. Special Conditions of Contract 24](#_Toc46930062)

[Section VI. Specifications 26](#_Toc46930063)

[Section VII. Drawings 107](#_Toc46930064)

[Section VIII. Bill of Quantities 112](#_Toc46930065)

[Section IX. Checklist of Technical and Financial Documents 113](#_Toc46930066)

# Glossary of Terms, Abbreviations, and Acronyms

**ABC** –Approved Budget for the Contract.

**ARCC** – Allowable Range of Contract Cost.

**BAC** – Bids and Awards Committee.

**Bid** – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender.* (2016 revised IRR, Section 5[c])

**Bidder** – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])

**Bidding Documents –** The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])

**BIR** – Bureau of Internal Revenue.

**BSP** – Bangko Sentral ng Pilipinas.

**CDA –** Cooperative Development Authority.

**Consulting Services** – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])

**Contract** – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

**Contractor –** is a natural or juridical entity whose proposal was accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded. Contractor as used in these Bidding Documents may likewise refer to a supplier, distributor, manufacturer, or consultant.

**CPI –** Consumer Price Index.

**DOLE –** Department of Labor and Employment.

**DTI** – Department of Trade and Industry.

**Foreign-funded Procurement or Foreign-Assisted Project** –Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).

**GFI** – Government Financial Institution.

**GOCC** –Government-owned and/or –controlled corporation.

**Goods** – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term “related” or “analogous services” shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

**GOP** – Government of the Philippines.

**Infrastructure Projects** – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

**LGUs –** Local Government Units.

**NFCC –** Net Financial Contracting Capacity.

**NGA –** National Government Agency.

**PCAB** – Philippine Contractors Accreditation Board.

**PhilGEPS -** Philippine Government Electronic Procurement System.

**Procurement Project** – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

**PSA –** Philippine Statistics Authority.

**SEC –** Securities and Exchange Commission.

**SLCC –** Single Largest Completed Contract.

**UN –** United Nations.

# Section I. Invitation to Bid

Republic of the Philippines

Province of Davao de Oro

**MUNICIPALITY OF COMPOSTELA**

**BIDS AND AWARDS COMMITTEE**

CP#: 0909-279-9827

**Invitation to Bid for**

***Upgrading of Maparat Water System- MEO***

1. The *Municipality of Compostela*, through the *Supplemental Budget No.1 CY 2023 ( General Fund)* intends to apply the sum of *Nine Hundred Ninety Nine Thousand Nine Hundred Sixty Two and Twelve Centavos Only (P999,962.12)* being the Approved Budget for the Contract (ABC) to payments under the contract for *Upgrading of Maparat Water System- MEO with Project Identification No. 2023-096.* Bids received in excess of the ABC shall be automatically rejected at bid opening.
2. The Municipality of Compostela now invites bids for the above Procurement Project. Completion of the Works is required ***60 calendar days****.* Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).
3. Bidding will be conducted through open competitive bidding procedures using non-discretionary “*pass/fail*” criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.
4. Interested bidders may obtain further information from Municipality of Compostela and inspect the Bidding Documents at the address given below from *8:00 a.m. to 5:00 p.m.*
5. A complete set of Bidding Documents may be acquired by interested bidders on ***August 09, 2023 to August 29, 2023*** from given address and website below *upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of* ***One Thousand Pesos (P1,000.00)***. The Procuring Entity shall allow the bidder to present its proof of payment for the fees ***presented in person****.*
6. The Municipality of Compostelawill hold a Pre-Bid Conference on ***August 17, 2023 at 1:30 p.m*.** at Office of the BAC, 2nd Floor, Municipal Hall Building, Dagohoy St., Purok 2, Poblacion, Compostela, Davao de Orowhich shall beopen to prospective bidders.
7. Bids must be duly received by the BAC Secretariat through manual submission at the office address as indicated below on ***August 29, 2023 at 1:00 p.m.***Late bids shall not be accepted.

1. All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 16.
2. Bid opening shall be on ***August 29, 2023 at 1:30 p.m*.** at the given address below. Bids will be opened in the presence of the bidders’ representatives who choose to attend the activity.
3. The *Municipality of Compostela* reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised Implementing Rules and Regulations (IRR) of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.
4. For further information, please refer to:

**EDWARDFORD N. DAGATAN**

BAC Office

2nd Floor, Municipal Hall Building, Dagohoy St., Purok 2,

Poblacion, Compostela, Davao de Oro

CP#: 0909-279-9827

Email Add: compobacsec@gmail.com

1. You may visit [*www.philgeps.gov.ph*](http://www.philgeps.gov.ph)and search for Municipality of Compostela for downloading of Bidding Documents.

*August 09,**2023*

**LUCELIA L. PAQUEO**

BAC Chairperson

# Section II. Instructions to Bidders

### Scope of Bid

The Procuring Entity, *Municipality of Compostela,* invites Bids for the *Upgrading of Maparat Water System- MEO* with Project Identification Number *2023 – 096.*

*[Note: The Project Identification Number is assigned by the Procuring Entity based on its own coding scheme and is not the same as the PhilGEPS reference number, which is generated after the posting of the bid opportunity on the PhilGEPS website.]*

The Procurement Project (referred to herein as “Project”) is for the construction of Works, as described in Section VI (Specifications).

### Funding Information

1. The GOP through the source of funding as indicated below for *CY 2023* in the amount of *Nine Hundred Ninety Nine Thousand Nine Hundred Sixty Two and Twelve Centavos Only (P999,962.12).*
2. The source of funding is: LGUs, the Supplemental Budget, as approved by the Sanggunian.

### Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manual and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or invitation to bid by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have inspected the site, determined the general characteristics of the contracted Works and the conditions for this Project, such as the location and the nature of the work; (b) climatic conditions; (c) transportation facilities; (c) nature and condition of the terrain, geological conditions at the site communication facilities, requirements, location and availability of construction aggregates and other materials, labor, water, electric power and access roads; and (d) other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

### Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices

The Procuring Entity, as well as the Bidders and Contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex “I” of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

### Eligible Bidders

1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.
2. The Bidder must have an experience of having completed a Single Largest Completed Contract (SLCC) that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC adjusted, if necessary, by the Bidder to current prices using the PSA’s CPI, except under conditions provided for in Section 23.4.2.4 of the 2016 revised IRR of RA No. 9184.

A contract is considered to be “similar” to the contract to be bid if it has the major categories of work stated in the **BDS**.

1. For Foreign-funded Procurement, the Procuring Entity and the foreign government/foreign or international financing institution may agree on another track record requirement, as specified in the Bidding Document prepared for this purpose.
2. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

### Origin of Associated Goods

There is no restriction on the origin of Goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN.

### Subcontracts

1. The Bidder may subcontract portions of the Project to the extent allowed by the Procuring Entity as stated herein, but in no case more than fifty percent (50%) of the Project.

The Procuring Entity has prescribed that: ***Subcontracting is not allowed***.

* 1. Subcontracting of any portion of the Project does not relieve the Contractor of any liability or obligation under the Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Contractor’s own acts, defaults, or negligence, or those of its agents, servants, or workmen.

### Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address at the *Office of the BAC, 2nd Floor, Municipal Hall Building, Dagohoy St., Purok 2, Poblacion, Compostela, Davao de Oro* as indicated in paragraph 6 of the **IB.**

### Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

### Documents Comprising the Bid: Eligibility and Technical Components

1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

1. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder’s affairs in the Philippines. For Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.
2. A valid PCAB License is required, and in case of joint ventures, a valid special PCAB License, and registration for the type and cost of the contract for this Project. Any additional type of Contractor license or permit shall be indicated in the **BDS**.
3. A List of Contractor’s key personnel (e.g., Project Manager, Project Engineers, Materials Engineers, and Foremen) assigned to the contract to be bid, with their complete qualification and experience data shall be provided. These key personnel must meet the required minimum years of experience set in the **BDS**.
4. A List of Contractor’s major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

### Documents Comprising the Bid: Financial Component

1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.
2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.
3. For Foreign-funded procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

### Alternative Bids

Bidders shall submit offers that comply with the requirements of the Bidding Documents, including the basic technical design as indicated in the drawings and specifications. Unless there is a value engineering clause in the **BDS**, alternative Bids shall not be accepted.

### Bid Prices

All bid prices for the given scope of work in the Project as awarded shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances as determined by the NEDA and approved by the GPPB pursuant to the revised Guidelines for Contract Price Escalation guidelines.

### Bid and Payment Currencies

* 1. Bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.
  2. Payment of the contract price shall be made in: ***Philippine Pesos*.**

### Bid Security

1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.
2. The Bid and bid security shall be valid until ***One Hundred Twenty (120) days****.* Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

### Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission to the given website or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

### Deadline for Submission of Bids

The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

### Opening and Preliminary Examination of Bids

1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders’ representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

1. The preliminary examination of Bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

### Detailed Evaluation and Comparison of Bids

1. The Procuring Entity’s BAC shall immediately conduct a detailed evaluation of all Bids rated “*passed*” using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of 2016 revised IRR of RA No. 9184.
2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 15 shall be submitted for each contract (lot) separately.
3. In all cases, the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184 must be sufficient for the total of the ABCs for all the lots participated in by the prospective Bidder.

### Post Qualification

Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS), and other appropriate licenses and permits required by law and stated in the **BDS**.

### Signing of the Contract

The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

# 

# Section III. Bid Data Sheet

**Bid Data Sheet**

|  |  |  |  |
| --- | --- | --- | --- |
| **ITB Clause** |  | | |
| 5.2 | For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be:  ***WATER WORKS*** | | |
| 7.1 | ***Subcontracting is not allowed.*** | | |
| 10.3 | *No further instruction.* | | |
| 10.4 | The key personnel must meet the required minimum years of experience set below: | | |
|  | Key Personnel  Civil Engineer  Foreman  Drilling Equipment Operator  Electrician  Plumber  Laborer | General Experience  5 years  3 years  3 years  3 years  3 years  3 years | Relevant Experience  3 years  1 year  1 year  1 year  1 year  1 year |
| 10.5 | The minimum major equipment requirements are the following: | | |
| Equipment  Drilling Machine  Plumbing Tools & Equipment | Capacity | Number of Units  1  1 |
| 12 | *[Insert Value Engineering clause if allowed.]* | | |
| 15.1 | The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:   1. The amount of not less than P 19,999.24 *[Two percent (2%) of ABC],* if bid security is in cash, cashier’s/manager’s check, bank draft/guarantee or irrevocable letter of credit; 2. The amount of not less than P 49,998.11 *[Five percent (5%) of ABC]* if bid security is in Surety Bond. | | |
| 19.2 | Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award. | | |
| 20 | No further instructions. | | |
| 21 | Additional contract documents are the following: NONE | | |

# Section IV. General Conditions of Contract

### Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

### Sectional Completion of Works

If sectional completion is specified in the **Special Conditions of Contract (SCC)**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date shall apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

### Possession of Site

* 1. The Procuring Entity shall give possession of all or parts of the Site to the Contractor based on the schedule of delivery indicated in the **SCC,** which corresponds to the execution of the Works. If the Contractor suffers delay or incurs cost from failure on the part of the Procuring Entity to give possession in accordance with the terms of this clause, the Procuring Entity’s Representative shall give the Contractor a Contract Time Extension and certify such sum as fair to cover the cost incurred, which sum shall be paid by Procuring Entity.
  2. If possession of a portion is not given by the above date, the Procuring Entity will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contract time to address such delay may be addressed through contract extension provided under Annex “E” of the 2016 revised IRR of RA No. 9184.

### The Contractor’s Obligations

The Contractor shall employ the key personnel named in the Schedule of Key Personnel indicating their designation, in accordance with **ITB** Clause 10.3 and specified in the **BDS**, to carry out the supervision of the Works.

The Procuring Entity will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are equal to or better than those of the personnel listed in the Schedule.

### Performance Security

1. Within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR.
2. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to RA No. 3688 against any subcontractor be they an individual, firm, partnership, corporation, or association supplying the Contractor with labor, materials and/or equipment for the performance of this Contract.

### Site Investigation Reports

The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the **SCC** supplemented by any information obtained by the Contractor.

### Warranty

1. In case the Contractor fails to undertake the repair works under Section 62.2.2 of the 2016 revised IRR, the Procuring Entity shall forfeit its performance security, subject its property(ies) to attachment or garnishment proceedings, and perpetually disqualify it from participating in any public bidding. All payables of the GOP in his favor shall be offset to recover the costs.
2. The warranty against Structural Defects/Failures, except that occasioned-on force majeure, shall cover the period from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity. Specific duration of the warranty is found in the **SCC**.

### Liability of the Contractor

Subject to additional provisions, if any, set forth in the **SCC**, the Contractor’s liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

If the Contractor is a joint venture, all partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

### Termination for Other Causes

Contract termination shall be initiated in case it is determined *prima facie* by the Procuring Entity that the Contractor has engaged, before, or during the implementation of the contract, in unlawful deeds and behaviors relative to contract acquisition and implementation, such as, but not limited to corrupt, fraudulent, collusive, coercive, and obstructive practices as stated in **ITB** Clause 4.

### Dayworks

Subject to the guidelines on Variation Order in Annex “E” of the 2016 revised IRR of RA No. 9184, and if applicable as indicated in the **SCC**, the Dayworks rates in the Contractor’s Bid shall be used for small additional amounts of work only when the Procuring Entity’s Representative has given written instructions in advance for additional work to be paid for in that way.

### Program of Work

* 1. The Contractor shall submit to the Procuring Entity’s Representative for approval the said Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works. The submissions of the Program of Work are indicated in the **SCC.**
  2. The Contractor shall submit to the Procuring Entity’s Representative for approval an updated Program of Work at intervals no longer than the period stated in the **SCC.** If the Contractor does not submit an updated Program of Work within this period, the Procuring Entity’s Representative may withhold the amount stated in the **SCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program of Work has been submitted.

### Instructions, Inspections and Audits

The Contractor shall permit the GOP or the Procuring Entity to inspect the Contractor’s accounts and records relating to the performance of the Contractor and to have them audited by auditors of the GOP or the Procuring Entity, as may be required.

### Advance Payment

The Procuring Entity shall, upon a written request of the Contractor which shall be submitted as a Contract document, make an advance payment to the Contractor in an amount not exceeding fifteen percent (15%) of the total contract price, to be made in lump sum, or at the most two installments according to a schedule specified in the **SCC**, subject to the requirements in Annex “E” of the 2016 revised IRR of RA No. 9184.

### Progress Payments

The Contractor may submit a request for payment for Work accomplished. Such requests for payment shall be verified and certified by the Procuring Entity’s Representative/Project Engineer. Except as otherwise stipulated in the **SCC**, materials and equipment delivered on the site but not completely put in place shall not be included for payment.

### Operating and Maintenance Manuals

1. If required, the Contractor will provide “as built” Drawings and/or operating and maintenance manuals as specified in the **SCC.**
2. If the Contractor does not provide the Drawings and/or manuals by the dates stated above, or they do not receive the Procuring Entity’s Representative’s approval, the Procuring Entity’s Representative may withhold the amount stated in the **SCC** from payments due to the Contractor.

# Section V. Special Conditions of Contract

**Special Conditions of Contract**

|  |  |
| --- | --- |
| **GCC Clause** |  |
| 2 | *Not applicable.* |
| 4.1 | *The procuring entity shall give possession of all parts of the site to the contractor upon receipt of the NTP.* |
| 6 | The site investigation reports are: *none* |
| 7.2 | Five (5) years. |
| 10 | No dayworks are applicable to the contract. |
| 11.1 | The Contractor shall submit the Program of Work to the Procuring Entity’s Representative within *Ten (10)* days of delivery of the Notice of Award. |
| 11.2 | The amount to be withheld for late submission of an updated Program of Work is Fifty Thousand Pesos (P50,000.00). |
| 13 | The amount of the advance payment shall not exceed 15% of the total contract price which will only be released upon complete mobilization. |
| 14 | Materials and equipment delivered on the site but not completely put in place shall be included for payment. |
| 15.1 | The date by which operating and maintenance manuals are required is upon acceptance of the project.  The date by which “as built” drawings are required is prior to the release of certificate of completion. |
| 15.2 | The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals by the date required is *one percent (1%) of the contract amount.* |

# Section VI. Specifications

PROJECT NAME: **UPGRADING OF MAPARAT WATER SYSTEM**

*DESCRIPTION:* ***INSTALLATION OF 2 SETS SOLAR PANELS (3,300W PER SET)***

***WITH PEDESTAL AND INSTALLATION OF 2 UNITS 3HP***

***SUBMERSIBLE PUMP WITH CONTROL AND COMPLETE***

***ACCESSORIES***

*LOCATION:* ***P-2 & P-3, Maparat ,Compostela, Davao de Oro***

**GENERAL CONDITION & SPECIFICATIONS**

**GENERAL CONDITION**

**1. GENERAL**

The drawing and the specifications are complementary to each other. Drawings are graphic means ofshowing work to be done. They are particularly suited to showing where materials are located. Thus, drawing exists essentially to show dimensions, location and placement. Not all works however can be presented in the drawings. Any doubts in the part of contractor shall be refer to the Municipal Engineer or the project engineer on site. Generalized works are usually in statement from, and hence the contractor in required to read the specifications carefully.

Specifications, on the other hand, are used to describe the materials, construction techniques, samples, shop drawings, guarantees and other contract requirements. Together, the drawing and the specifications are used to inform the contractor. In cases where the specified brand carries with it the manufacturer’s specifications, the manufacturer’s specifications shall hold precedence over these specifications.

**2. SPECIFICATION**

***FOR PEDESTAL FRAME :***

ITEM 100 – CLEARING AND GRUBBING

**100.1 Description**

This item shall consist of clearing, grubbing, removing and disposing all vegetation and debris as designated in the Contract, except those objects that are designated to remain in place or are to be removed in consonance with other provisions of this Specification. The work shall also include the preservation from injury or defacement of all objects designated to remain.

**100.2 Construction Requirements**

**100.2.1 General**

The Engineer will establish the limits of work and designate all trees, shrubs, plants and other things to remain. The Contractor shall preserve all objects designated to remain. Paint required for cut or scarred surface of trees or shrubs selected for retention shall be an approved asphaltum base paint prepared especially for tree surgery.

Clearing shall extend one (1) meter beyond the toe of the fill slopes or beyond rounding of cut slopes as the case maybe for the entire length of the project unless otherwise shown on the plans or as directed by the Engineer and provided it is within the right of way limits of the project, with the exception of trees under the jurisdiction of the Forest Management Bureau (FMB).

**100.2.2 Clearing and Grubbing**

All surface objects and all trees, stumps, roots and other protruding obstructions, not designated to remain, shall be cleared and/or grubbed, including mowing as required, except as provided below:

(1) Removal of undisturbed stumps and roots and nonperishable solid objects with a minimum depth of one (1) meter below subgrade or slope of embankment will not be required.

(2) In areas outside of the grading limits of cut and embankment areas, stumps and nonperishable solid objects shall be cut off not more than 150 mm (6 inches) above the ground line or low water level.

(3) In areas to be rounded at the top of cut slopes, stumps shall be cut off flush with or below the surface of the final slope line.

(4) Grubbing of pits, channel changes and ditches will be required only to the depth necessitated by the proposed excavation within such areas.

(5) In areas covered by cogon/talahib, wild grass and other vegetations, top soil shall be cut to a maximum depth of 150 mm below the original ground surface or as designated by the Engineer, and disposed outside the clearing and grubbing limits as indicated in the typical roadway section.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted to the required density.

If perishable material is burned, it shall be burned under the constant care of component watchmen at such times and in such a manner that the surrounding vegetation, other adjacent property, or anything designated to remain on the right of way will not be jeopardized. If permitted, burning shall be done in accordance with applicable laws, ordinances, and regulation.

The Contractor shall use high intensity burning procedures, (i.e., incinerators, high stacking or pit and ditch burning with forced air supplements) that produce intense burning with little or no visible smoke emission during the burning process. At the conclusion of each burning session, the fire shall be completely extinguished so that no smoldering debris remains.

In the event that the Contractor is directed by the Engineer not to start burning operations or to suspend such operations because of hazardous weather conditions, material to be burned which interferes with subsequent construction operations shall be moved by the Contractor to temporary locations clear of construction operations and later, if directed by the Engineer, shall be placed on a designated spot and burned.

Materials and debris which cannot be burned and perishable materials may be disposed off by methods and at locations approved by the Engineer, on or off the project. If disposal is by burying, the debris shall be placed in layers with the material so disturbed to avoid nesting. Each layer shall be covered or mixed with earth material by the land-fill method to fill all voids. The top layer of material buried shall be covered with at least 300 mm (12 inches) of earth or other approved material and shall be graded, shaped and compacted to present a pleasing appearance. If the disposal location is off the project, the Contractor shall make all necessary arrangements with property owners in writing for obtaining suitable disposal locations which are outside the limits of view from the project. The cost involved shall be included in the unit bid price. A copy of such agreement shall be furnished to the Engineer. The disposal areas shall be seeded, fertilized and mulched at the Contractor’s expense.

Woody material may be disposed off by chipping. The wood chips may be used for mulch, slope erosion control or may be uniformly spread over selected areas as directed by the Engineer. Wood chips used as mulch for slope erosion control shall have a maximum thickness of 12 mm (1/2 inch) and faces not exceeding 3900 mm2 (6 square inches) on any individual surface area. Wood chips not designated for use under other sections shall be spread over the designated areas in layers not to exceed 75 mm (3 inches) loose thickness. Diseased trees shall be buried or disposed off as directed by the Engineer.

All merchantable timber in the clearing area which has not been removed from the right of way prior to the beginning of construction, shall become the property of the Contractor, unless otherwise provided.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be trimmed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 6 m (20 feet) above the roadbed surface. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices.

Timber cut inside the area staked for clearing shall be felled within the area to be cleared.

**100.2.3 Individual Removal of Trees or Stumps**

Individual trees or stumps designated by the Engineer for removal and located in areas other than those established for clearing and grubbing and roadside cleanup shall be removed and disposed off as specified under Subsection 100.2.2 except trees removed shall be cut as nearly flush with the ground as practicable without removing stumps.

**100.3 Method of Measurement**

Measurement will be by one or more of the following alternate methods:

1. Area Basis. The work to be paid for shall be the number of hectares and fractions thereof acceptably cleared and grubbed within the limits indicated on the Plans or as may be adjusted in field staking by the Engineer. Areas not within the clearing and grubbing limits shown on the Plans or not staked for clearing and grubbing will not be measured for payment.

2. Lump-Sum Basis. When the Bill of Quantities contains a Clearing and Grubbing lump-sum item, no measurement of area will be made for such item.

3. Individual Unit Basis (Selective Clearing). The diameter of trees will be measured at a height of 1.4 m (54 inches) above the ground. Trees less than 150 mm (6 inches) in diameter will not be measured for payment.

When Bill of Quantities indicates measurement of trees by individual unit basis, the units will be designated and measured in accordance with the following schedule of sizes:

|  |  |
| --- | --- |
| Diameter at height of 1.4 m | Pay Item Designation |
| Over 150 mm to 900 mm | Small |
| Over 900 mm | Large |

**100.4 Basis of Payment**

The accepted quantities, measured as prescribed in Section 100.3, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities, which price and payment shall be full compensation for furnishing all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| Pay Item Number | Description | Unit of Measurement |
| 100 (1) | Clearing and Grubbing | Hectare |
| 100 (2) | Clearing and Grubbing | Lump Sum |
| 100 (3) | Individual Removal of  Trees, Small | Each |
| 100 (4) | Individual removal of  Trees, Large | Each |

**ITEM 103 – STRUCTURE EXCAVATION**

**103.1 Description**

This Item shall consist of the necessary excavation for foundation of bridges, culverts, underdrains, and other structures not otherwise provided for in the Specifications. Except as otherwise provided for pipe culverts, the backfilling of completed structures and the disposal of all excavated surplus materials, shall be in accordance with these Specifications and in reasonably close conformity with the Plans or as established by the Engineer.

This Item shall include necessary diverting of live streams, bailing, pumping, draining, sheeting, bracing, and the necessary construction of cribs and cofferdams, and furnishing the materials therefore, and the subsequent removal of cribs and cofferdams and the placing of all necessary backfill.

It shall also include the furnishing and placing of approved foundation fill material to replace unsuitable material encountered below the foundation elevation of structures.

No allowance will be made for classification of different types of material encountered.

**103.2 Construction Requirements**

**103.2.1 Clearing and Grubbing**

Prior to starting excavation operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Item 100, Clearing and Grubbing.

**103.2.2 Excavation**

(1) General, all structures. The Contractor shall notify the Engineer sufficiently in advance of the beginning of any excavation so that cross-sectional elevations and measurements may be taken on the undisturbed ground. The natural ground adjacent to the structure shall not be disturbed without permission of the Engineer.

Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Plans or as staked by the Engineer. They shall be of sufficient size to permit the placing of structures or structure footings of the full width and length shown. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximate only and the Engineer may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary, to secure a satisfactory foundation.

Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Plans or as staked by the Engineer. They shall be of sufficient size to permit the placing of structures or structure footings of the full width and length shown. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximate only and the Engineer may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary, to secure a satisfactory foundation.

(2) Structures other than pipe culverts. All rock or other hard foundation materials shall be cleaned all loose materials, and cut to a firm surface, either level, stepped, or serrated as directed by the Engineer. All seams or crevices shall be cleaned and grouted. All loose and disintegrated rocks and thin strata shall be removed. When the footing is to rest on material other than rock, excavation to final grade shall not be made until just before the footing is to be placed. When the foundation material is soft or mucky or otherwise unsuitable, as determined by the Engineer, the Contractor shall remove the unsuitable material and backfill with approved granular material. This foundation fill shall be placed and compacted in 150 mm (6 inches) layers up to the foundation elevation.

When foundation piles are used, the excavation of each pit shall be completed before the piles are driven and any placing of foundation fill shall be done after the piles are driven. After the driving is completed, all loose and displaced materials shall be removed, leaving a smooth, solid bed to receive the footing.

(3) Pipe Culverts. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 300 mm or 4 mm for each 100 mm of fill over the top of pipe, whichever is greater, but not to exceed three-quarters of the vertical inside diameter of the pipe. The width of the excavation shall be at least 300 mm (12 inches) greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 150 mm (6 inches) in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, such unstable soil under the pipe and for a width of at least one diameter on each side of the pipe shall be removed to the depth directed by the Engineer and replaced with approved granular foundation fill material properly compacted to provide adequate support for the pipe, unless other special construction methods are called for on the Plans.

The foundation surface shall provide a firm foundation of uniform density throughout the length of the culvert and, if directed by the Engineer, shall be cambered in the direction parallel to the pipe centerline.

Where pipe culverts are to be placed in trenches excavated in embankments, the excavation of each trench shall be performed after the embankment has been constructed to a plane parallel to the proposed profile grade and to such height above the bottom of the pipe as shown on the Plans or directed by the Engineer.

**103.2.3 Utilization of Excavated Materials**

All excavated materials, so far as suitable, shall be utilized as backfill or embankment. The surplus materials shall be disposed off in such manner as not to obstruct the stream or otherwise impair the efficiency or appearance of the structure. No excavated materials shall be deposited at any time so as to endanger the partly finished structure.

**103.2.4 Cofferdams**

Suitable and practically watertight cofferdams shall be used wherever water-bearing strata are encountered above the elevation of the bottom of the excavation. If requested, the Contractor shall submit drawings showing his proposed method of cofferdam construction, as directed by the Engineer.

Cofferdams or cribs for foundation construction shall in general, be carried well below the bottoms of the footings and shall be well braced and as nearly watertight as practicable. In general, the interior dimensions of cofferdams shall be such as to give sufficient clearance for the construction of forms and the inspection of their exteriors, and to permit pumping outside of the forms. Cofferdams or cribs which are tilted or moved laterally during the process of sinking shall be righted or enlarged so as to provide the necessary clearance.

When conditions are encountered which, as determined by the Engineer, render it impracticable to dewater the foundation before placing the footing, the Engineer may require the construction of a concrete foundation seal of such dimensions as he may consider necessary, and of such thickness as to resist any possible uplift. The concrete for such seal shall be placed as shown on the Plans or directed by the Engineer. The foundation shall then be dewatered and the footing placed. When weighted cribs are employed and the mass is utilized to overcome partially the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage such as dowels or keys shall be provided to transfer the entire mass of the crib to the foundation seal. When a foundation seal is placed under water, the cofferdams shall be vented or ported at low water level as directed.

Cofferdams shall be constructed so as to protect green concrete against damage from sudden rising of the stream and to prevent damage to the foundation by erosion. No timber or bracing shall be left in cofferdams or cribs in such a way as to extend into substructure masonry, without written permission from the Engineer.

Any pumping that may be permitted from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete material being carried away. Any pumping required during the placing of concrete, or for a period of at least 24 hours thereafter, shall be done from a suitable sump located outside the concrete forms. Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure.

Unless otherwise provided, cofferdams or cribs, with all sheeting and bracing involved therewith, shall be removed by the Contractor after the completion of the substructure. Removal shall be effected in such manner as not to disturb or mar finished masonry.

**103.2.5 Preservation of Channel**

Unless otherwise permitted, no excavation shall be made outside of caissons, cribs, cofferdams, or sheet piling, and the natural stream bed adjacent to structure shall not be disturbed without permission from the Engineer. If any excavation or dredging is made at the side of the structure before caissons, cribs, or cofferdams are sunk in place, the Contractor shall, after the foundation base is in place, backfill all such excavations to the original ground surface or stream bed with material satisfactory to the Engineer.

**103.2.6 Backfill and Embankment for Structures Other Than Pipe Culverts**

Excavated areas around structures shall be backfilled with free draining granular material approved by the Engineer and placed in horizontal layers not over 150 mm (6 inches) in thickness, to the level of the original ground surface. Each layer shall be moistened or dried as required and thoroughly compacted with mechanical tampers.

In placing backfills or embankment, the material shall be placed simultaneously in so far as possible to approximately the same elevation on both sides of an abutment, pier, or wall. If conditions require placing backfill or embankment appreciably higher on one side than on the opposite side, the additional material on the higher side shall not be placed until the masonry has been in place for 14 days, or until tests made by the laboratory under the supervision of the Engineer establishes that the masonry has attained sufficient strength to withstand any pressure created by the methods used and materials placed without damage or strain beyond a safe factor.

Backfill or embankment shall not be placed behind the walls of concrete culverts or abutments or rigid frame structures until the top slab is placed and cured. Backfill and embankment behind abutments held at the top by the superstructure, and behind the sidewalls of culverts, shall be carried up simultaneously behind opposite abutments or sidewalls.

All embankments adjacent to structures shall be constructed in horizontal layers and compacted as prescribed in Subsection 104.3.3 except that mechanical tampers may be used for the required compaction. Special care shall be taken to prevent any wedging action against the structure and slopes bounding or within the areas to be filled shall be benched or serrated to prevent wedge action. The placing of embankment and the benching of slopes shall continue in such a manner that at all times there will be horizontal berm of thoroughly compacted material for a distance at least equal to the height of the abutment or wall to the backfilled against except insofar as undisturbed material obtrudes upon the area.

Broken rock or coarse sand and gravel shall be provided for a drainage filter at weepholes as shown on the Plans.

**103.2.7 Bedding, Backfill, and Embankment for Pipe Culverts**

Bedding, Backfill and Embankment for pipe culverts shall be done in accordance with Item 500, Pipe Culverts and Storm Drains.

**103.3 Method of Measurement**

**103.3.1 Structure Excavation**

The volume of excavation to be paid for will be the number of cubic metres measured in original position of material acceptably excavated in conformity with the Plans or as directed by the Engineer, but in no case, except as noted, will any of the following volumes be included in the measurement for payment:

(1) The volume outside of vertical planes 450 mm (18 inches) outside of and parallel to the neat lines of footings and the inside walls of pipe and pipe-arch culverts at their widest horizontal dimensions.

(2) The volume of excavation for culvert and sections outside the vertical plane for culverts stipulated in (1) above.

(3) The volume outside of neat lines of underdrains as shown on the Plans, and outside the limits of foundation fill as ordered by the Engineer.

(4) The volume included within the staked limits of the roadway excavation, contiguous channel changes, ditches, etc., for which payment is otherwise provided in the Specification.

(5) Volume of water or other liquid resulting from construction operations and which can be pumped or drained away.

(6) The volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed ground.

(7) the volume of any material rehandled, except that where the Plans indicate or the Engineer directs the excavation after embankment has been placed and except that when installation of pipe culverts by the imperfect trench method specified in Item 500 is required, the volume of material re-excavated as directed will be included.

(8) The volume of excavation for footings ordered at a depth more than 1.5 m (60 inches) below the lowest elevation for such footings shown on the original Contract Plans, unless the Bill of Quantities contains a pay item for excavation ordered below the elevations shown on the Plans for individual footings.

**103.3.2 Bridge Excavation**

The volume of excavation, designated on the Plans or in the Special Provisions as “Bridge Excavation” will be measured as described below and will be kept separate for pay purposes from the excavation for all structures.

The volume of bridge excavation to be paid shall be the vertical 450 mm (18 inches) outside of and parallel to the neat lines of the footing. The vertical planes shall constitute the vertical faces of the volume for pay quantities regardless of excavation inside or outside of these planes.

**103.3.3 Foundation Fill**

The volume of foundation fill to be paid for will be the number of cubic metres measures in final position of the special granular material actually provided and placed below the foundation elevation of structures as specified, complete in place and accepted.

**103.3.4 Shoring, Cribbing, and Related Work**

Shoring, cribbing and related work whenever included as a pay item in Bill of Quantities will be paid for at the lump sum bid price. This work shall include furnishing, constructing, maintaining, and removing any and all shoring, cribbing, cofferdams, caissons, bracing, sheeting water control, and other operations necessary for the acceptable completion of excavation included in the work of this Section, to a depth of 1.5 m below the lowest elevation shown on the Plans for each separable foundation structure.

**103.3.5 Basis of Payment**

The accepted quantities, measured as prescribed in Section 103.3, shall be paid for at the contract unit price for each of the particular pay items listed below that is included in the Bill of Quantities. The payment shall constitute full compensation for the removal and disposal of excavated materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item, except as follows:

(1) Any excavation for footings ordered at a depth more than 1.5 m below the lowest elevation shown on the original Contract Plans will be paid for as provided in Part K, Measurement and Payment, unless a pay item for excavation ordered below Plan elevation appears in the Bill of Quantities.

(2) Concrete will be measured and paid for as provided under Item 405, Structural Concrete.

(3) Any roadway or borrow excavation required in excess of the quantity excavated for structures will be measured and paid for as provided under Item 102.

(4) Shoring, cribbing, and related work required for excavation ordered more than 1.5 m (60 inches ) below Plan elevation will be paid for in accordance with Part K.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| Pay Item Number | Description | Unit of Measurement |
| 103 (1) | Structure Excavation | Cubic Meter |
| 103 (2) | Bridge Excavation | Cubic Meter |
| 103 (3) | Foundation Fill | Cubic Meter |
| 103 (4) | Excavation ordered below Plan elevation | Cubic Meter |
| 103 (5) | Shoring, cribbing, and related work | Lump sum |
| 103 (6) | Pipe culverts and drain excavation | Cubic Meter |

ITEM 403 – METAL STRUCTURES

**403.1 Description**

This work shall consist of steel structures and the steel structure portions of composite structures, constructed in reasonably close conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

The work will include the furnishing, fabricating, hauling, erecting, welding and painting of structural metals called for in the Special Provision or shown on the Plans. Structural metals will include structural steel, rivet, welding, special and alloy steels, steel forgings and castings and iron castings. This work will also include any incidental metal construction not otherwise provided for, all in accordance with these Specifications, Plans and Special Provisions.

**403.2 Material Requirements**

Materials shall meet the requirements of Item 712, Structural Metal; Item 409, Welded Structural Steel, and Item 409, Welded Structural Steel; and Item 709, Paints.

**403.3 Construction Requirements**

**403.3.1 Inspection**

The Contractor shall give the Engineer at least fifteen (15) days notice prior to the beginning of work at the mill or shop, so that the required inspection may be made. The term “mill” means any rolling mill, shop or foundry where material for the work is to be manufactured or fabricated. No material shall be rolled or fabricated until said inspection has been provided.

The Contractor shall furnish the Engineer with copies of the certified mill reports of the structural steel, preferably before but not later than the delivery of the steel to the job site.

The Contractor shall furnish all facilities for inspection and the Engineer shall be allowed free access to the mill or shop and premises at all times. The Contractor shall furnish, without charge, all labor, machinery, material and tools necessary to prepare test specimens.

Inspection at the mill or shop is intended as a means of facilitating the work and avoiding errors and it is expressly understood that it will not relieve the Contractor from any responsibility for imperfect material or workmanship and the necessity for replacing same. The acceptance of any material or finished member at the mill or shop by the Engineer shall not preclude their subsequent rejection if found defective before final acceptance of the work. Inspection of welding will be in accordance with the provision of Section 5 of the “Standard Code for Arc and Gas Welding in Building Construction” of the American Welding Society.

**403.3.2 Stock Material Control**

When so specified in the Contract, stock material shall be segregated into classes designated as “identified” or “unidentified”**.** Identified material is material which can be positively identified as having been rolled from a given heat for which certified mill test can be produced. Unidentified material shall include all other general stock materials. When it is proposed to use unidentified material, the Engineer shall be notified of such intention at least fifteen (15) days in advance of commencing fabrication to permit sampling and testing. When so indicated or directed, the Contractor shall select such material as he wishes to use from stock, and place it in such position that it will be accessible for inspection and sampling. The Contractor shall select identified material from as few heat numbers as possible, and furnish the certified mill test reports on each of such heat numbers. Two samples shall be taken from each heat number as directed, one for a tension test and one for a bend test.

In the case of unidentified stock, the Engineer may, at his discretion, select any number of random test specimens.

Each bin from which rivets or bolts are taken shall subject to random test. Five rivets or bolts may be selected by the Engineer from each bin for test purposes.

Structural material, either plain or fabricated, shall be stored above the ground upon platforms, skids, or other supports. It shall be kept free from dirt, grease, or other foreign matter, and shall be protected as far as practicable from corrosion.

**403.3.3 Fabrication**

These Specifications apply to riveted, bolted and welded construction. The Contractor may, however, with approval of the Engineer, substitute high tensile strength steel bolts equivalent to the rivets in any connection.

Workmanship and finish shall be in accordance with the best general practice in modern bridge shops. Portions of the work exposed to view shall be finished neatly. Shearing, flame cutting, and chipping shall be done carefully and accurately.

Structural material, either plain or fabricated, shall be stored above the ground upon platforms, skids or other supports. It shall be kept free from dirt, grease or other foreign matter, and shall be protected as far as practicable from corrosion.

Rolled material before being laid off or worked must be straight. If straightening is necessary, it shall be done by methods that will not injure the metal. Sharp kinks and bends will be cause for rejection of the material.

Preparation of material shall be in accordance with AWS (American Welding Society) D 1.1, paragraph 3.2 as modified by AASHTO Standard Specification for Welding of Structural Steel Highway Bridges.

**403.3.4 Finishing and Shaping**

Finished members shall be true to line and free from twists, bends and open joints.

1. Edge Planing

Sheared edges of plates more than 15.9 mm in thickness and carrying calculated stresses shall be planed to a depth of 6.3 mm. Re-entrant cuts shall be filleted before cutting.

2. Facing of Bearing Surfaces

The surface finish of bearing and based plates and other bearing surfaces that are to come in contact with each other or with concrete shall meet the American National Standards Institute surface roughness requirements as defined in ANSI B-46.1-47, Surface Roughness Waviness and Lay, Part I:

|  |  |
| --- | --- |
| Steel slabs | ANSI 2,000 |
| Heavy plates in contact in shoes to  Be welded | ANSI 1,000 |
| Milled ends of compression members,  stiffeners and fillers | ANSI 500 |
| Bridge rollers and rockers | ANSI 250 |
| Pins and pin holes | ANSI 125 |
| Sliding bearings | ANSI 125 |

3. Abutting Joints

Abutting joints in compression members and girders flanges, and in tension members where so specified on the drawings, shall be faced and brought to an even bearing. Where joints are not faced, the opening shall not exceed 6.3 mm.

4. End Connection Angles

Floor beams, stringers and girders having end connection angles shall be built to plan length back to back of connection angles with a permissible tolerance of 0 mm to minus 1.6 mm. If end connections are faced, the finished thickness of the angles shall not be less than that shown on the detail drawings, but in no case less than 9.5 mm.

5. Lacing Bars

The ends of lacing bars shall be neatly rounded unless another form is required.

6. Fabrication of Members

Unless otherwise shown on the Plans, steel plates for main members and splice plates for flanges and main tension members, not secondary members, shall be cut and fabricated so that the primary direction of rolling is parallel to the direction of the main tensile and/or compressive stresses.

Fabricated members shall be true to line and free from twists, bends and open joints.

7. Web Plates (Riveted or Bolted)

In girders having no cover plates and not to be encased in concrete, the top edges of the web shall not extend above the backs of the flange angles and shall not be more than 3.2 mm below at any point. Any portion of the plate projection beyond the angles shall be chipped flush with the backs of the angles. Web plates of girders having cover plates may not be more than 12.7 mm less in width than the distance back to back of flange angles.

Splices in webs of girders without cover plates shall be sealed on top with red lead paste prior to painting.

At web splices, the clearance between the ends of the plates shall not exceed 9.5 mm. The clearance at the top and bottom ends of the web slice plates shall not exceed 6.3 mm.

8. Bent Plates

Cold-bent load-carrying rolled-steel plates shall conform to the following:

a. They shall be so taken from the stock plates that the bendline will be at right angles to the direction of rolling, except that cold-bent ribs for orthotropic deck bridges may be bent in the direction of rolling if permitted by the Engineer.

b. The radius of bends shall be such that no cracking of the plate occurs. Minimum bend radii, measured to the concave face of the metal, are shown in the following table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ASTM  DESIG-  ATION | | THICKNESS, t in mm | | | | |
| Up to  6.3 | Over 6.3  To 12.7 | Over 12.7  To 25.4 | Over 25.4  to 38.1 | Over 38.1  to 50.08 |
| A36 | | 1.5t | 1.5t | 2t | 3t | 4t |
| A242 | | 2t | 3t | 5t | a--- | a--- |
| A440 | | 2.5t | 3.5t | 6t | a--- | a--- |
| A441 | | 2t | 3t | 5t | a--- | a--- |
| A529 | | 2t | 2t | ---- | ---- | ---- |
| A572 | Gr.42 | 2t | 2t | 3t | 4t | 5t |
| Gr.45 | 2t | 2t | 3t | 4t | ---- |
| Gr.50 | 2.5t | 2.5t | 4t | a--- | ---- |
| Gr.55 | 3t | 3t | 5t | a--- | ---- |
| Gr.60 | 3.5t | 3.5t | 6t | ---- | ---- |
| Gr.65 | 4t | 4t | ---- | ---- | ---- |
| A588 | | 2t | 3t | 5t | a--- | a--- |
| A514b | | 2t | 2t | 2t | 3t | 3t |

a It is recommended that steel in this thickness range be bent hot. Hot bending however, may result in a slight decrease in the as-rolled mechanical properties.

b The mechanical properties of ASTM A 514 steel results from a quench-and-temper-operation. Hot bending may adversely affect these mechanical properties. If necessary to hotbend, fabricator should discuss procedure with steel supplier.

c. Before bending, the corners of the plate be rounded to a radius of 1.6 mm throughout that portion of the plate where the bending is to occur.

9. Fit of Stiffeners

End stiffeners of girders and stiffeners intended as supports for concentrated loads shall have full bearing (either milled, ground or on weldable steel in compression areas of flanges, welded as shown on the Plans or specified) on the flanges to which they transmit load or from which they receive load. Stiffeners not intended to support concentrated loads shall, unless shown or specified otherwise, fit sufficiently tight to exclude water after being painted, except that for welded flexural members, the ends of stiffeners adjacent to the tension flanges shall be cut back as shown on the Plans. Fillers under stiffeners shall fit within 6.3 mm at each end.

Welding will be permitted in lieu of milling or grinding if noted on the Plans or in the Special Provisions. Brackets, clips, gussets, stiffeners, and other detail material shall not be welded to members or parts subjected to tensile stress unless approved by the Engineer.

10. Eyebars

Pin holes may be flame cut at least 50.8 mm smaller in diameter than the finished pin diameter. All eyebars that are to be placed side by side in the structure shall be securely fastened together in the order that they will be placed on the pin and bored at both ends while so clamped. Eyebars shall be packed and matchmarked for shipment and erection. All identifying marks shall be stamped with steel stencils on the edge of one head of each member after fabrication is completed so as to be visible when the bars are nested in place on the structure. The eyebars shall be straight and free from twists and the pin holes shall be accurately located on the centerline of the bar. The inclination of any bar to the plane of the truss shall not exceed 1.6 mm to 305 mm.

The edges of eyebars that lie between the transverse centerline of their pin holes shall be cut simultaneously with two mechanically operated torches abreast of each other, guided by a substantial template, in such a manner as to prevent distortion of the plates.

11. Annealing and Stress Relieving

Structural members which are indicated in the Contract to be annealed or normalized shall have finished machining, boring and straightening done subsequent to heat treatment. Normalizing and annealing (full annealing) shall be in accordance with ASTM E 44. The temperatures shall be maintained uniformly throughout the furnace during heating and cooling so that the temperature at no two points on the member will differ by more than 37.80C at any one time.

Members of A514/A517 steels shall not be annealed or normalized and shall be stress relieved only with the approval of the Engineer.

A record of each furnace charge shall identify the pieces in the charge and show the temperatures and schedule actually used. Proper instruments including recording pyrometers, shall be provided for determining at any time the temperatures of members in the furnace. The records of the treatment operation shall be available to and meet the approval of the Engineer.

Members, such as bridge shoes, pedestals, or others which are built up by welding sections of plate together shall be stress relieved in accordance with the provisions of Subsection 403.3.11 when required by the Plans, Specifications or Special Provisions governing the Contract.

12. Tests

When full size tests of fabricated structural members or eyebars are required by the Contract, the Plans or Specifications will state the number and nature of the tests, the results to be attained and the measurements of strength, deformation or other performances that are to be made. The Contractor will provide suitable facilities, material, supervision and labor necessary for making and recording the tests. The members tested in accordance with the Contract will be paid for in accordance with Subsection 403.3.5.1. The cost of testing, including equipment handling, supervision labor and incidentals for making the test shall be included in the contract price for the fabrication or fabrication and erection of structural steel, whichever is the applicable item in the Contract, unless otherwise specified.

**403.3.5 Pins and Rollers**

Pins and rollers shall be accurately turned to the dimensions shown on the Plans and shall be straight, smooth, and free from flaws. Pins and rollers more 228.6 mm or less in diameter may either be forged and annealed. Pins and rollers 228.6 mm or less in diameter may either be forged and annealed or cold-finished carbon-steel shafting.

In pins larger than 228.6 mm in diameter, a hole not less than 50.8 mm in diameter shall be bored full length along the axis after the forging has been allowed to cool to a temperature below the critical range under suitable conditions to prevent injury by too rapid cooling and before being annealed.

Pin holes shall be bored true to the specified diameter, smooth and straight, at right angles with the axis of the member and parallel with each other unless otherwise specified. The final surface shall be produced by a finishing cut.

The distance outside to outside of holes in tension members and inside to inside of holes in compression members shall not vary from that specified more than 0.8 mm. Boring of holes in built-up members shall be done after the riveting is completed.

The diameter of the pin hole shall not exceed that of the pin by more than 0.51 mm for pins 127 mm or less in diameter, or 0.8 mm for larger pins.

The pilot and two driving nuts for each size of pin shall be furnished, unless otherwise specified.

**403.3.6 Fastener Holes (Rivets and Bolts)**

All holes for rivets or bolts shall be either punched or drilled. Material forming parts or a member composed of not more than five thickness of metal may be punched 1.6 mm larger than the nominal diameter of the rivets or bolts whenever the thickness of the material is not greater than 19 mm for structural steel, 15.9 mm for high-strength steel or 12.7 mm for quenched and tempered alloy steel, unless subpunching and reaming is required for field connections.

When there are more than five thicknesses or when any of the main material is thicker than 19 mm for structural steel, 15.9 mm for high-strength steel, or 12.7 mm for quenched and tempered alloy steel, all holes shall either be subdrilled or drilled full size.

When required for field connections, all holes shall either be subpunched or subdrilled (subdrilled if thickness limitation governs) 4.8 mm smaller and, after assembling, reamed 1.6 mm larger or drilled full size 1.6 mm larger than the nominal diameter of the rivets or bolts.

When permitted by design criteria, enlarged or slotted holes are allowed with high-strength bolts. For punched holes, the diameter of the die shall not exceed the diameter of the punch by more than 1.6 mm. If any holes must be enlarged to admit the fasteners, they shall be reamed. Holes shall be clean cut, without torn or ragged edges. Poor matching of holes will be cause for rejection.

Reamed holes shall be cylindrical, perpendicular to the member, and not more than 1.6 mm larger than the nominal diameter of the fasteners. Where practicable, reamers shall be directed by mechanical means. Drilled holes shall be 1.6 mm larger than the nominal diameter of the fasteners. Burrs on the outside surfaces shall be removed. Poor matching of holes will be cause for rejection. Reaming and drilling shall be done with twist drills. If required by the Engineer, assembled parts shall be taken apart for removal of burrs caused by drilling. Connecting parts requiring reamed or drilled holes shall be assembled and securely held while being reamed or drilled and shall be matchmarked before disassembling.

Unless otherwise specified, holes for all field connections and field splices of main truss or arch members, continuous beams, towers (each face), bents, plate girders and rigid frames shall be subpunched (or subdrilled if subdrilling is required) and subsequently reamed while assembled in the shop in accordance with Subsection 403.3.7.

All holes for floor-beam and stringer field end connections shall be subpunched and reamed to a steel template reamed while being assembled.

Reaming or drilling full size of field connection through templates shall be done after templates have been located with the utmost care as to position and angle and firmly bolted in place. Templates used for the reaming of matching members, or of the opposite faces of one member, shall be exact duplicated. Templates for connections which duplicate shall be so accurately located that like members are duplicates and require no matchmarking.

If additional subpunching and reaming is required, it will be specified in the Special Provisions or on the Plans.

Alternately, for any field connection or splice designated above in lieu of sub-sized holes and reaming while assembled, or drilling holes full-size while assembled, the Contractor shall have the option to drill bolt holes full-size in unassembled pieces and/or connections including templates for use with matching sub-sized and reamed holes means of suitable numerically-controlled (N/C) drilling equipment subject to the specific provisions contained in this Subsection.

If N/C drilling equipment is used, the Engineer, unless otherwise stated in the Special Provisions or on the Plans, may require the Contractor, by means if check assemblies to demonstrate that this drilling procedure consistently produces holes and connections meeting the requirements of conventional procedures.

The Contractor shall submit to the Engineer for approval a detailed outline of the procedures that he proposes to follow in accomplishing the work from initial drilling through check assembly, if required, to include the specific members of the structure that may be N/C drilled, the sizes of the holes, the location of common index and other reference points, composition of check assemblies and all other pertinent information.

Holes drilled by N/C drilling equipment shall be drilled to appropriate size either through individual pieces, or any combination of pieces held tightly together.

All holes punched full size, subpunched or subdrilled shall be so accurately punched that after assembling (before any reaming is done), a cylindrical pin 3.2 mm smaller in diameter than the nominal size of the punched hole may be entered perpendicular to the face of the member, without drifting, in at least 75 percent of the contiguous holes in the same plane. If the requirement is not fulfilled, the badly punched pieces will be rejected. If any hole will not pass a pin 4.8 mm smaller in diameter than the nominal size of the punched holes, this will cause for rejection.

When holes are reamed or drilled, 85 percent of the holes in any continuous group shall, after reaming or drilling, show no offset greater than 0.8 mm between adjacent thickness of metal.

All steel templates shall have hardened steel bushings in holes accurately dimensioned from the center lines if the connections as inscribed on the template. The center lines shall be used in locating accurately the template from the milled or scribed ends of the members.

**403.3.7 Shop Assembly**

1. Fitting for Riveting and Bolting

Surfaces of metal in contact shall be cleaned before assembling. The parts of a member shall be assembled, well pinned and firmly drawn together with bolts before reaming or riveting is commenced. Assembled pieces shall be taken apart, if necessary, for the removal of burrs and shavings produced by the reaming operation. The member shall be free from twists, bends and other deformation. Preparatory to the shop riveting of full-sized punched material, the rivet holes, if necessary, shall be spear-reamed for the admission of the rivets. The reamed holes shall not be more than 1.6 mm larger than the nominal diameter of the rivets.

End connection angles, and similar parts shall be carefully adjusted to correct positions and bolted, clamped, or otherwise firmly in place until riveted.

Parts not completely riveted in the shop shall be secured by bolts, in so far as practicable, to prevent damage in shipment and handling.

1. Shop Assembling

The field connections of main members of trusses, arches, continuous beam spans, bents, towers (each face), plate girders and rigid frames shall be assembled in the shop with milled ends of compression members in full bearing, and then shall have their sub-size holes reamed to specified size while the connections are assembled. Assembly shall be “Full Truss or Girders Assembly” unless “Progressive Chord Assembly” or “Special Complete Structure Assembly” is specified in the Special Provisions or on the Plans.

Check assemblies with Numerically-Controlled Drilled Fields Connections shall be in accordance with the provision of 2 (f) of this Subsection.

Each assembly, including camber, alignment, accuracy of holes and fit of milled joints, shall be approved by the Engineer before reaming is commenced or before an N/C drilled check assembly is dismantled.

The fabricator shall furnished the Engineer a camber diagram showing the camber at each panel point in the cases of trusses or arch ribs and at the location of field splices and fractions of span length (0.25 points minimum, 0.10 points maximum) in case of continuous beam and girders or rigid frames. When the shop assembly is Full Truss or Girder Assembly or Special Complete Structure Assembly, the camber diagram shall show the camber measured in assembly. When any of the other methods of shop assembly is used, the camber diagram shall show calculated camber.

Methods of assembly shall be described below:

1. Full of Truss or Girders Assembly shall consist of assembling all members of each truss, arch rib, bent, tower face, continuous beam line, plate girder or rigid frame at one time.
2. Progressive Truss or Girder Assembly shall consist of assembling initially for each truss, arch rib, bent, tower face, continuous beam line, plate girder, or rigid frame all members in at least three continuous shop sections or panels but not less than the number of panels associated with three continuous chord lengths (i.e., length between field splices) and not less than 45.72 m in case of structures longer than 45.72 m. At least one shop section or panel or as many panels as are associated with a chord length shall be added at the advancing end of the assembly before any member is removed from the rearward end so that the assembled portion of the structure is never less than that specified above.
3. Full Chord Assembly shall consist of assembling with geometric angles at the joints, the full length of each chord or each truss or open spandrel arch, or each leg of each bent or tower, than reaming their field connection holes while the members are assembled; and reaming the web member connections to steel templates set at geometric (not cambered) angular relation to the chord lines. Field connection holes in web members shall be reamed to steel templates. At least one end of each web member shall be milled or shall be scribed normal to the longitudinal axis of the member and the templates of both ends of the member shall be accurately located from one of the milled ends or scribed line.
4. Progressive Chord Assembly shall consist of assembling contiguous chord members in the manner specified for Full Chord Assembly, and in the number and length specified for Progressive Truss or Girder Assembly.
5. Special Complete Structure Assembly shall consist of assembling the entire structure, including the floor system. (This procedure is ordinarily needed only for complicated structures such as those having curbed girders, or extreme skew in combination with severe grade or camber). The assembly including camber, alignment, accuracy of holes and fit of milled joints shall be approved by the Engineer before reaming is commenced.

A Contractor shall furnished the Engineer a camber diagram showing the camber at each panel point of each truss, arch rib, continuous beam line, plate girder or rigid frame. When shop assembly is Full Truss or Girder Assembly or Special Complete Structure Assembly, the camber diagram shall show the camber measured in assembly. When any of the other methods of shop assembly is used, the camber diagram shall show calculated camber.

1. Check Assemblies with Numerically-Controlled Drilled Field Connections. A check assembly shall be required for each major structural type of each project, unless otherwise designated on the Plans or in the Special Provisions, and shall consist of at least three contiguous shop sections or, in a truss, all members in at least three contiguous panels but not less than the number of panels associated with three contiguous chord lengths (i.e., length between field splices). Check assemblies should be based on the proposed order erection, joints in bearings, special complex points, and similar considerations. Such special points could be the portals of skewed trusses, etc.

Use of either geometric angles (giving theoretically zero secondary stresses under deadload conditions after erection) or cambered angles (giving theoretically zero secondary stresses under no-load conditions) should be designated on the Plans or in the Special Provisions.

The check assemblies shall be preferably be the first such sections of each major structural type to be fabricated.

No matchmaking and no shop assemblies other than the check assemblies shall be required.

If the check assembly fails in some specific manner to demonstrate that the required accuracy is being obtained, further check assemblies may be required by the Engineer for which there shall be no additional cost to the contracting authority.

**403.3.8 Rivets and Riveting**

The size of rivets called for on the Plans shall be the size before heating. Rivet heads shall be of standard shape, unless otherwise specified, and of uniform size for the same diameter of rivet. They shall be full, neatly made, concentric with the rivets holes, and in full contact with the surface of the member. Sufficient rivets for field connections shall be furnished to rivet the entire structure with an ample surplus to replace all rivets burned, lost or cut out.

Rivets shall be heated uniformly to a “light cherry red color” and shall be driven while hot. Any rivet whose point is heated more than the remainder shall not be driven. When a rivet is ready for driving, it shall be free from slag, scale and other adhering matter. Any rivet which is sealed excessively, will be rejected.

All rivets that are loose, burned, badly formed, or otherwise defective shall be removed and replaced with satisfactory rivets. Any rivet whose head is defective in size or whose head is driven off center will be considered defective and shall be removed. Stitch rivets that are loosened by driving of adjacent rivets shall be removed and replaced with satisfactory rivets. Caulking, recapping, or double gunning of rivets heads will not be permitted.

Shop rivets shall be driven by direct-acting rivet machines when practicable. Approved bevelled rivet sets shall be used for forming rivet heads on sloping surfaces. When the use of a direct-acting rivet machine is not practicable, pneumatic hammers of approved size shall be used. Pneumatic bucking tools will be required when the size and length of the rivets warrant their use.

Rivets may be driven cold provided their diameter is not over 9.5 mm.

**403.3.9 Bolted Connections, Unfurnished, Turned and Ribbed Bolts**

1. General

Bolts under this Subsection shall conform to “Specifications for Carbon Steel Externally and Internally Threaded Standard Fasteners”, ASTM A 307. Specifications for high strength bolts are covered under Subsection 403.3.10.

Bolts shall be unfinished, turned or an approved form of ribbed bolts with hexagonal nuts and heads except that ribbed bolts shall have button heads. Bolted connections shall be used only as indicated by the Plans or Special Provisions. Bolts not tightened to the proof loads shall have single self locking nuts or double nuts. Bevel washers shall be used where bearing faces have a slope or more than 1:20 with respect to a plane normal to the bolt axis. Bolts shall be of such length that will extend entirely through their nuts but not more than 6.3 mm beyond them.

Bolts shall be driven accurately into the holes without damage to the threads. A snap shall be used to prevent damage to the heads. The heads and nuts shall be drawn tight against the work with the full effort of a man using a suitable wrench, not less than 381 mm long for bolts of nominal diameter 19 mm and over. Heads of bolts shall be tapped with a hammer while the nuts are being tightened.

2. Unfinished Bolts

Unfinished bolts shall be furnished unless other types are specified. The number of bolts furnished shall be 5 percent more than the actual number shown on the Plans for each size and length.

3. Turned Bolts

The surface of the body of turned bolts shall meet the ANSI roughness rating value of 125. Heads and nuts shall be hexagonal with standard dimensions for bolts of the nominal size specified or the next larger nominal size. Diameter of threads shall be equal to the body of the bolt or the nominal diameter of the bolt specified. Holes for turned bolts shall be carefully reamed with bolts furnished to provide for a light driving fit. Threads shall be entirely outside of the holes. A washer shall be provided under the nut.

4. Ribbed Bolts

The body of ribbed shall be of an approved form with continuous longitudinal ribs. The diameter of the body measured on a circle through the points of the ribs shall be 1.98 mm greater than the nominal diameter specified for the bolts.

Ribbed bolts shall be furnished with round heads conforming to ANSI B 18.5 unless otherwise specified. Nuts shall be hexagonal, either recessed or with a washer of suitable thickness. Ribbed bolts shall make a driving fit with the holes. The hardness of the ribs shall be such that the ribs do not mash down enough to permit the bolts to turn in the holes during tightening. If for any reason the bolt twists before drawing tight, the holes shall be carefully reamed and an oversized bolt used as a replacement. The Contractor shall provide and supply himself with oversize bolts and nuts for this replacement in an amount not less than ten percent (10%) of the number of ribbed bolts specified.

**403.3.10 Bolted Connections (High Tensile-Strength Bolts)**

1. Bolts

Bolts shall be AASHTO M 164 (ASTM A 325 or AASHTO M 253) tensioned to a high tension. Other fasteners which meet the chemical requirements of AASHTO M 164 or M 253 and which meet the mechanical requirements of the same specification in full size tests and which have body diameter and bearing areas under the head and nut, or their equivalents, not less than those provided by a bolt and nut of the same nominal dimensions prescribed above, may be used subject to the approval of the Engineer.

Bolts lengths shall be determined by adding the grip-length values given in Table 403.1 to the total thickness of connected material. The values of Table 403.1 compensate for manufacturer’s tolerance, the use of heavy semi-finished hexagon nut and a positive “stick-through” at the end of the bolt. For each hardened flat washer that is used and 4 mm to the tabular value and for each bevelled washer add 7.9 mm. The length determined shall be adjusted to the next longer 6.3 mm.

**Table 403.1 – Grip-Length Values**

|  |  |
| --- | --- |
| Bolts Size (mm) | To determine required  bolt length, add grip (mm) \* |
| 9.5 | 17.5 |
| 12.7 | 22.2 |
| 19.0 | 25.4 |
| 22.2 | 28.6 |
| 25.4 | 31.7 |
| 28.6 | 38.1 |
| 31.7 | 41.3 |
| 34.9 | 44.4 |
| 38.1 | 47.6 |

\* Does not include allowance for washer thickness

2. Bolted Parts

The slope of surface of bolted parts in contact with the bolt head and nut shall not exceed 1:20 with respect to a plane normal to the bolt axis. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible material. When assembled, all joint surfaces, including those adjacent to the bolt head, nuts or washers, shall be free of scale, except tight mill scale, and shall also be free of burrs, dirt and other foreign material that would prevent solid seating of the parts. Paint is permitted unconditionally in bearing-type connections.

In friction-type connections, the Class, as defined below, indicating the condition of the contact surfaces shall be specified on the Plans. Where no Class is specified, all joint surfaces shall be free of scale, except tight mill scale and shall not have a vinyl wash.

a. Classes A, B and C (uncoated). Contact surfaces shall be free of oil, paint, lacquer or other coatings.

1. Class D (hot-dip galvanized and roughened). Contact surfaces shall be tightly scored by wire brushing or blasting after galvanizing and prior to assembly. The wire brushing treatment shall be a light application of manual or power brushing that marks or scores the surface but remove relatively little of the zinc coating. The blasting treatment shall be a light “brush-off” treatment which will produce a dull gray appearance. However, neither treatment should be severed enough to produce any break or discontinuity in the zinc surface.
2. Classes E and F (blast-cleaned, zinc rich paint). Contact surfaces shall be coated with organic or inorganic zinc rich paint as defined in the Steel Structures Painting Council Specification SSPC 12.00.
3. Classes G and H (blast-cleaned, metallized zinc or aluminum). Contact surfaces shall be coated in accordance with AWS C2.2, Recommended Practice for Metallizing with Aluminum and Zinc for Protection of Iron and Steel, except that subsequent sealing treatments, described in Section IV therein shall not be used.
4. Class I (vinyl wash). Contact surfaces shall be coated in accordance with the provisions of the Steel Structure Painting Council Pretreatment Specifications SSPC PT3.

AASHTO M 164 (ASTM A 325) Type 2 and AASHTO M 253 bolts shall not be galvanized nor shall they be used to connect galvanized material.

3. Installation

a. Bolt Tension. Each fastener shall be tightened to provide, when all fasteners in the joints are tight at least the minimum bolt tension shown in Table 403.2 for the size of fastener used.

Threaded bolts shall be tightened with properly calibrated wrenches or by the turn-of-nut method. If required, because of bolt entering and wrench operation clearances, tightening by either procedure may be done by turning the bolt while the nut is prevented from rotating. Impact wrenches, if used, shall be of adequate capacity and sufficiently supplied with air to perform the required tightening of each bolt in approximately ten seconds.

AASHTO M 253 and galvanized AASHTO M 164 (ASTM A 325) bolts shall not be reused. Other AASHTO M 164 (ASTM A 325) bolts may be reused, but not more than once, if approved by the Engineer. Retightening previously tightened bolts which may have been loosened by the tightening of adjacent bolts shall not be considered as a reuse.

1. Washers. All fasteners shall have a hardened washer under the element (nut or bolt head) turned in tightening except that AASHTO M 164 (ASTM A 325) bolts installed by the turn of the nut method in holes which are not oversized or slotted may have the washer omitted. Hardened washers shall be used under both the head and nut regardless of the element turned in the case of AASHTO M 253 bolts if the material against which it bears has a specified yield strength less than 275.76 MPa.

**Table 403.2 – Bolt Tension**

|  |  |  |
| --- | --- | --- |
|  | Minimum Bolt Tension1, kg. | |
| **Bolt Size, mm** | **AASHTO M 164**  **(ASTM A 325)**  **Bolts** | **AASHTO M 253**  **(ASTM A 420)**  **Bolts** |
| 12.7 | 5 466 | 6 758 |
| 15.9 | 8 709 | 10 569 |
| 19.0 | 12 882 | 15 821 |
| 22.2 | 13 268 | 21 999 |
| 25.4 | 23 360 | 24 312 |
| 28.6 | 25 605 | 36 786 |
| 31.7 | 32 522 | 45 858 |
| 34.9 | 38 760 | 55 111 |
| 38.1 | 47 174 | 66 905 |

**1 Equals to 70 percent of specified minimum tensile strength bolts. Where an outer face of the bolted parts has a slope of more than 1:20 with respect to a Plane normal to the bolt axis, a smooth bevelled washer shall be used to compensate for the lack of parallel line.**

1. Calibrated Wrench Tightening. When Calibrated wrenches are used to provide the bolt tension as specified above, their setting shall be such as to induce a bolt tension 5 to 10 percent in excess of this value. These wrenches shall be calibrated at least once each working day by tightening, in a device capable of indicating actual bolt tension, not less than three typical bolts of each diameter from the bolts to be installed. Power wrenches shall be adjusted to installed or cut-out at the selected tension. If manual torque wrenches are used, the torque indication corresponding to the calibrating tension shall be noted and used in the installation of all the tested lot. Nuts shall be turned in the tightening direction when torque is measured. When using calibrated wrenches to install several bolts in a single joint, the wrench shall be returned to “touch-up” bolts previously tightened which may have been loosened by the tightening of adjacent bolts, until all are tightened to the prescribed amount.
2. Turn-of-Nut Tightening. When the turn-of-nut method is used to provide the bolt tension specified in (a) above, there shall first be enough bolts brought to a “snug tight” condition to insure that the parts of the joint are brought into full contact with each other. Snug tight is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Following this initial operation, bolts shall be placed in any remaining holes in the connection and brought to snug tightness.

All bolts in the joints shall then be tightened additionally, by the applicable amount of nut rotation specified in Table 403.3 with tightening progressing systematically from the most rigid part of the joint to its free edges. During this operation, there shall be no rotation of the part not turned by the wrench.

e. Lock Pin and Collar Fasteners. The installation of lock pin and collar fasteners shall be by methods approved by the Engineer.

Table 403.3 – Nut Rotation From Snug Tight Condition1

|  |  |  |  |
| --- | --- | --- | --- |
|  | Disposition of Outer Faces of  Bolted Parts | | |
| Bolt Length measured from underside of head to extreme end of point | Both faces normal to faces normal to bolt axis | One face normal to bolt axis and other face sloped not more 1:20 (bevel washer not used) | Both faces sloped not more than 1:20 from normal to bolt axis (bevel washers not used) |
| Up to and including 4 diameters | 0.33 turn | 0.5 turn | 0.66 turn |
| Over 4 diameters but not exceeding 8 diameters | 0.5 turn | 0.66 turn | 0.625 turn |
| Over 8 diameters but not exceeding 12 diameters2 | 0.66 turn | 0.83 turn | 1 turn |

1  **Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by ½ turn and less the tolerance should be plus or minus 300, for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 450.**

**2 No research work has been performed by the Research Council on Riveted and Bolted Structural joints to establish the turn-of-nut procedure when bolt lengths exceed 12 diameters. Therefore, the required rotation must be determined by actual tests in a suitable tension device simulating the actual conditions.**

4. Inspection

The Engineer will determine that the requirements of these Specifications are not in the work. When the calibrated wrench method of tightening is used, the Engineer shall have full opportunity to witness the calibration tests.

The Engineer will observe the installation and tightening of the bolts to determine that the selected tightening procedure is properly used and will determine that all bolts are tightened.

The following inspection shall be used unless a more extensive or different procedure is specified:

* 1. The Contractor shall use an inspecting wrench which may either be a torque wrench or a power wrench that can be accurately adjusted in accordance with the requirements of Subsection 403.3.10(3) (c) above, in the presence of the Engineer.

b. Three bolts of the same grade, size and condition as those under inspection shall be placed individually in a calibration device capable of indicating bolt tension. Length may be any length representative of bolts used in the structure. There shall be a washer under the part turned in tightening each bolt.

c. When the inspecting wrench is a torque wrench, each of the three bolts specified above shall be tightened in the calibration device by any convenient means to the minimum tension specified for its size in Table 403.2. The inspecting wrench shall then be applied to the tightened bolt and the torque necessary to run the nut or head 5 degrees (approximately 25.4 mm at 304.8 mm radius) in the tightening direction shall be determined. The average torque measured in the tests of three bolts shall be taken as the job inspection torque to be used in the manner specified below.

d. When the inspecting wrench is a power wrench, it shall be adjusted so that it will tighten each of the three bolts specified to a tension at least 5 but not more than 10 percent greater than the minimum tension specified for its size in Table 403.2. This setting of wrench shall be taken as the job inspecting torque to be used in the manner specified below.

1. Bolts, represented by the three samples bolts prescribed above, which have been tightening in the structure shall be inspected by applying, in the tightening direction, the inspecting wrench and its job inspecting torque to 10 percent of the bolts, but not less than two bolts selected at random in each connection. If no nut or bolt head is turned by this application of the job inspecting torque, the connection shall be accepted as properly tightened. If any nut or bolt head is turned by the application of the job inspecting torque, this torque shall be applied to all bolts in the connection, and all bolts whose nut or head is turned by the job inspecting torque shall be tightened and re-inspected, or alternatively, the fabricator or erector, at his option may re-tighten all the bolts in the connection and then resubmit the connection for the specified inspection.

**403.3.11 Welding**

Welding shall be done in accordance with the best modern practice and the applicable requirements at AWS D1.1 except as modified by AASHTO “Standard Specifications for Welding of Structural Steel Highway Bridges”.

**403.3.12 Erection**

1. General

The Contractor shall provide the falsework and all tools, machinery and

appliances, including driftpins and fitting-up bolts, necessary for the expeditious handling of the work and shall erect the metal work, remove the temporary construction, and do all work necessary to complete the structure as required by the Contract and in accordance with the Plans and these Specifications.

If shown on the Plans or in the Special Provisions, the Contractor shall dismantle the old structure on the bridge site in accordance with Item 101, Removal of Structures and Obstructions.

**403.3.13 Handling and Storing Materials**

Materials to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Girders and beams shall be placed upright and shored. Long members, such as columns and chords, shall be supported on skids placed near enough together to prevent injury from deflection. If the Contract is for erection only, the Contractor shall check the material turned over to him against the shipping lists and report promptly in writing any shortage or damage discovered. He shall be responsible for the loss of any material while in his care, or for any damage caused to it after being received by him.

**403.3.14 Falsework**

The false work shall be properly designed and substantially constructed and maintained for the loads which will come upon it. The Contractor shall prepare and submit to the Engineer working drawings for falsework and working drawings for changes in any existing structure for maintaining traffic, in accordance with Clause 45 of Part G, Div. II, Vol. I.

**403.3.15 Method and Equipment**

Before starting the work of erection, the Contractor shall inform the Engineer fully as to the method of erection he proposes to follow, and the amount and character of equipment he proposes to use, which shall be subject to the approval of the Engineer. The approval of the Engineer shall not be considered as relieving the Contractor of the responsibility for the safety of his method or equipment or from carrying out the work in full accordance with the Plans and Specifications. No work shall be done until such approval by the Engineer has been obtained.

**403.3.16 Straightening Bent Materials**

The strengthening 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 injury. Distorted members shall be straightened by mechanical means or, if approved by the Engineer, by the carefully planned and supervised application of a limited amount of localized heat, except that heat straightening of AASHTO M 244 (ASTM A 514) or ASTM A 517 steel members shall be done only under rigidly controlled procedures, each application subject to the approval of the Engineer. In no case shall the maximum temperature of the AASHTO M 244 (ASTM A 514) or ASTM A 517 steels exceed 607.20C, nor shall the temperature exceed 5100C at the weld metal or within 152.4 mm of weld metal. Heat shall not be applied directly on weld metal. In all other steels, the temperature of the heated area shall not exceed 648.90C (a dull red) as controlled by temperature indicating crayons, liquids or bimetal thermometers.

Parts to be heat-straightened shall be substantially free of stress and from external forces, except stresses resulting from mechanical means used in conjunction with the application of heat.

Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture.

**403.3.17 Assembling Steel**

The parts shall be accurately assembled as shown on the working drawings and any matchmarks shall be followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will injure 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. Unless erected by the cantilever methods, truss spans shall be erected on blocking so placed as to give the trusses proper camber. The blocking shall be left in place until the tension chord splices are fully connected with permanent fasteners and all other truss connections pinned and erection bolted. Splices of butt joints of compression members, that are milled to bear and of railing shall not be permanently fastened until the spans have been swung, except that such permanent fastening may be accomplished for the truss members at any time that joint holes are fair. Splices and field connections shall

have one-half of the holes filled with erection bolts and cylindrical erection pins (half bolts and half pins) before placing permanent fasteners. Splices and connections carrying traffic during erection shall have three-fourths of the holes so filled, unless otherwise permitted by the Engineer.

Fitting-up bolts shall be of the same nominal diameter as the permanent fasteners and cylindrical erection pins will be 1.6 mm larger.

**403.3.18 Riveting**

Pneumatic hammers shall be used for field riveting except when the use of hand tools is permitted by the Engineer. Rivets larger than 15.9 mm in diameter shall not be driven by hand. Cup-faced dollies, fitting the head closely to insure good bearing, shall be used. Connections shall be accurately and securely fitted up before the rivets are driven.

Drifting shall be only such as to draw the parts into position and not sufficient to enlarge the holes or distort the metal. Unfair holes shall be reamed or drilled. Rivets shall be heated uniformly to a “light cherry red” color and shall be driven while hot. They shall not be overheated or burned. Rivet heads shall be full and symmetrical, concentric with the shank, and shall have full bearing all around. They shall not be smaller than the heads of the shop rivets. Rivets shall be tight and shall grip the connected parts securely together. Caulking or recupping will not be permitted. In removing rivets, the surrounding metal shall not be injured. If necessary, they shall be drilled out.

**403.3.19 Pin Connections**

Pilot and driving nuts shall be used in driving pins. They shall be furnished by the Contractor without charge. Pins shall be so driven that the members will take full bearing on them. Pin nuts shall be screwed up tight and the threads burred at the face of the nut with a pointed tool.

**403.3.20 Setting Shoes and Bearings**

Shoes and bearing shall not be placed on bridge seat bearing areas that are improperly finished, deformed, or irregular. They shall be set level in exact position and shall have full and even bearing. The shoes and bearing plates may be set by either of the following methods:

1. Method 1

The bridge seat bearing area shall be heavily coated with red lead paint and then covered with three layers of 405 to 472 g/m2 duck, each layer being coated thoroughly on its top surface with red lead paint. The shoes and bearing plates shall be placed in position while the paint is plastic.

As alternatives to canvas and red lead, and when so noted on the Plans or upon written permission by the Engineer, the following may be used:

a. Sheet lead of the designated thickness

* 1. Preformed fabric pad composed of multiple layers of 270 g/m2 duck impregnated and bound with high quality natural rubber or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness. The number of plies shall be such as to produce the specified thickness, after compression and vulcanizing. The finished pads shall withstand compression loads perpendicular to the plane of the laminations of not less than 7 kg/mm2 without detrimental reduction in thickness or extension.
  2. Elastomeric bearing pads

2. Method 2

The shoes and bearing plates shall be properly supported and fixed with grout. No load shall be placed on them until the grout has set for at least 96 hours, adequate provision being made to keep the grout well moistened during this period. The grout shall consist of one part Portland Cement to one part of fine-grained sand.

The location of the anchor bolts in relation to the slotted holes in expansion shoes shall correspond with the temperature at the time of erection. The nuts on anchor bolts at the expansion ends shall be adjusted to permit the free movement of the span.

**403.3.21 Preparing Metal Surfaces for Painting**

All surfaces of new structural steel which are to be painted shall be blast cleaned unless otherwise specified in the Special Provisions or approved in writing by the Engineer.

In repainting existing structures where partial cleaning is required, the method of cleaning will be specified in the Special Provision.

The steel surfaces to be painted shall be prepared as outlined in the “Steel Structures Painting Council Specifications” (SSPC) meeting one of the following classes of surface preparation.

1. SSPC – SP – 5 White Metal Blast Cleaning
2. SSPC – SP – 6 Commercial Blast Cleaning
3. SSPC – SP – 8 Pickling
4. SSPC – SP – 10 Near White Blast Cleaning

Blast cleaning shall leave all surfaces with a dense and uniform anchor pattern of not less than one and one-half mills as measured with an approved surface profile comparator.

Blast cleaned surfaces shall be primed or treated the same day blast cleaning is done. If cleaned surface rust or are contaminated with foreign material before painting is accomplished, they shall be recleaned by the Contractor at his expense.

When paint systems No. 1 or 3 are specified, the steel surfaces shall be blast cleaned in accordance with SSPC – SP – 10. When paint systems No. 2, 4 or 5 are specified, the steel surface shall be blast cleaned in accordance with SSPC – SP – 6.

**403.3.22 System of Paint**

The paint system to be applied shall consist of one as set forth in Table 403.4 and as modified in the Special Provisions.

**403.3.23 Painting Metal Surfaces**

1. Time of Application

The prime coat of paint or pretreatment when specified, shall be applied as soon as possible after the surface has been cleaned and before deterioration of the surface occurs. Any oil, grease, soil, dust or foreign matter deposited on the surface after the surface preparation is completed shall be removed prior to painting. In the event the rusting occurs after completion of the surface preparation, the surfaces shall be again cleaned.

Particular care shall be taken to prevent the contamination of cleaned surfaces with salts, acids, alkali, or other corrosive chemicals before the prime coat is applied and between applications of the remaining coats of paint. Such contaminants shall be removed from the surface. Under these circumstances, the pretreatments or, in the absence of a pretreatment, the prime coat of paint shall be applied immediately after the surface has been cleaned.

2. Storage of Paint and Thinner

All paint and thinner should preferably be stored in a separate building or room that is well ventilated and free from excessive heat, sparks, flame or the direct ray of the sun.

All containers of paint should remain unopened until required for use. Containers which have been opened shall be used first.

Paint which has livered, gelled, or otherwise deteriorated during storage shall not be used. Thixotropic materials which may be stirred to attain normal consistency are satisfactory.

3. Mixing and Thinning

All ingredients in any container of paint shall be thoroughly mixed before use and shall be agitated often enough during application to keep the pigment in suspension.

Paint mixed in the original container shall not be transferred until all settled pigment is incorporated into the vehicle. This does not imply that part of the vehicle cannot be poured off temporarily to simplify the mixing.

Mixing shall be by mechanical methods, except that hard mixing will be permitted for container up to 19 litres in size.

Mixing in open containers shall be done in a well ventilated area away from sparks or flames.

Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

When a skin has formed in the container, the skin shall be cut loose from the sides of the container, removed, and discarded. If such skins are thick enough to have a practical effect on the composition and quality of the paint, the paint shall not be used.

The paint shall be mixed in manner which will insure breaking up of all lumps, complete dispersion of settled pigment, and a uniform composition. If mixing is done by hand, most of the vehicle shall be poured off into a clean container. The pigment in the paint shall be lifted from the bottom of the container with a broad, flat paddle, lumps shall be broken up, and the pigment thoroughly mixed with the vehicle. The poured off vehicle shall be returned to the paint with simultaneous stirring, or pouring repeatedly from one container to another until the composition is uniform. The bottom of the container shall be inspected for unmixed pigment. Tinting pastes or colors shall be wetted with a small amount of thinner, vehicle, or paint and thoroughly mixed. The thinned mixture shall be added to the large container of paint and mixed until the color is uniform.

Paint which does not have a limited pot life, or does not deteriorate on standing, may be mixed at any time before using, but if settling has occurred, it must be remixed immediately before using. Paint shall not remain in spray pots, painter’s buckets, etc., overnight, but shall be gathered into a container and remixed before use.

No thinner shall be added to the paint unless necessary for proper application. In no case shall more than 0.5 litres of thinner be added per 3.8 litres unless the paint is intentionally formulated for greater thinning.

The type of thinner shall comply with the paint specification.

When the use of thinner is permissible, thinner shall be added to paint during the mixing process. Painters shall not add thinner to paint after it has been thinned to the correct consistency.

All thinning shall be done under supervision of one acquainted with the correct amount and type of thinner to be added to the paint.

**Table 403.4 – Paint System**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Paint System | | | | |
|  | 1 | 2 | 3 | 4 | 5 |
| High Pollution or Coastal | x | x | x |  |  |
| Mild Climate |  |  |  | x | X |

Note:

1. Paint system shown for severe areas are satisfactorily in less severe areas.

2. Coastal - within 304.8 m of ocean or tidal water.

High pollution-air pollution environment such as industrial areas.

Mild-other than coastal areas not in air pollution environment.

All structural steel shall be painted by one of the following systems. The required system or choice of systems will be shown in the Contract.

System 4 is intended for use in mild climates or to repaint existing structures where the other systems are not compatible.

|  |  |  |
| --- | --- | --- |
| **Coating Thickness** | **Specifications** | **Min. Dry Film** |
| System 1 – Vinyl Paint System | | |
| Wash Prime | 708.03 (b) | 12.7 |
| Intermediate Coat | 708.03 (b) | 38.10 – 50.80 |
| 3rd Coat | 708.03 (b) | 38.10 – 50.80 |
| 4th Coat | 708.03 (b) | 38.10 – 50.80 |
| Finish Coat | 708.03 (b) | 38.10 – 50.80 |
|  | Total thickness | 165.10 – 203.20 |
| System 2 – Epoxy-Polymide System | | |
| Prime Coat | 708.03 (c) | 50.80 – 76.20 |
| Intermediate Coat | 708.03 (c) | 50.80 – 76.20 |
| 3rd Coat | 708.03 (c) | 50.80 – 76.20 |
| Finish Coat | 708.03 (c) | 38.10 – 50.80 |
|  | Total thickness | 190.50 – 279.40 |
| \* The third coat may be eliminated in mild climates | | |

|  |  |  |
| --- | --- | --- |
| **Coating Thickness** | **Specifications** | **Min. Dry Film** |
| System 3 – Inorganic Zinc-Rich Coating System | | |
| Prime Coat | 708.03(d) | 88.90 – 127 |
| Epoxy Intermediate Coat | 708.03 (d) | 40.80 – 76.20 |
| Finish Coat | 708.03 (d) | 38.10 – 50.80 |
|  | Total thickness | 177.80 – 254 |
| Alternate System | | |
| Prime Coat | 708.03 (d) | 88.90 – 127 |
| Wash Primer Tie Coat | 708.03 (d) | 12.70 |
| Finish Coat | 708.03 (d) | 38.10 – 50.80 |
|  | Total thickness | 139.70 – 190.50 |
| System 4 – Alkyd-Oil-Basic Lead-Chromate System | | |
| Prime Coat | 708.03 (e) | 38.10 – 50.80 |
| Intermediate Coat | 708.03 (e) | 38.10 – 50.80 |
| Finish Coat | 708.03 (e) | 38.10 – 50.80 |
|  | Total thickness | 114.30 – 152.40 |
| \* The paint system may be specified as four coats for new structure steel in mild climate, with a minimum thickness of 152.40 mm. | | |
| System 5 – Organic Zinc-Rich Paint System | | |
| Prime Coat | 708.03 (f) | 38.10 – 50.80 |
| Intermediate Coat | 708.03 (f) | 50.80 – 63.50 |
| Wash Primer Tie Coat | 708.03 (f) | 12.70 |
| Finish Coat | 708.03 (f) | 38.10 – 50.80 |
|  | Total thickness | 139.70 – 177.80 |

4. Application of Paint

a. General

The oldest of each kind of paint shall be used first. Paint shall be applied by brushing or spraying or a combination of these methods. Daubers or sheepskins may be used when no other method is practicable for proper application in places of difficult access. Dipping, roller coating, or flow coating shall be used only when specifically authorized. All paints shall be applied in accordance with the manufacturer’s instructions.

Open seams at contact surfaces of built up members which would retain moisture shall be caulked with red lead paste, or other approved material, before the second undercoat of paint is applied.

Paint shall not be applied when the surrounding air temperature is below 4.40C. Paint shall not be applied when the temperature is expected to drop to 00C before the paint has dried. Paint shall not be applied to steel at a temperature over 51.70C unless the paint is specifically formulated for application at the proposed temperature, nor shall paint be applied to steel which is at a temperature that will cause blistering or porosity or otherwise will be detrimental to the life of the paint.

Paint shall not be applied in fog or mist, or when it is raining or when the relative humidity exceeds 85 percent. Paint shall not be applied to wet or damp surfaces.

When paint must be applied in damp or cold weather, the steel shall be painted under cover, or protected, or sheltered or the surrounding air and the steel heated to a satisfactory temperature. In such cases, the above temperature and humidity conditions shall be met. Such steel shall remain under cover or be protected until dry or until weather conditions permit its exposure.

Any applied paint exposed to excess humidity, rain or condensation shall first be permitted to dry. Then damaged areas of paint shall be removed, the surface again prepared and then repainted with the same number of coats of paint of the same kind as the undamaged areas.

If stripe painting is stipulated in the Special Provisions or if the Contractor chooses to do so at his option, all edges, corners, crevices, rivets, bolts, weld and sharp edges shall be painted with the priming paint by brush before the steel receives first full prime coat of paint. Such striping shall extend for at least 25.4 mm from the edge. When practicable, this stripe coat shall be permitted to dry before the prime coat is applied, otherwise the stripe coat shall set to touch before the full prime coat is applied. However, the stripe coat shall not be permitted to dry for a period of long enough to allow rusting of the unprimed steel. When desired, the stripe coat may be applied after a complete prime coat.

To the maximum extent practicable, each coat of paint shall be applied as continuous film of uniform thickness free of pores. Any thin spots or areas missed in the application shall be repainted and permitted to dry before the next coat of paint is applied. Film thickness is included in the description of paint systems. Each coat of paint shall be in a proper state of cure or dryness before application of the succeeding coat.

b. Brush Application

Paint shall be worked into all crevices and corners where possible and surfaces not accessible to brushes shall be painted by spray, doubers, or sheepskins. All runs or rags shall be brushed out. There shall be a minimum of brush marks left in the paint.

c. Spray Application of Paint

The equipment used for spray application of paint shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gages. The air caps, nozzles, and needles shall be those recommended by the manufacturer of the equipment for the material being sprayed. The equipment shall be kept in satisfactory condition to permit proper paint application. In closed or recirculating paint spray system, where gas under pressure is used over the liquid, the gas shall be an inert, one such as nitrogen. Traps or separators shall be provided to remove oil and water from the compressed air. These traps or separators shall be adequate size and shall be drained periodically during operations. The air from the spray gun impinging against the surface shall show no water or oil.

Paint ingredients shall be kept properly mixed in the spray pots or containers during paint applications either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

The pressure on the material in the pot and of the air at the guns shall be adjusted for optimum spraying effectiveness. The pressure on the material in the pot shall be adjusted when necessary for changes in elevation of the gun above the pot. The atomizing air pressure at the gun shall be high enough to atomize the paint properly but not so high as to cause excessive fogging of paint, excessive evaporation of solvent or loss by overspray.

Spray equipment shall be kept sufficiently clean so that dirt, dried paint and other foreign material are not deposited in the paint film. Any solvents left in the equipment shall be completely removed before applying paint to the surface being painted.

Paint shall be applied in uniform layer, with overlapping at the edge of the spray pattern. The spray shall be adjusted so that the paint is deposited uniformly. During application, the gun shall be held perpendicular to the surface and at a distance which will insure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke.

All rums and sags shall be brushed out immediately or the paint shall be removed and the surface repainted. Spray application of prime coats shall in all cases be immediately followed by brushing

Areas inaccessible to the spray gun shall be painted by brush, if not accessible by brush, daubers or sheepskins shall be used. Brushes shall be used to work paint into cracks, crevices and blind spots where are not adequately painted by spray.

d. Shop Painting

Shop painting shall be done after fabrication and before any damage to the surface occurs from weather or other exposure. Shop contact surfaces shall not be painted unless specified.

Surfaces not to be in contact but which will be inaccessible after assembly shall receive the full paint system specified or three shop coats of the specified before assembly.

The areas of steel surfaces to be in contact with concrete shall not be painted, unless otherwise shown on the Plans, the areas of steel surfaces to be in contact with wood shall receive either the full paint coats specified or three shop coats of the specified primer.

If paint would be harmful to a welding operator or would be detrimental to the welding operation or the finished welds, the steel shall not be painted within a suitable distance from the edges to be welded. Welding through inorganic zinc paint systems will not be permitted unless approved by the Engineer.

Antiweld spatter coatings shall be removed before painting. Weld slag and flux shall be removed by methods at least as effective as those specified for the cleaning.

Machine-finished or similar surfaces that are not to be painted, but do not require protections, shall be protected with a coating of rust inhibitive petroleum, other coating which may be more suitable, for special conditions.

Erection marks and weight marks shall be copied on area that have been previously painted with the shop coat.

e. Field Painting

Steel structures shall be painted as soon as practicable after erection.

Metal which has been shop coated shall be touched up with the same type of paints as the shop coat. This touch-up shall include cleaning and painting of field connections, welds, rivets and all damaged or defective paint and rusted areas. The Contractor may, at his option, apply an overall coat of primer in place of touch-up spot painting.

Surfaces (other than contact surfaces) which are accessible before erection but which will not be accessible after erection shall receive all field coats of paint before erection.

If possible the final coat of paint shall not be applied until all concrete work is finished. If concreting or other operations damage any paint, the surfaces shall be cleaned and repainted. All cement or concrete spatter and dripping shall be removed before any paint is applied.

Wet paint shall be protected against damage from dust or other detrimental foreign matter to the extent practicable.

f. Drying of Painted Metal

The maximum practicable time shall be allowed for paint to dry before recoating or exposure. No drier shall be added to paint on the job unless specifically called for in the Specifications for the paint. No painted metal shall be subjected to immersion before the paint is dried through. Paint shall be protected from rain, condensation, contamination, and freezing until dry, to the fullest extent practicable.

g. Handling of Painted Steel

Painted steel shall not be handled until the paint has dried, except for necessary handling in turning for painting or stacking for drying.

Paint which is damaged in handling shall be scraped off and touched-up with the same number of the coats and kinds of paint as were previously applied to the steel.

Painted steel shall not be loaded for shipment or shipped until it is dry.

Precautions shall be taken to minimize damage to paint films resulting from stocking members.

5. Measurement of Dry Film Thickness of Paints

a. Instrumentation

Dry paint film thickness shall be measured using Pull-Off (Type 1) or Fixed Probe (Type 2) Magnetic Gages. Type 1 gages include Tinsley, Elcometer, Microtest and Inspector models. Type 2 gage include Elcometric, Minitector, General Electric, Verimeter and Accuderm models.

* 1. Calibration

1. Type 1 (Pull-Off) Magnetic Gages

Measure the coating thickness on a series of reliable standards covering the expected range of paint thickness. Record the calibration correction either plus (+) or minus (-) required at each standard thickness. To guard against gage drift during use, re-check occasionally with one or more of the standards.

When the gage adjustment has drifted so far that large corrections are needed, it is advisable to re-adjust closer to the standard values and re-calibrate.

For Type 1 gages, the preferred basic standards are small, chromeplated steel panels that may be available from the National Bureau of Standards in coating thickness from 12.70 mm to 203.20 mm.

Plastic shims of certified thickness in the appropriate ranges may also be used to calibrate the gages. The gage is held firmly enough to press the shim tightly against the steel surface. Record the calibration correction as above.

2. Type 2 (Fixed Probe) Magnetic Gages

Shims of plastic or non-magnetic metals laid on the appropriate steel base (at least 76.2 x 76.2 x 3.2 mm) are suitable working standards. These gages are held firmly enough to press the shim tightly against the steel surface. One should avoid excessive pressure that might indent the plastic or, on a blast cleaned surface, might impress the steel peaks into the undersurface of the plastic.

The National Bureau of Standards – standards panels shall not be used to calibrate Type 2 gages.

c. Measurement Procedures

To determine the effect of the substrate surface condition on the gage readings, access is required to some unpainted areas.

Repeated gage readings, even at points close together, may differ considerably due to small surface irregularities. Three gage readings should therefore be made for each spot measurement of either the substrate or the paint. Move the probe a short distance for each new gage reading. Discard any unusually high of flow gage reading that cannot be repeated consistently. Take the average of the three gage readings as the spot measurement.

1. Measurement with Type 1 (Pull-Off) Gage

Measure (A), the bare substrate, at a number of spots to obtain a representative average value. Measure (B), the dry paint film, at the specified number of spots.

Correct the (A) and (B) gage readings or averages as determined by calibration of the gage. Subtract the corrected readings (A) from (B) to obtain the thickness of the paint above the peaks of the surface.

2. Measurement with Type 2 (Fixed Probe) Gage

Place a standard shim of the expected paint thickness on the bare substrate that is to be painted. Adjust the gage in place on the shim so that it indicates the known thickness of the shim.

Conform the gage setting by measuring the shim at several other area of the bare substrate. Re-adjust the gage as needed to obtain an average setting representative of the substrate.

With the gage adjustment as above, measure the dry paint film at three points. The gage readings indicate the paint film thickness at the three points. The gage readings indicate the paint thickness above the peaks of the surface profile.

Re-check the gage setting at frequent intervals during a long series of measurements. Make five separate spot measurements spaced evenly over each section of the structure 9.29 square metres in area, or of other area as may be specified. The average of five spot measurements for each such section shall not be less than the specified thickness. No single spot measurement (average of three readings) in any section shall be less than 80% of the specified thickness.

Since paint thickness is usually specified (or implied) as a minimum, greater thickness that does not cause defects of appearance or functions such as mud cracking, wrinkling, etc., is permitted unless otherwise specified.

d. Special Notes

All of the above magnetic, if properly adjusted and in good condition, are inherently accurate to within +15% of the true thickness of the coating.

Much larger, external errors may be caused by variations in method of use of the gages or by unevenness of the surface of the substrate or of the coating. Also, any other film present on the steel (rust or mill scale or even a blast cleaned profile zone) will add to the apparent thickness of the applied paint film.

The surface of the paint and the probe of the gage must be free from dust, grease and other foreign matter in order to obtain close contact of the probe with the paint and also to avoid adhesion of the magnet. The accuracy of the measurement will be affected if the coating is tacky or excessively soft.

The magnetic gages are sensitive to geometrical discontinuities of the steel, as at holes, corners or edges. The sensitivity to edge effects and discontinuities varies from gage to gage. Measurements closer than 25.4 mm from the discontinuity may not be valid unless the gage is calibrated specifically for that location.

Magnetic gage readings also may be affected by proximity to another mass of steel close to the body of the gage, by surface curvature and presence of other magnetic fields.

All of the magnets or probe must be held perpendicular to the painted surface to produce valid measurements.

**403.3.24 Clean-up**

Upon completion and before final acceptance, the Contractor shall remove all falsework, falsework piling down to at least 609.6 mm below the finished ground line, excavated or unused materials, rubbish and temporary buildings. He shall replace or renew any fences damaged and restored in an acceptable manner all property, both public and private, which may have been damaged during the prosecution of the work and shall leave the work site and adjacent highway in a neat and presentable condition, satisfactory to the Engineer. All excavated material or falsework placed in the stream channel during construction shall be removed by the Contractor before final acceptance.

**403.4 Method of Measurement**

**403.4.1 Unit Basis**

The quantity of structural steel to be paid for shall be the number of kilos complete in place and accepted. For the purpose of measurement for payment components fabricated from metals listed in (1) below, such as casting, alloy steels, steel plates, anchor bolts and nuts, shoes, rockers, rollers, pins and nuts, expansion dams, roadway drains and souppers, welds metal, bolts embedded in concrete, cradles and brackets, posts, conduits and ducts, and structural shapes for expansion joints and pier protection will be considered as structural steel.

Unless otherwise provided, the mass of metal paid for shall be computed and based upon the following mass:

1. Unit Density kg/m3

|  |  |
| --- | --- |
| Aluminum, cast or rolled | 2771.2 |
| Bronze or copper alloy | 8585.9 |
| Copper sheet | 8938.3 |
| Iron, cast | 7128.2 |
| Iron, malleable | 7528.7 |
| Lead, sheet | 11229 |
| Steel, cast or rolled, including alloy copper bearing and stainless | 7849 |
| Zinc | 7208.3 |

1. Shapes, Plates Railing and Flooring

The mass of steel shapes and plates shall be computed on the basis of their nominal mass and dimensions as shown on the approved shop drawings, deducting for copes, cuts and open holes, exclusive of rivets holes. The mass of all plates shall be computed on the basis of nominal dimensions with no additional for overrun.

The mass of railing shall be included as structural steel unless the Bill of Quantities contains as pay item for bridge railing under Item 401, Railings.

The mass of steel grid flooring shall be computed separately.

1. Casting

The mass of casting shall be computed from the dimensions shown on the approved drawings, deducting for open holes. To this mass will be added 5 percent allowable for fillets and overruns. Scale mass may be substituted for computed mass in the case of castings of small complex parts for which accurate computations of mass would be difficult.

1. Miscellaneous

The mass of erection bolts, shop and field paint, galvanizing the boxes, crates and other containers used for shipping, together with sills, struts, and rods used for supporting members during the transportation, bridge hardware as defined in Subsection 402.2.2 excluding steel plates and bearings, connectors used for joining timber members, nails, spikes and bolts, except anchor bolts will be excluded.

1. Rivets Heads

The mass of all rivet heads, both files and shop, will be assumed as follows:

|  |  |  |
| --- | --- | --- |
| **Diameter of rivet**  **(mm)** |  | **kg per 100 heads** |
| 12.7 |  | 1.80 |
| 15.9 |  | 3.20 |
| 19.0 |  | 5.44 |
| 22.2 |  | 8.16 |
| 25.4 |  | 11.80 |
| 28.6 |  | 16.33 |
| 31.7 |  | 21.8 |

1. High-Strength Bolts

High-strength steel bolts shall be considered for purpose of payment, the same as rivets of the same diameter, with the mass of the bolt heads and nuts the same as the corresponding rivet heads.

1. Welds

The mass of shop and field fillet welds shall be assumed as follows:

|  |  |  |
| --- | --- | --- |
| **Size of Weld**  **(mm)** |  | **kg per linear metre** |
| 6.3 |  | 0.984 |
| 7.9 |  | 1.213 |
| 9.5 |  | 1.771 |
| 12.7 |  | 2.690 |
| 5.9 |  | 3.936 |
| 19.0 |  | 5.379 |
| 22.2 |  | 7.314 |
| 25.4 |  | 9.774 |

The mass of other welds will be computed on the basis of the theoretical volume from dimensions of the welds, with an addition of 50 mass percent as an allowance for overrun.

1. Other Items

The quantities of other Contract Items which enter into the completed and accepted structure shall be measured for payment in the manner prescribed for the Items involved.

**403.4.2 Lump Sum Basis**

Lump sum will be the basis of payment unless noted otherwise in the bidding documents. No measurements of quantities will be made except as provided in Subsection 403.5.1 (4).

**403.5 Basis of Payment**

**403.5.1 Structural Steel**

1. Furnished, Fabricated and Erected

The quantity, determined as provided above, shall be paid for at the contract unit price per kilogram for “Structural Steel, furnished, fabricated and erected”, which price and payment shall constitute full compensation for furnishing, galvanizing, fabricating, radiographing, magnetic particle inspection, delivering, erecting ready for use, and painting all steel and other metal including all labor, equipment, tools and incidentals necessary to complete the work, except as provided in Subsections 403.5.2, 403.5.3 and 403.5.4.

2. Furnished and Fabricated

When a quantity and unit price for “Structural Steel, furnished and fabricated” are shown in the Bill of Quantities, the quantity, determined as provided above, will be paid for at the contract unit price per kilogram which price and payment shall be full compensation for furnishing, galvanizing, fabricating, radiographing, magnet particle inspection, shop painting and delivering the structural steel and other metal free of charges at the place designated in the Special Provisions and for all labor, equipment, tools and incidentals necessary to complete the work, save erection and except as provided in Subsection 403.5.2, 403.5.3 and 403.5.4.

3. Erected

When a quantity and unit price for “Structural Steel Erected” are shown in the Bill of Quantities, the quantity, determined as provided above, will be paid for at the said contract unit price per kilogram which price and payment shall be full compensation for unloading all the structural steel and other metal, payment of any demurrage charges, transporting to the bridge site, erecting, magnetic particle inspection and radiographing, complete ready for use including furnishing and applying the field paint including all labor, equipment, tools and incidentals necessary to complete the work, save furnishing and fabrication, and except as provided in Subsections 403.5.2, 403.5.3 and 403.5.4.

4. Lump Sum

When the Bill of Quantities calls for lump sum price for “Structural Steel, furnished, fabricated and erected”, the Item will be paid for at the contract lump sum price and payment shall be full compensation for furnishing, fabricating and erecting material and for all work herein before prescribed in connection therewith, including all labor, equipment, tools and incidentals necessary to complete the work, except as provided in Subsections 403.5.2, 403.5.3 and 403.5.4.

The estimate of the mass of structural steel shown on the Plans is approximate only and no guarantee is made that it is the correct mass to be furnished. No adjustment in the contract price will be made if the mass furnished is more or less than estimated mass.

If changes in the work are ordered by the Engineer, which vary the mass of steel to be furnished, the lump sum payment shall be adjusted as follows:

1. The value per kilogram of the increase or decrease in mass of structural steel involved in the change shall be determined by dividing the contract lump sum amount by the estimate of mass shown on the Plans. The adjusted contract lump sum payment shall be the contract lump sum plus or minus the value of the steel involved in the change, and no additional compensation shall be made on account of said change.
2. Full-size members which are tested in accordance with the Specifications when such tests are required by the Contract, shall be paid for at the same rate as for comparable members in the structure. Members which fail to meet the Contract requirements, and members rejected as a result of test shall not be paid for.

**403.5.2 Material Considered as Structural Steel**

For the purpose of Subsection 403.5.1 and unless otherwise shown on the Plans, castings, forgings, special alloy steels and steel plates, wrought iron, and structural shapes of expansion joints and pier protection shall be considered as structural steel except that when quantities and unit price for certain alloy steels, forgings, castings or other specific categories of metal are called for in the Bill of Quantities, the mass of such selected material, determined as provided above, shall be paid for at the respective contract unit price per kilogram for “Structural Steel (Alloy steel, forgings, castings, and/or other category), furnished and fabricated, and erected” or “Structural Steel (Subsection 403.4.1), furnished and fabricated” as named in the Bill of Quantities.

**403.5.3 Other Items**

The quantities of all other Contract Items which enter into the completed and accepted structure shall be paid for at the contract unit prices for the several Pay Items as prescribed for the Items involved.

**403.5.4 Payment as Reinforcing Steel**

When the Bill of Quantities does not contain a pay item for structural steel, the quantities of metal drains, scuppers, conduits, ducts and structural shapes for expansion joints and pier protection, measured as provided above will be paid for as Reinforcing Steel under Item 404.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| Pay Item Number | Description | Unit of Measurement |
| 403 (1) | Structural Steel,  furnished, fabricated  and erected | kilogram |
| 403 (2) | Structural Steel,  furnished, fabricated  and erected | kilogram |
| 403 (3) | Structural Steel,  furnished, fabricated | kilogram |
| 403 (4) | Structural Steel,  furnished, fabricated | kilogram |
| 403 (5) | Structural Steel erected | kilogram |
| 403 (6) | Structural Steel erected | kilogram |
| 403 (7) | Structural Steel,  furnished, fabricated  and erected | kilogram |

Where separate payment is to be made for certain metals or for certain particular components, other than under the general provision for structural steel, designation of those particular cases shall be inserted in the spaces provided in the pay names for Item 403 (2), 403 (4) or 403 (6), as the case may be.

# ITEM 404 – REINFORCING STEEL

* 1. **Description**

This Item shall consist of furnishing, bending, fabricating and placing of steel reinforcement of the type, size, shape and grade required in accordance with this Specification and in conformity with the requirements shown on the Plans or as directed by the Engineer.

* 1. **Material Requirements**

Reinforcing steel shall meet the requirements of item 710, Reinforcing Steel and Wire Rope.

* + 1. **Construction Requirements**

**404.3.1 Order Lists**

Before materials are ordered, all order lists and bending diagrams shall be furnished by the Contractor, for approval of the Engineer. The approval of order lists and bending diagrams by the Engineer shall in no way relieve the Contractor of responsibility for the correctness of such lists and diagrams. Any expense incident to the revisions of materials furnished in accordance with such lists and diagrams to make them comply with the Plans shall be borne by the Contractor.

**404.3.2 Protection of Material**

Steel reinforcement shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, detrimental rust, loose scale, paint, grease, oil, or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel specified.

* + 1. **Bending**

All reinforcing bars requiring bending shall be cold-bent to the shapes shown on the Plans or required by the Engineer. Bars shall be bent around a circular pin having the following diameters (D) in relation to the diameter of the bar (d):

|  |  |
| --- | --- |
| Nominal diameter, d, mm | Pin diameter (D) |
| 10 to 20  25 to 28  32 and greater | 6d  8d  10d |

Bends and hooks in stirrups or ties may be bent to the diameter of the principal bar enclosed therein.

* + 1. **Placing and Fastening**

All steel reinforcement shall be accurately placed in the position shown on the Plans or required by the Engineer and firmly held there during the placing and setting of the concrete. Bars shall be tied at all intersections except where spacing is less than 300mm in each directions, in which case, alternate intersections shall be tied. Ties shall be fastened on the inside.

Distance from the forms shall be maintained by means of stays, blocks, ties, hangers, or other approved supports, so that it does not vary from the position indicated on the Plans by more than 6mm. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shapes and dimensions. Layers of bars shall be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks shall not be permitted. Unless otherwise shown on the Plans or required by the Engineer, the minimum distance between bars shall be 40mm. Reinforcement in any member shall be placed and then inspected and approved by the Engineer before the placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal may be required. If fabric reinforcement is shipped in rolls, it shall be straightened before being placed. Bundled bars shall be tied together at not more than 1.8m intervals.

* + 1. **Splicing**

All reinforcement shall be furnished in the full lengths indicated on the Plans. Splicing of bars, except where shown on the Plans, will not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible and with a minimum separation of not less than 40 bar diameters. Not more than one-third of the bars may be spliced in the same cross-section, except where shown on the Plans.

Unless otherwise shown on the Plans, bars shall be lapped a minimum distance of:

|  |  |  |  |
| --- | --- | --- | --- |
| Splice Type | Grade 40  min. lap | Grade 60  min. lap | But not less than |
| Tension | 24 bar dia | 36 bar dia | 300 mm |
| Compression | 20 bar dia | 24 bar dia | 300 mm |

In lapped splices, the bars shall be placed in contact and wired together. Lapped splices will not be permitted at locations where the concrete section is insufficient to provide minimum clear distance of one and one-third the maximum size of coarse aggregate between the splice and the nearest adjacent bar. Welding of reinforcing steel shall be done only if detailed on the Plans or if authorized by the Engineer in writing. Spiral reinforcement shall be spliced by lapping at least one and a half turns or by butt welding unless otherwise shown on the Plans.

* + 1. **Lapping of Bar Mat**

Sheets of mesh or bar mat reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges. The overlap shall not be less than one mesh in width.

* 1. **Method of Measurement**

The quantity of reinforcing steel to be paid for will be the final quantity placed and accepted in the completed structure.

No allowance will be made for tie-wires, separators, wire chairs and other material used in fastening the reinforcing steel in place. If bars are substituted upon the Contractor’s request and approved by the Engineer and as a result thereof more steel is used than specified, only the mass specified shall be measured for payment.

No measurement or payment will be made for splices added by the Contractor unless directed or approved by the Engineer.

When there is no item for reinforcing steel in the Bill of Quantities, costs will be considered as incidental to the other items in the Bill of Quantities.

* 1. **Basis of Payment**

The accepted quantity, measured as prescribed in Section 404.4, shall be paid for at the contract unit price for Reinforcing Steel which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| Pay Item Number | Description | Unit of Measurement |
| 404 | Reinforcing Steel | Kilogram |

# ITEM 405 – STRUCTURAL CONCRETE

* 1. **Description**

**405.1.1 Scope**

This Item shall consist of furnishing, bending, placing and finishing concrete in all structures except pavements in accordance with this Specification and conforming to the lines, grades, and dimensions shown on the Plans. Concrete shall consist of a mixture of Portland Cement, fine aggregate, coarse aggregate, admixture when specified, and water mixed in the proportions specified or approved by the Engineer.

**405.1.2 Classes and Uses of Concrete**

Five classes of concrete are provided for in this Item, namely: A, B, C, P and Seal. Each class shall be used in that part of the structure as called for on the Plans.

The classes of concrete will generally be used as follows:

Class A – All superstructures and heavily reinforced substructures. The important parts of the structure included are slabs, beams, girders, columns, arch ribs, box culverts, reinforced abutments, retaining walls, and reinforced footings.

Class B – Footings, pedestals, massive pier shafts, pipe bedding, and gravity walls, unreinforced or with only a small amount of reinforcement.

Class C – Thin reinforced sections, railings, precast R.C. piles and cribbing and for filler in steel grid floors.

Class P – Prestressed concrete structures and members.

Seal – Concrete deposited in water.

* 1. **Material Requirements**

**405.2.1 Portland Cement**

It shall conform to all the requirements of Subsection 311.2.1.

* + 1. **Fine Aggregate**

It shall conform to all the requirements of Subsection 311.2.2.

* + 1. **Coarse Aggregate**

It shall conform all the requirements of Subsection 311.2.3 except that gradation shall conform to Table 405.1.

Table 405.1 – Grading Requirements for Coarse Aggregate

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sieve Designation | | Mass Percent Passing | | | | |
| Standard  Mm | Alternate  US Standard | Class  A | Class  B | Class  C | Class  P | Class  Seal |
| 63  50  37.5  25  19.0  12.5  9.5  4.75 | 2-1/2”  2”  1-1/2”  1”  ¾”  ½”  3/8”  No.4 | 100  95 – 100  -  35 – 70  -  10 – 30  0 - 5 | 100  95 – 100  -  35 – 70  -  10 – 30  -  0 - 5 | 100  90 – 100  40 – 70  0 – 15\* | 100  95 – 100  -  20 – 55  0 – 10\* | 100  95 – 100  -  25 – 60  -  0 – 10\* |

\* The measured cement content shall be within plus (+) or minus (-) 2 mass percent of the design cement content.

* + 1. **Water**

It shall conform to the requirements of Subsection 311.2.4

* + 1. **Reinforcing Steel**

It shall conform to the requirements of Item 710, Reinforcing Steel and Wire Rope.

* + 1. **Admixtures**

Admixtures shall conform to the requirements of Subsection 311.2.7

* + 1. **Curing Materials**

Curing materials shall conform to the requirements of Subsection 311.2.8.

* + 1. **Expansion Joint Materials**

Expansion joint materials shall be:

1. Preformed Sponge Rubber and Cork, conforming to AASHTO M 153.
2. Hot-Poured Elastic Type, conforming to AASHTO M 173.
3. Preformed Fillers, conforming to AASHTO M 213.
   * 1. **Elastomeric Compression Joint Seals**

These shall conform to AASHTO M 220.

* + 1. **Elastomeric Bearing Pads**

These shall conform to AASHTO M 251 or Item 412 – Elastomeric Bearing Pads.

* + 1. **Storage of Cement and Aggregates**

Storage of cement and aggregates shall conform to all the requirements of Subsection 311.2.10.

* 1. **Sampling and Testing of Structural Concrete**

As work progresses, at least one (1) sample consisting of three (3) concrete cylinder test specimens, 150 x 300mm (6 x 12 inches), shall be taken from each seventy five (75) cubic meters of each class of concrete or fraction thereof placed each day.

Compliance with the requirements of this Section shall be determined in accordance with the following standard methods of AASHTO:

|  |  |
| --- | --- |
| Sampling of fresh concrete  Weight per cubic metre and air content (gravi-  Metric) of concrete  Sieve analysis of fine and coarse aggregates  Slump of Portland Cement Concrete  Specific gravity and absorption of fine aggregate | T 141  T 121  T 27  T 119  T 84 |

Tests for strength shall be made in accordance with the following:

|  |  |
| --- | --- |
| Making and curing concrete compressive and  flexural tests specimens in the field  Compressive strength of molded concrete  Cylinders | T 23  T 22 |

* 1. **Production Requirements**
     1. **Proportioning and Strength of Structural Concrete**

The concrete materials shall be proportioned in accordance with the requirements for each class of concrete as specified in Table 405.2, using the absolute volume method as outlined in the American Concrete Institute (ACI) Standard 211.1. “Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete”. Other methods of proportioning may be employed in the mix design with prior approval of the Engineer. The mix shall either be designed or approved by the Engineer. A change in the source of materials during the progress of work may necessitate a new mix design.

The strength requirements for each class of concrete shall be as specified in Table 405.2.

Table 405.2 - Composition and Strength of Concrete for Use in Structures

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Class  Of  Concrete | Minimum  Cement  Content  Per m3  kg  (bag\*\*) | Maximum  Water/  Cement  Ratio  kg/kg | Consistency  Range in  Slump  mm (inch) | Designated  Size of Coarse  Aggregate  Square Opening  Std. mm | Minimum  Compressive  Strength of 150x300mm  Concrete  Cylinder  Specimen at  28 days,  MN/m2 (psi) |
| A  B  C  P  Seal | 360  (9 bags)  320  (8 bags)  380  (9.5 bags)  440  (11 bags)  380  (9.5 bags) | 0.53  0.58  0.55  0.49  0.58 | 50 – 100  (2 – 4)  50 – 100  (2 – 4)  50 – 100  (2 – 4)  100 max.  (4 max.)  100 – 200  (4 - 8) | 37.5 – 4.75  (1-1/2” – No. 4)  50 – 4.75  (2” – No. 4)  12.5 – 4.75  (1/2” – No. 4)  19.0 – 4.75  (3/4” – No. 4)  25 – 4.75  (1” – No. 4) | 20.7  (3000)  16.5  (2400)  20.7  (3000)  37.7  (5000)  20.7  (3000) |

\* The measured cement content shall be within plus or minus 2 mass percent of the design cement content.

\*\* Based on 40 kg/bag

**405.4.2 Consistency**

Concrete shall have a consistency such that it will be workable in the required position. It shall be of such a consistency that it will flow around reinforcing steel but individual particles of the coarse aggregate when isolated shall show a coating of mortar containing its proportionate amount of sand. The consistency of concrete shall be gauged by the ability of the equipment to properly place it and not by the difficulty in mixing and transporting. The quantity of mixing water shall be determined by the Engineer and shall not be varied without his consent. Concrete as dry as it is practical to place with the equipment specified shall be used.

**405.4.3 Batching**

Measuring and batching of materials shall be done at a batching plant.

1. Portland Cement

Either sacked or bulk cement may be used. No fraction of a sack of cement shall be used in a batch of concrete unless the cement is weighed. All bulk cement shall be weighed on an approved weighing device. The bulk cement weighing hopper shall be properly sealed and vented to preclude dusting operation. The discharge chute shall not be suspended from the weighing hopper and shall be so arranged that cement will neither be lodged in it nor leak from it.

Accuracy of batching shall be within plus (+) or minus (-) 1 mass percent.

1. Water

Water may be measured either by volume or by weight. The accuracy of measuring the water shall be within a range of error of not more than 1 percent.

1. Aggregates

Stockpiling of aggregates shall be in accordance with Subsection 311.2.10. All aggregates whether produced or handled by hydraulic methods or washed, shall be stockpiled or binned for draining for at least 12 hours prior to batching. Rail shipment requiring more than12 hours will be accepted as adequate binning only if the car bodies permit free drainage. If the aggregates contain high or non-uniform moisture content, storage or stockpile period in excess of 12 hours may be required by the Engineer.

Batching shall be conducted as to result in a 2 mass percent maximum tolerance for the required materials.

1. Bins and Scales

The batching plant shall include separate bins for bulk cement, fine aggregate and for each size of coarse aggregate, a weighing hopper, and scales capable of determining accurately the mass of each component of the batch.

Scales shall be accurate to one-half (0.5) percent throughout the range used.

1. Batching

When batches are hauled to the mixer, bulk cement shall be transported either in waterproof compartments or between the fine and coarse aggregate. When cement is placed in contact with moist aggregates, batches will be rejected unless mixed within 1-1/2 hours of such contact. Sacked cement may be transported on top of the aggregates.

Batches shall be delivered to the mixer separate and intact. Each batch shall be dumped cleanly into the mixer without loss, and, when more than one batch is carried on the truck, without spilling of material from one batch compartment into another.

1. Admixtures

The Contractor shall follow an approved procedure for adding the specified amount of admixture to each batch and will be responsible for its uniform operation during the progress of the work. He shall provide separate scales for the admixtures which are to be proportioned by weight, and accurate measures for those to be proportioned by volume. Admixtures shall be measured into the mixer with an accuracy of plus or minus three (3) percent.

The use of Calcium Chloride as an admixture will not be permitted.

**405.4.4 Mixing and Delivery**

Concrete may be mixed at the site of construction, at a central point or by a combination of central point and truck mixing or by a combination of central point mixing and truck agitating. Mixing and delivery of concrete shall be in accordance with the appropriate requirements of AASHTO M 157 except as modified in the following paragraphs of this section, for truck mixing or a combination of central point and truck mixing or truck agitating. Delivery of concrete shall be regulated so that placing is at a continuous rate unless delayed by the placing operations. The intervals between delivery of batches shall not be so great as to allow the concrete inplace to harden partially, and in no case shall such an interval exceed 30 minutes.

In exceptional cases and when volumetric measurements are authorized, for small project requiring less than 75 cu.m. per day of pouring, the weight proportions shall be converted to equivalent volumetric proportions. In such cases, suitable allowance shall be made for variations in the moisture condition of the aggregates, including the bulking effect in the fine aggregate. Batching and mixing shall be in accordance with ASTM C 685, Section 6 through 9.

Concrete mixing, by chute is allowed provided that a weighing scales for determining the batch weight will be used.

For batch mixing at the site of construction or at a central point, a batch mixer of an approved type shall be used. Mixer having a rated capacity of less than a one-bag batch shall not be used. The volume of concrete mixed per batch shall not exceed the mixer’s nominal capacity as shown on the manufacturer’s standard rating plate on the mixer except that an overload up to 10 percent above the mixer’s nominal capacity may be permitted, provided concrete test data for strength, segregation, and uniform consistency are satisfactory and provided no spillage of concrete takes place. The batch shall be so charge into the drum that a portion of the water shall enter in advance of the cement and aggregates. The flow of water shall be uniform and all water shall be in the drum by the end of the first 15 seconds of the mixing period. Mixing time shall be measured from the time all materials, except water, are in the drum. Mixing time shall not be less than 60 seconds for mixers having a capacity of 1.5m3 or less. For mixers having a capacity greater than 1.5m3, the mixing time shall not be less than 90 seconds. If timing starts, the instant the skip reaches its maximum raised position, 4 seconds shall be added to the specified mixing time. Mixing time ends when the discharge chute opens.

The mixer shall be operated at the drum speed as shown on the manufacturer’s name plate on the mixer. Any concrete mixed less than the specified time shall be discarded and disposed off by the Contractor at his own expenses.

The timing device on stationary mixers shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released. In case of failure of the timing device, the Contractor will be permitted to continue operations while it is being repaired, provided he furnishes an approved timepiece equipped with minute and second hands. If the timing device is not placed in good working order within 24 hours, further use of the mixer will be prohibited until repairs are made.

Retempering concrete will not be permitted. Admixtures for increasing the workability, for retarding the set, or for accelerating the set or improving the pumping characteristics of the concrete will be permitted only when specifically provided for in the Contract, or authorized in writing by the Engineer.

1. Mixing Concrete: General

Concrete shall be thoroughly mixed in a mixer of an approved size and type that will insure a uniform distribution of the materials throughout the mass.

All concrete shall be mixed in mechanically operated mixers. Mixing plant and equipment for transporting and placing concrete shall be arranged with an ample auxiliary installation to provide a minimum supply of concrete in case of breakdown of machinery or in case the normal supply of concrete is disrupted. The auxiliary supply of concrete shall be sufficient to complete the casting of a section up to a construction joint that will meet the approval of the Engineer.

Equipment having components made of aluminum or magnesium alloys, which would have contact with plastic concrete during mixing, transporting or pumping of Portland Cement concrete, shall not be used.

Concrete mixers shall be equipped with adequate water storage and a device of accurately measuring and automatically controlling the amount of water used.

Materials shall be measured by weighing. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. The accuracy of all weighing devices except that for water shall be such that successive quantities can be measured to within one percent of the desired amounts. The water measuring device shall be accurate to plus or minus 0.5 mass percent. All measuring devices shall be subject to the approval of the Engineer. Scales and measuring devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to insure their accuracy.

Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the entire plant is running, the scale reading at cut-off shall not vary from the weight designated by the Engineer more than one mass percent for cement, 1-1/2 mass percent for any size of aggregate, or one (1) mass percent for the total aggregate in any batch.

1. Mixing Concrete at Site

Concrete mixers may be of the revolving drum or the revolving blade type and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. The pick-up and throw-over blades of mixers shall be restored or replaced when any part or section is worn 20mm or more below the original height of the manufacturer’s design. Mixers and agitators which have an accumulation of hard concrete or mortar shall not be used.

When bulk cement is used and volume of the batch is 0.5m3 or more, the scale and weigh hopper for Portland Cement shall be separate and distinct from the aggregate hopper or hoppers. The discharge mechanism of the bulk cement weigh hopper shall be interlocked against opening before the full amount of cement is in the hopper. The discharging mechanism shall also be interlocked against opening when the amount of cement in the hopper is underweight by more than one (1) mass percent or overweight by more than 3 mass percent of the amount specified.

When the aggregate contains more water than the quantity necessary to produce a saturated surface dry condition, representative samples shall be taken and the moisture content determined for each kind of aggregate.

The batch shall be so charged into the mixer that some water will enter in advance of cement and aggregate. All water shall be in the drum by the end of the first quarter of the specified mixing time.

Cement shall be batched and charged into the mixer so that it will not result in loss of cement due to the effect of wind, or in accumulation of cement on surface of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cement in the concrete mixture.

The entire content of a batch mixer shall be removed from the drum before materials for a succeeding batch are placed therein. The materials composing a batch except water shall be deposited simultaneously into the mixer.

All concrete shall be mixed for a period of not less than 1-1/2 minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at the speed for which it has been designed.

Mixers shall be operated with an automatic timing device that can be locked by the Engineer. The time device and discharge mechanics shall be so interlocked that during normal operation no part of the batch will be charged until the specified mixing time has elapsed.

The first batch of concrete materials placed in the mixer shall contain a sufficient excess of cement, sand, and water to coat inside of the drum without reducing the required mortar content of the mix. When mixing is to cease for a period of one hour or more, the mixer shall be thoroughly cleaned.

1. Mixing Concrete at Central Plant

Mixing at central plant shall conform to the requirements for mixing at the site.

1. Mixing Concrete in Truck

Truck mixers, unless otherwise authorized by the Engineer, shall be of the revolving drum type, water-tight, and so constructed that the concrete can be mixed to insure a uniform distribution of materials throughout the mass. All solid materials for the concrete shall be accurately measured and charged into the drum at the proportioning plant. Except as subsequently provided, the truck mixer shall be equipped with a device by which the quantity of water added can be readily verified. The mixing water may be added directly to the batch, in which case a tank is not required. Truck mixers may be required to be provided with a means of which the mixing time can be readily verified by the Engineer.

The maximum size of batch in truck mixers shall not exceed the minimum rated capacity of the mixer as stated by the manufacturer and stamped in metal on the mixer. Truck mixing, shall, unless other-wise directed be continued for not less than 100 revolutions after all ingredients, including water, are in the drum. The mixing speed shall not be less than 4 rpm, nor more than 6 rpm.

Mixing shall begin within 30 minutes after the cement has been added either to the water or aggregate, but when cement is charged into a mixer drum containing water or surface wet aggregate and when the temperature is above 32oC, this limit shall be reduced to 15 minutes. The limitation in time between the introduction of the cement to the aggregate and the beginning of the mixing may be waived when, in the judgement of the Engineer, the aggregate is sufficiently free from moisture, so that there will be no harmful effects on the cement.

When a truck mixer is used for transportation, the mixing time specified in Subsection 405.4.4 (3) at a stationary mixer may be reduced to 30 seconds and the mixing completed in a truck mixer. The mixing time in the truck mixer shall be as specified for truck mixing.

1. Transporting Mixed Concrete

Mixed concrete may only be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturers of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable point for adequate placement and consolidation in place.

Truck agitators shall be loaded not to exceed the manufacturer’s guaranteed capacity. They shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point.

The rate of discharge of mixed concrete from truck mixers or agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within one hour, or before 250 revolutions of the drum or blades, whichever comes first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 30oC, or above, a time less than one hour will be required.

1. Delivery of Mixed Concrete

The Contractor shall have sufficient plant capacity and transportation apparatus to insure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing and finishing of the concrete. The rate shall be such that the interval between batches shall not exceed 20 minutes. The methods of delivering and handling the concrete shall be such as will facilitate placing of the minimum handling.

* 1. **Method of Measurement**

The quantity of structural concrete to be paid for will be the final quantity placed and accepted in the completed structure. No deduction will be made for the volume occupied by pipe less than 100mm (4 inches) in diameter or by reinforcing steel, anchors, conduits, weep holes or expansion joint materials.

* 1. **Basis of Payment**

The accepted quantities, measured as prescribed in Section 405.5, shall be paid for at the contract unit price for each of the Pay Item listed below that is included in the Bill of Quantities.

Payment shall constitute full compensation for furnishing, placing and finishing concrete including all labor, equipment, tools and incidentals necessary to complete the work prescribed in the item.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| Pay Item Number | Description | Unit of Measurement |
| 405 (1)  405 (2)  405 (3)  405 (4)  405 (5) | Structural Concrete, Class A  Structural Concrete, Class B  Structural Concrete, Class C  Structural Concrete, Class P  Seal Concrete | Cubic Meter  Cubic Meter  Cubic Meter  Cubic Meter  Cubic Meter |

***FOR SOLAR PANELS , WIRES AND CONTROL:***

**Supply, Delivery and Installation of Solar Panels for Water Pump**

- Solar Panels, 3,300W -(10 pcs. Per set) 330w per panel

Peak Power (Pmax) : 330W

Open Circuit Voltage (Voc) : 46.94V

Short Circuit Current (Isc) : 9.25A

Max. Power Voltage (Vmp) : 38.15V

Max. Power Current (Imp) : 8.65A

Module Weight : 21.8Kg

Module Dimension (LxWxH) mm : 1956 x 992 x35mm

Power Tolerance : 0-+5%

Standard Test Condition : 1000w/m², 25°c, AM 1.5

- AC-DC Breaker SPD w/ Safety Box (Control)

- Ground rod

- 120m PV Cable

- 120m Pump Cable

- Other accessories

***FOR SUBMERSIBLE PUMP AND MOTOR:***

Supply, Delivery and Installation of 3 Hp Submersible Pump,Single phase having a 7.5 cubic meter per hour Flow output and Maximum Head of 150 m.

Pipe outlet size : 1 ¼” dia.

Pump Length : 1 m. approx.

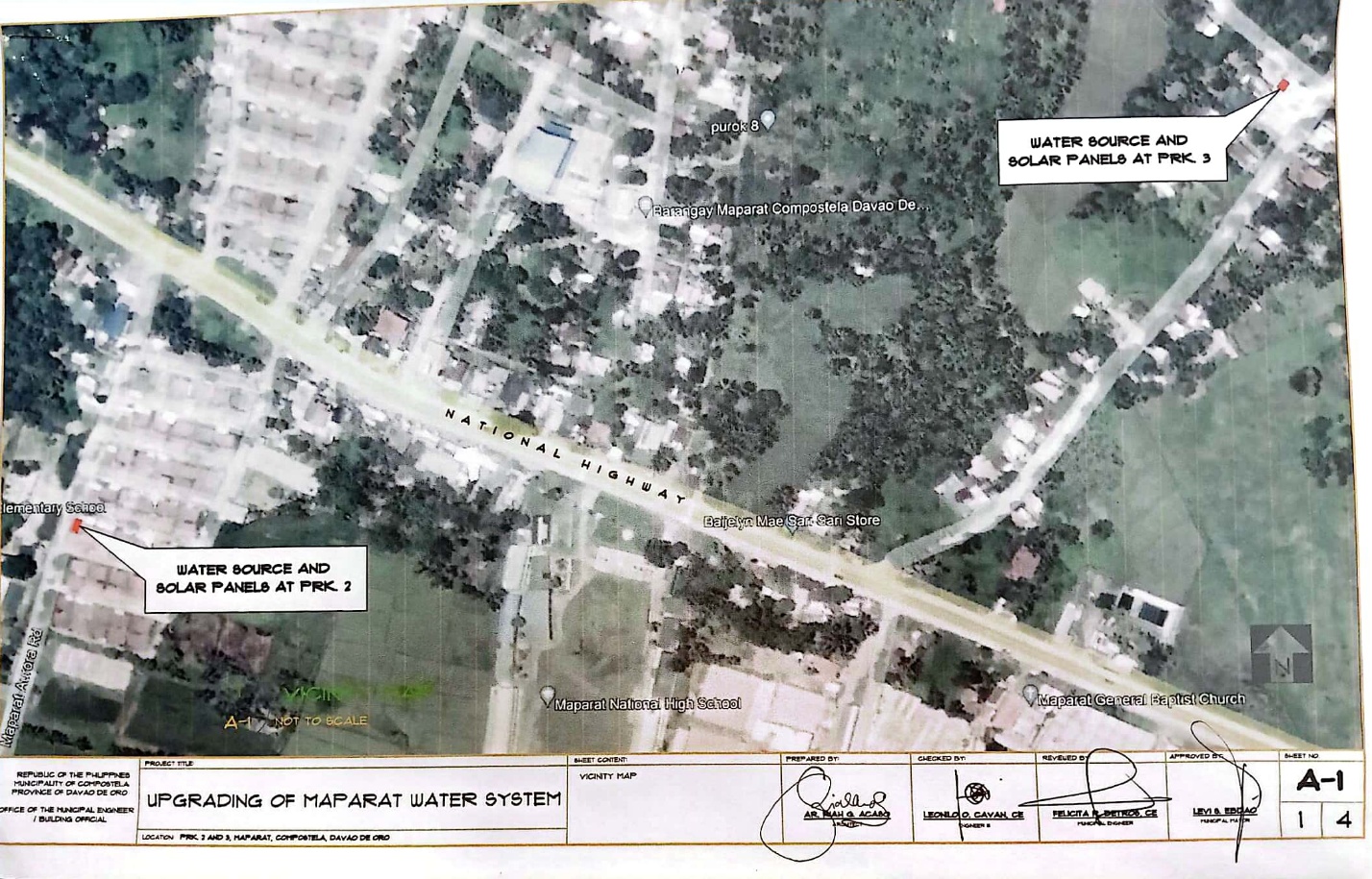
Pump Q : 7.5 cubic meter/hr

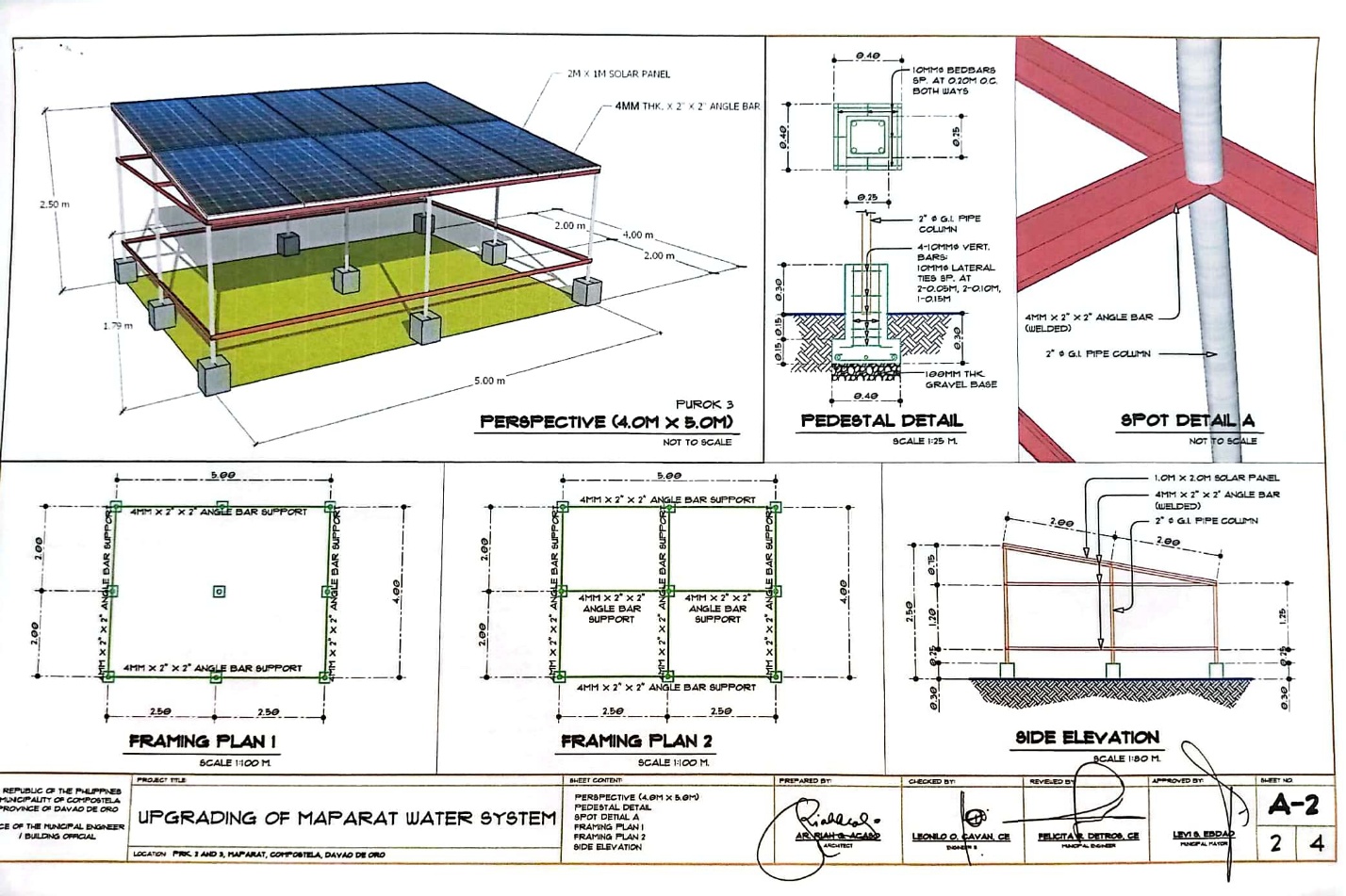
TDH : 150m

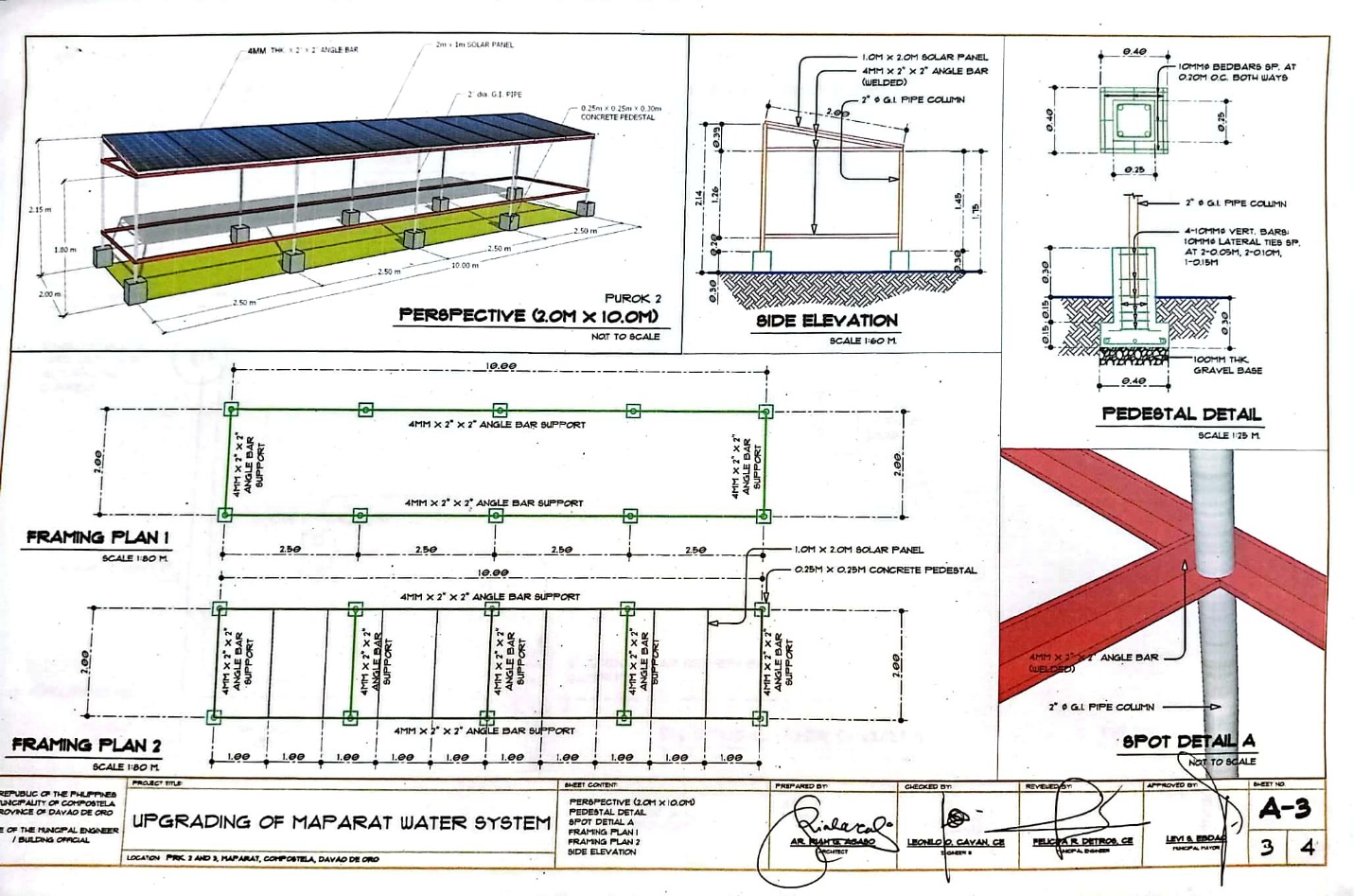
E

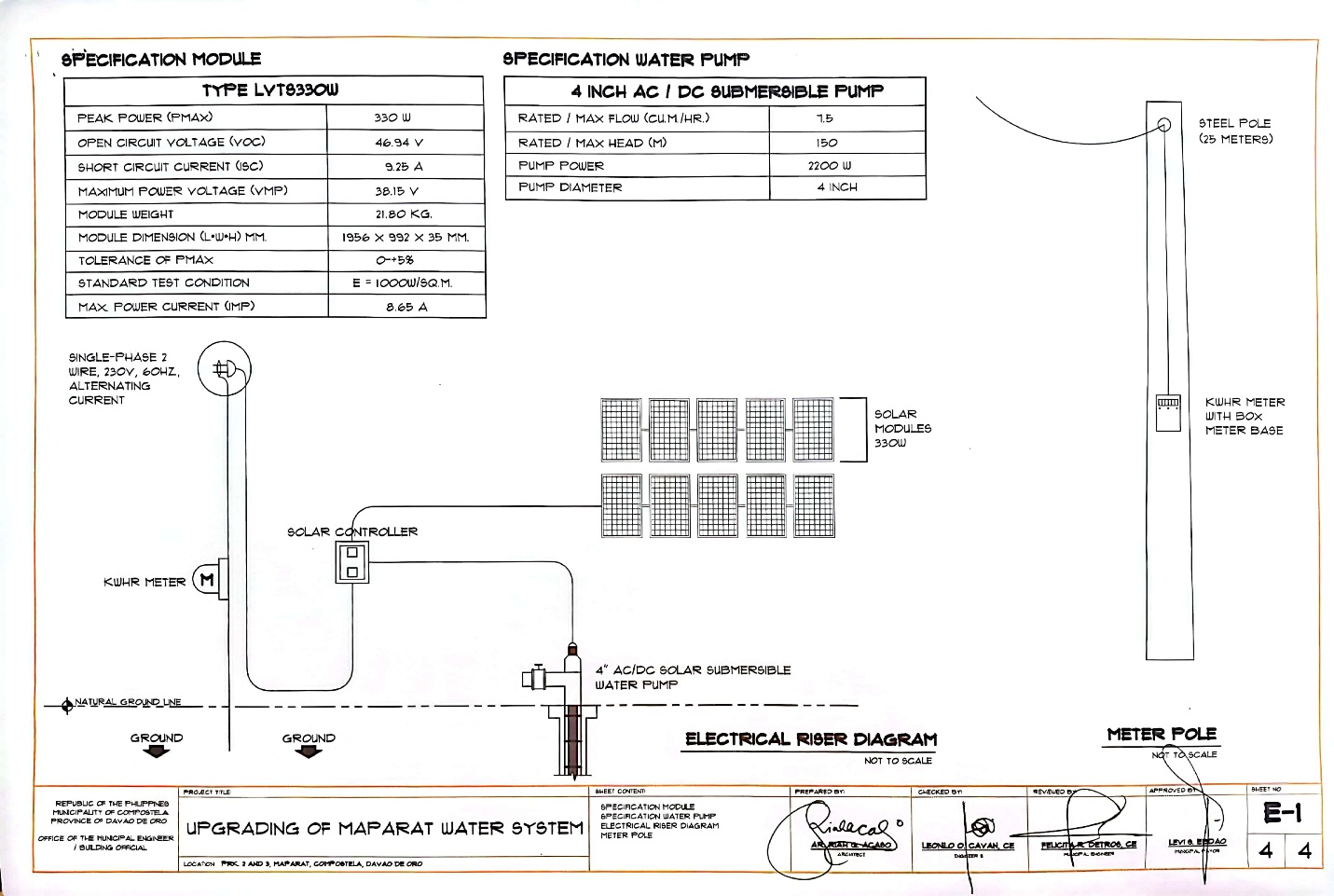
# Section VII. Drawings

*[Insert here a list of Drawings. The actual Drawings, including site plans, should be attached to this section, or annexed in a separate folder.]*









# Section VIII. Bill of Quantities

**Project Title: *Upgrading of Maparat Water System- MEO***

**ABC (Php): *999,962.12***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Project Title: ***Upgrading of Maparat Water System- MEO*** | | | | | |
| ABC (Php): ***999,962.12*** | | | | | |
| Item No. | Description of Works | Quantity | Unit | Unit Price (In words & figures) | Total Price (In words & figures) |
| 1. | I. Supply, Delivery and Installation of Solar Panel | 2 | Set |  |  |
| - Solar Panels, 3,300W – (10pcs. Per Set) 330W Per Panels |
| -AC- DC Breaker SPD w/ Safety Box |
| -Ground Rod |
| -120m PV Cable |
| -120m Pump |
| 2. | II. Supply, Delivery and Installation of 1 unit 3.0 Hp Submersible Pump, Single Phase Having a 7.5 Cubic Meter per Hour Flow Output and Maximum Head of 150m | 2 | Set |  |  |
| 3. | III. Pedestal Frame for Solar Panels | 1 | Lot |  |  |
| 4. | IV. Billboard | 2 | Each |  |  |
| ***GRAND TOTAL (In words and Figures)*** | | | | |  |

Note: Total cost of line item includes cost of Contractor’s Profit, VAT Tax, others

|  |  |  |
| --- | --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Name of Bidder | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Authorized Signatory | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date |

# Section IX. Checklist of Technical and Financial Documents

**Checklist of Technical and Financial Documents**

|  |  |  |
| --- | --- | --- |
| 1. **TECHNICAL COMPONENT ENVELOPE** | | |
| ***Class “A” Documents*** | | |
| *Legal Documents* | | |
|  | * + - 1. Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);   **or** | |
|  | * + - 1. Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document;   **and** | |
|  | * + - 1. Mayor’s or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;   **and** | |
|  | 1. Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR). | |
| *Technical Documents* | | |
|  | 1. Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and** | |
|  | 1. Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules; **and** | |
|  | 1. Philippine Contractors Accreditation Board (PCAB) License;   **or**  Special PCAB License in case of Joint Ventures;  **and** registration for the type and cost of the contract to be bid; **and** | |
|  | 1. Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission;   **or**  Original copy of Notarized Bid Securing Declaration; **and** | |
|  | 1. Project Requirements, which shall include the following: | |
|  | * 1. Organizational chart for the contract to be bid; | |
|  | * 1. List of contractor’s key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data; | |
|  | * 1. List of contractor’s major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be;   2. Affidavit of Site Inspection;   3. Construction schedule and S-curve;   4. Manpower schedule;   5. Construction methods;   6. Equipment utilization schedule;   7. Construction Safety and Health Program approved by DOLE – to be submitted on the first billing;   8. PERT/CPM **and** | |
|  | 1. Original duly signed Omnibus Sworn Statement (OSS);   **and** if applicable, Original Notarized Secretary’s Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder. | |
|  | 1. Mayor’s Permit (Municipality of Compostela) | |
|  | 1. Bidder’s Fee (Official Receipt) | |
|  |  | |
| *Financial Documents* | | |
|  | 1. The prospective bidder’s audited financial statements, showing, among others, the prospective bidder’s total and current assets and liabilities, stamped “received” by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and** | |
|  | 1. The prospective bidder’s computation of Net Financial Contracting Capacity (NFCC). | |
| ***Class “B” Documents*** | | |
|  | 1. If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence;   **or**  duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful. | |
| 1. **FINANCIAL COMPONENT ENVELOPE** | | |
|  | | 1. Original of duly signed and accomplished Financial Bid Form; **and** |
| *Other documentary requirements under RA No. 9184* | | |
|  | | 1. Original of duly signed Bid Prices in the Bill of Quantities; **and** |
|  | | 1. Duly accomplished Detailed Estimates Form, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipment rentals used in coming up with the Bid; **and** |
|  | | 1. Cash Flow by Quarter. |

**Bidding Forms**

**Bid Form for the Procurement of Infrastructure Projects**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### BID FORM

Date : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project Identification No. : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*To: [name and address of Procuring Entity]*

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers],* the receipt of which is hereby duly acknowledged, we, the undersigned, declare that:

1. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: *[insert name of contract];*
2. We offer to execute the Works for this Contract in accordance with the PBDs;
3. The total price of our Bid in words and figures, excluding any discounts offered below is: *[insert information]*;
4. The discounts offered and the methodology for their application are: *[insert information]*;
5. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties],* which are itemized herein and reflected in the detailed estimates,
6. Our Bid shall be valid within the a period stated in the PBDs, and it shall remain binding upon us at any time before the expiration of that period;
7. If our Bid is accepted, we commit to obtain a Performance Security in the amount of *[insert percentage amount]* percent of the Contract Price for the due performance of the Contract, or a Performance Securing Declaration in lieu of the the allowable forms of Performance Security, subject to the terms and conditions of issued GPPB guidelines for this purpose;
8. We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;
9. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and
10. We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.
11. We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the [Name of Project] of the [Name of the Procuring Entity*].*
12. We acknowledge that failure to sign each and every page of this Bid Form, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Legal Capacity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Duly authorized to sign the Bid for and behalf of: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STATEMENT OF THE BIDDER OF ALL ITS ONGOING GOVERNMENT AND PRIVATE CONTRACTS, INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED**

Business Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Business Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name of Contract | Date of Contract | Contract Duration | Owner’s Name & Address | Nature of Work | Contractor’s Role | | Total Contract Value at Award | Estimated Comple-tion Time | Estimated Contract Value at Comple-tion | % of Accomplish-ments | | Value of Outstanding Works |
| Descrip-tion | % of Participa-tion | Planned | Actual |
| *GOVERNMENT* |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| *PRIVATE* |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | | | | | | | | | | *TOTAL* | |  |

Note: This statement shall be supported with:

1. Notice of Award
2. Contract Agreement

Submitted by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Printed Name and Signature

Designation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STATEMENT OF SINGLE LARGEST COMPLETED CONTRACTS (SLCC)**

Business Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Business Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name of Contract | Date of Contract | Owner’s Name & Address | Nature of Work | Contractor’s Role | | Total Contract Value at Award | Date of Completion Time | Total Contract Value at Completion |
| Description | % of Participa-tion |
| Government |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Private |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Note: This statement shall be supported with:

1. Notice of Award and/or Notice to Proceed
2. Contract Agreement
3. Certificate of Final Acceptance or Constructors Performance Evaluation System (CPES) of at least satisfactory rating.

Submitted by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Printed Name and Signature

Designation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NFCC COMPUTATION**

1. Summary of the Applicant Supplier’s/Distributor’s/Manufacturer’s assets and liabilities on the basis of the attached income tax return and audited financial statement, stamped “RECEIVED” by the Bureau of Internal Revenue or BIR authorized collecting agent, for the immediately preceding year and a certified copy of Schedule of Fixed Assets particularly the list of construction equipment.

|  |  |  |
| --- | --- | --- |
|  |  | Year 20\_\_ |
| 1. | Total Assets |  |
| 2. | Current Assets |  |
| 3. | Total Liabilities |  |
| 4. | Current Liabilities |  |
| 5. | Net Worth (1-3) |  |
| 6. | Net Working Capital (2- 4) |  |

1. The Net Financial Contracting Capacity (NFCC) based on the above data is computed as follows:

NFCC = [(Current Asset – Current Liabilities) (15)] minus value of all outstanding works under ongoing contracts including awarded contracts yet to be started

NFCC = P \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Submitted by:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Supplier / Distributor / Manufacturer

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of Authorized Representative

Date : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Bid Securing Declaration Form**

***[shall be submitted with the Bid if bidder opts to provide this form of bid security]***

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

REPUBLIC OF THE PHILIPPINES)

CITY OF \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) S.S.

**BID SECURING DECLARATION**

**Project Identification No.: *[Insert number]***

To: *[Insert name and address of the Procuring Entity]*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid Securing Declaration.
2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any procurement contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1(b), 34.2, 40.1 and 69.1, except 69.1(f),of the IRR of RA No. 9184; without prejudice to other legal action the government may undertake.
3. I/We understand that this Bid Securing Declaration shall cease to be valid on the following circumstances:
   * + 1. Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
       2. I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right; and
       3. I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this \_\_\_\_ day of *[month] [year]* at *[place of execution]*.

*[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]*

*[Insert signatory’s legal capacity]*

Affiant

***[Jurat]***

*[Format shall be based on the latest Rules on Notarial Practice]*

**Omnibus Sworn Statement (Revised)**

***[shall be submitted with the Bid]***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

REPUBLIC OF THE PHILIPPINES )

CITY/MUNICIPALITY OF \_\_\_\_\_\_ ) S.S.

**AFFIDAVIT**

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

*[If a sole proprietorship:]* I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

*[If a partnership, corporation, cooperative, or joint venture:]* I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

1. *[Select one, delete the other:]*

*[If a sole proprietorship:]* As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

*[If a partnership, corporation, cooperative, or joint venture:]* I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary’s Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable;)];

1. [Name of Bidder] is not “blacklisted” or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, **by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;**

1. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

1. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;
2. *[Select one, delete the rest:]*

*[If a sole proprietorship:]* The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

*[If a partnership or cooperative:]* None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

*[If a corporation or joint venture:]* None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

1. *[Name of Bidder]* complies with existing labor laws and standards; and

1. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:
   1. Carefully examining all of the Bidding Documents;
   2. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
   3. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
   4. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

1. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.
2. **In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.**

**IN WITNESS WHEREOF**, I have hereunto set my hand this \_\_ day of \_\_\_, 20\_\_ at \_\_\_\_\_\_\_\_\_\_\_\_, Philippines.

*[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]*

*[Insert signatory’s legal capacity]*

Affiant

***[Jurat]***

*[Format shall be based on the latest Rules on Notarial Practice]*

**FOR YOUR INFORMATION!**

**BIDDERS/SUPPLIERS/CONTRACTOR’S**

**ARTICLE 17 – PERMIT FEE FOR PRIVATE CONTRACTORS**

**Section 85 – DEFINITION OF TERMS**

1. **“CONTRACTOR” –** includes persons, natural or juridical, not subject to professional tax under Section 139 of the Local Government Code, whose activity consist essentially of the sale of all kinds of goods or services for a fee, regardless of whether or not the performance of the service calls for the exercise or use of the physical or mental faculties of such contractor or his/her employees or supplier, manufacturer of heavy or light equipment and the likes.

**SECTION 86 – TAX ON BUSINESS SITUATED OUTSIDE THE MUNICIPALITY**

A tax shall be imposed to any person or entity whose business is situated outside the Municipality after participating a public bidding or other modality of procurement have been awarded the contract subject to the existing tax schedule promulgated for the purpose and the nature of business as defined herein.

The total contract cost shown in the Purchase Order and or Contract Agreement shall be the amount subject to tax. Corresponding deduction shall be made for each transaction and for any and all voucher made as payment of obligation incurred after full delivery of goods and services and acceptance thereof.

**SECTION 87 – IMPOSITION OF CONTRACTOR PERMIT FEE**

That any individual, person, company, corporation or having juridical entity shall secure necessary permit and **shall pay a Contractor Permit Fee of One Percent (1%) based on the Project Cost.**

**SECTION 88 – TIME OF PAYMENT**

The fee is imposed shall be payable before issuance of Notice to Proceed or Notice of Award or shall be made before the commencement of the work.

***As per 2022 Revised Omnibus Revenue Code of the Municipality of Compostela.***

