REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION
REGIONAL OFFICE NO. VII (CENTRAL VISAYAS)
DAO, TAGBILARAN CITY, BOHOL

CANLAMBONG CIS
(REHBAILITATION OF SPILLWAY, CANAL STRUCTURES AND CONCRETE CANAL LINING)
DIMIAO, BOHOL

BCSIMO-LMC-12-2023

20 July 2023

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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
NATIONAL IRRIGATION ADMINISTRATION
REGIONAL OFFICE NO. VII (CENTRAL VISAYAS)
DAO, TAGBILARAN CITY, BOHOL

INVITATION TO BID

FOR CANLAMBONG CIS (REHABILITATION OF SPILLWAY, CANAL STRUCTURES AND CONCRETE CANAL LINING), DIMIAO, BOHOL

1. National Irrigation Administration - Regional Office 7 (NIA-RO7), through General Appropriation Act –REPAIR for Calendar Year (CY) 2023 intends to apply the sum of **Four Million Eight Hundred Thirty Nine Thousand Nine Hundred Fifty Pesos & 81/100 (PhP 4,839,950.81)** being the Approved Budget for the Contract (ABC) to payment under contract **CANLAMBONG CIS (REHABILITATION OF SPILLWAY, CANAL STRUCTURES AND CONCRETE CANAL LINING), DIMIAO, BOHOL** with Contract No. **BCSIMO-LMC-12-2023**. Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The NIA-RO7 now invites bid for the above Procurement Project. Completion of the Work is required **150 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. Instruction 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 the NIA-RO7 and inspect Bidding Documents at the address given below from 8:00 AM to 5:00 PM except during declared (special & regular) holidays and weekends.

5. A complete set of Bidding Documents may be acquired by interested Bidders who were able to log-in in the Philippine Government Electronic Procurement System (PhilGEPS) wherein the name of the company will be reflected in the Documents Request List of the Bid Notice Abstract of the Procuring Entity, from **July 20, 2023, 8:00 AM to August 11, 2023, 8:30 AM** during office hour from the given address and website(s) below & upon presentation of the payment from NIA-RO7 Cashier of non-refundable fee of **Five Thousand Pesos (Php 5,000.00)** only. The Procuring Entity shall allow the bidder to present its proof of payment for the fees in person, by facsimile, or through electronic means.

   Interested Bidders' representatives must also present a letter duly signed by the General Manager/Owner, if a Sole Proprietorship, or authorized Signatory if a Corporation, authorizing him/her to acquire the Bidding Documents.

6. The NIA-RO7, will hold a Pre-Bid Conference on **July 28, 2023, 9:00 AM** at **Central Visayas Training Center (CVTC), NIA-RO7, Dao District, Tagbilaran City, Bohol** and/or through videoconferencing/webcasting via Google Meet**,** which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat through manual submission at the office address as indicated below on or before **August 11, 2023, 9:00 AM**. Late bids shall not be accepted.

8. All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in ITB Clause 18.

9. Bid opening shall be on **August 11, 2023, 9:00 AM** at **Central Visayas Training Center (CVTC), NIA-RO7, Dao District, Tagbilaran City, Bohol** and/or through video conferencing/webcasting Google Meet. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The NIA-RO7, 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.

11. For further information, please refer to:
    NIA-RO7, BAC Secretariat
    J.A. Clarin St., Dao District
    Tagbilaran City, Bohol
    Email Address: niaro7.bacsec@gmail.com
    Telephone No. (038) 501 9421/ (038) 427 1018

12. You may visit the website (region7.nia.gov.ph) for downloading of Bidding Documents.

ENGR. ORENCIO M. APALE
BAC Chairperson

Section II. Instructions to Bidders

1. Scope of Bid

The *National Irrigation Administration - Regional Office 7(NIA-RO7) i*nvites Bids for the *Canlambong CIS (Rehabilitation of Spillway, Canal Structures and Concrete Canal Lining), Dimiao, Bohol*, with Project Identification Number *BCSIMO-LMC-12-2023*.

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

2. Funding Information

2.1. The GOP through the source of funding as indicated below for GAA- REPAIR CIS Project FY 2023 in the amount of PhP 4,839,950.81.

2.2. The source of funding is:

a. NGA, the General Appropriations Act or Special Appropriations.

3. 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.

4. 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.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. 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**.

5.3. 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.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

6. 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.

7. Subcontracts

7.1. 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:

a. Subcontracting is not allowed.

7.1. *[If Procuring Entity has determined that subcontracting is allowed during the bidding , state:]* The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criterial stated in **ITB** Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.

7.2. *[If subcontracting is allowed during the contract implementation stage, state:]* The Supplier may identify its subcontractor during the contract implementation stage. Subcontractors identified during the bidding may be changed during the implementation of this Contract. Subcontractors must submit the documentary requirements under Section 23.1 of the 2016 revised IRR of RA No. 9184 and comply with the eligibility criteria specified in **ITB** Clause 5 to the implementing or end-user unit.

7.3. 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.

8. 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 and/or through videoconferencing/webcasting} as indicated in paragraph 6 of the **IB.**

9. 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.

10. Documents Comprising the Bid: Eligibility and Technical Components

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

10.2. 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.

10.3. 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**.

10.4. 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**.

10.5. 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**.

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.3. 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.

12. 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.

13. 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.

14. Bid and Payment Currencies

14.1. 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.

14.2. *Payment of the contract price shall be made in:*

a. Philippine Pesos.

15. Bid Security

15.1. 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**.

15.2. The Bid and bid security shall be valid until *120calendar days from opening of bid.* Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

16. 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.

17. 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.**

18. Opening and Preliminary Examination of Bids

18.1. 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.

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

19. Detailed Evaluation and Comparison of Bids

19.1. 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.

19.2. 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 16 shall be submitted for each contract (lot) separately.

19.3. 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.

20. 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**.

21. 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: ***Canal Structures and Concrete Canal Lining***
7.1	***Sub-contracting is not allowed***
10.3	*[Specify if another Contractor license or permit is required.] None*
10.4	The key personnel must meet the required minimum years of experience set below:

Key Personnel		Relevant Experience
1 – Project Manager	–	Preferably Technical individual with at least three (3) years' experience as Project Manager;
1 – Project Engineer	–	A licensed Civil Engineer with at least two (2) years' experience as Project Engineer in similar works;
1 – Materials Engineer	–	With at least two (2) years' experience as Materials Engineer duly accredited by the DPWH provided that the limits of
Materials Engineer II	-	Two (2) projects located within the same province for simultaneous assignments, with an aggregate cost of not more than P150M
Materials Engineer I	-	Four (4) projects located within the same province for simultaneous assignments, with an aggregate cost of not more than P 50M
1 – Safety/Health Officer	–	With Training Certificate and with at least two (2) years' experience as Safety Officer.
1 - Foreman	–	with at least two (2) years' experience as Foreman for Earthworks, concreting and/or other related works;

<table>
<tr><td>10.5</td><td>The minimum major equipment requirements are the following:

<table>
<tr><th colspan="2">Equipment</th><th>Capacity</th><th>Number of Units</th></tr>
<tr><td>1.</td><td>Cargo/Dump truck</td><td></td><td>2</td></tr>
<tr><td>2.</td><td>Concrete Mixer</td><td>1 Bagger</td><td>1</td></tr>
<tr><td>3.</td><td>Concrete Vibrator</td><td></td><td>1</td></tr>
<tr><td>4.</td><td>Vibratory Plate/Rammer Compactor</td><td></td><td>2</td></tr>
<tr><td>5.</td><td>Survey Instrument (Automatic Level/Total Station)</td><td>set</td><td>1</td></tr>
<tr><td>6.</td><td>Bar Cutter</td><td></td><td>1</td></tr>
<tr><td>7.</td><td>Materials Test Apparatus
a. Concrete Cylinder Molds (1 set = 3 cylinder molds)
b. Slump Cone</td><td>set

set</td><td>1

1</td></tr>
</table>
</td></tr>
<tr><td>12</td><td>[Insert Value Engineering clause if allowed.]</td></tr>
<tr><td>15.1</td><td>The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:
a. The amount of not less than 2% of the ABC, if bid security is in cash, cashier’s/manager’s check, bank draft/guarantee or irrevocable letter of credit;

b. The amount of not less than 5% of the ABC if bid security is in Surety Bond.</td></tr>
<tr><td>19.2</td><td>Partial bids are not allowed:</td></tr>
<tr><td>20</td><td>None</td></tr>
<tr><td>21</td><td>Additional contract documents relevant to the Project that may be required by existing laws and/or the Procuring Entity, such as construction schedule and S-curve, manpower schedule, construction methods, equipment utilization schedule, construction safety and health program approved by the DOLE, and other acceptable tools of project scheduling.</td></tr>
</table>

Section IV. General Conditions of Contract

1. 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.

2. 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).

3. Possession of Site

4.1. 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.

4.2. 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.

4. 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.

5. Performance Security

5.1. 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.

5.2. 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.

6. 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.

7. Warranty

7.1. 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.

7.2. 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**.

8. 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.

9. 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.

10. 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.

11. Program of Work

11.1. 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.**

11.2. 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.

12. 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.

13. 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.

14. 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.

15. Operating and Maintenance Manuals

15.1. If required, the Contractor will provide “as built” Drawings and/or operating and maintenance manuals as specified in the **SCC.**

15.2. 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	*[If different dates are specified for completion of the Works by section, i.e. "sectional completion," these dates should be listed here.]*
4.1	*[Specify the schedule of delivery of the possession of the site to the Contractor, whether full or in part.]*
6	The site investigation reports are: *[list here the required site investigation reports.]*
7.2	*[In case of semi-permanent structures, such as buildings of types 1, 2, and 3 as classified under the National Building Code of the Philippines, concrete/asphalt roads, concrete river control, drainage, irrigation lined canals, river landing, deep wells, rock causeway, pedestrian overpass, and other similar semi-permanent structures:]* Five (5) years.
10	a. Dayworks are applicable at the rate shown in the Contractor's original Bid.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within 7 days of delivery of the Notice to Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is [*insert amount*].
13	The amount of the advance payment is 15% of the Contract Price and to be recouped every progress billing, to be made as per herein schedule: a. First (1st) Installment – 7.5% of the Contract Price – upon submission to and acceptance by NIA of an Irrevocable Standby Letter of Credit of equivalent value issued by a commercial bank, a bank guarantee or surety bond, callable upon demand, issued by a surety or insurance company duly accredited by the Insurance Commission and confirmed by NIA. b. Second (2nd) Installment – 7.5% of the Contract Price – upon submission to and acceptance by NIA of an Irrevocable Standby Letter of Credit of equivalent value issued by a commercial bank, a bank guarantee or surety bond, callable upon demand, issued by a surety or insurance company duly accredited by the Insurance Commission and confirmed by NIA (if amount is not included in the first Installment), and after Contractor has fully mobilized the initial equipment requirement and Key Personnel indicated in its Manpower Utilization Schedule.
14	Materials and equipment delivered on the site but not completely put in place shall not be included for payment.
15.1	The date by which operating and maintenance manuals are required is *[date]*.

	The date by which "as built" drawings are required is *[date]*.
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 *[amount in local currency]*.

Section VI. Specifications

CONCRETE

1501 SCOPE

This section covers all the materials as cement, aggregates, water admixtures and proportioning, mixing, transporting, placing, finishing, curing, and protection of concrete, including supplies, equipment, tools and all other incidentals necessary for concrete works.

All the applicable provisions of the latest version revision of the ACI Building Code [ACI-318-63] and American Society for Testing Materials [ASTM] shall govern in all cases not specifically provided for herein.

1502 CONCRETE COMPOSITION

Concrete shall be composed of Portland cement, fine and coarse aggregates, water, and if necessary, admixtures or agents approved by NIA. The design of concrete mixtures and consistency shall be as specified in this Section.

1503 CEMENT

a. **General**. The cement shall conform to the requirement of the standard specifications for Portland cement [ASTM: C-150 Type 1]. Special cement may be used subject to the approval of the Engineer provided it meets the requirements of Portland cement with regards to strength, soundness and setting time.

b. **Storage**. Contractor shall, immediately upon delivery of cement to the jobsite, store the same in a dry, weather tight and properly ventilated structure with adequate provisions for the prevention of absorption of moisture. All storage facilities shall be subject to the approval of the engineer and shall be such as to permit easy access for the inspection and identification. In order that cement any not become unduly age after delivery, the Contractor shall used any cement of the same type, which has been stored at the site for 60 days or more before using cement of lesser storage age. Any cement stored at the project site over four months shall not be used unless retest proves it to be satisfactory. Sacked cement shall not be stocked higher than 14 sacks for storage for a period of not longer than 30 days not higher than seven sacks for longer period.

c. **Payment**. Payment for cement shall be considered included in the contract unit price for the various items of concrete in the Bill of Quantities for which cement is used.

1504 ADMIXTURES

In order to reduce the cement content and/ or the amount of mixing water, and to improve the concrete workability, the Contractor may be allowed to use. The Contractor shall submit to NIA for approval such admixture he proposes to use. The contractor shall be

required to submit manufacturer's brochures and data sheets for review together with detailed proposals on how the admixtures will be used in the works. This information should be supported with mix design and the results of trial mixes. All admixtures shall be used strictly in accordance with the manufacturer's recommendations. However no additional payment will be made by NIA to the Contractor in view of this as the costs thereof is considered included in the Contract unit price for the different classes of concrete.

The following type of admixture will be given consideration by the NIA provided that they conform to the provisions of this paragraph.

1. Air entraining agent

2. water reducing admixtures

3. water reducing and retarding admixtures

4. water reducing and accelerating admixtures

Admixtures shall be furnished in a powder or liquid form. If furnished in a solution it shall contain at least 50% solid and a mold inhibitor. The admixtures effect on the properties of Portland cement concrete mixtures shall meet the requirements of ASTM: c-494.

Admixtures will be accepted on manufacturer's certification of conformance with the specifications but permission to slip on certification shall in no way relieve the contractor of responsibility for furnishing an admixtures not meeting specification requirements. Where the engineer has reason to believe that testing is necessary to proved compliance with the requirements of these specifications, it may order these admixtures to be sampled and tested any time the contractor shall provide facilities satisfactory to the engineer for readily procuring samples for test.

Air Entraining Agent. Concrete produced with water reducing agents shall contain four to six percent of entrained by volume. The air entraining agent shall conform to the requirements of ASTM C 260, and shall be tested in accordance with ASTM: C 233. The total calculated air content of the concrete as discharged from the mixer shall be as follows:

Course Aggregates Maximum Size	Total Air – Percent by Volume of Concrete
2.0 cm	5±1
3.8 cm	4±1

The agent in solution shall be maintained at uniform strength and shall be added to the batch in a portion of the mixing water. This solution shall be batched by means of a mechanical batcher capable of accurate measurement. When a retarder dispersing agent is used in concrete, the portion of the mixing water containing the air-entraining agent shall be introduced separately into the mixer.

Water Reducing Agent or Water Reducing and Set Retarding Agent. The contractor may be allowed to use an approved water reducing agent, or water-reducing and set retarding agent in concrete. The ASTM designations for these admixtures are Type A and

Type D, respectively. The agent used shall be suitable calcium, sodium or ammonium salts or lignosulfonic acids or of nonlingnin, hydroxylated carboxylic and acid groups. The agent shall be of the uniform consistency and quality within each container and from shipment to shipment.

The amount of water reducing, or water reducing and set retarding agent to be used in each concrete mix shall in general be within the following limits:

Lignosulfonic Acid Type	-	0.27 to 0.37 percent of solid crystalline lining by weight, of cement
Hydroxylated Carboxylic	-	0.25 to 0.50 percent of liquid, by weight of cement.

Water Reducing and Accelerating Admixtures. The ASTM designation for this admixture is Type E. water reducing and accelerating admixture may be used by the contractor for speeding up pre-casting and post-tensioning operations for pre-cast and pre-stressed beams, girders, slabs and bearing pads, if approved.

1505 WATER

The water used in concrete, mortar and grout shall be free from objectionable quantities of silt, organic matter, alkali, salts and other impurities. The recommendation of the seventh edition of the U.S Bureau of Reclamation Concrete Manual for mixing water shall be followed.

1506 FINE AGGREGATES

a. General. The term "Fine Aggregates" is used to designate aggregates in which the maximum size of the particles is 5 millimeters. Fine aggregates for concrete, mortar and grout shall be provided by the Contractor and shall consist of natural sand, manufactured- sand, or a combination of both. The different components shall be batched separately, or subject to the written approval of the Engineer, or blended prior to delivery to the batching plant.

As means of providing moisture control, the Contractor may be required to stockpile the fine aggregates over porous storage to drain excessive water and to stabilize moisture content.

b. Quality. Fine aggregates shall conform to the requirements of ASTM C-33 and shall consist of hard, tough, durable, uncoated rock particles. The Contractor shall exercise every possible precaution in transporting, washing, and screening operations to prevent contamination of sand particles. Fine aggregates shall conform to the following requirements:

1. **Grading** - It is assumed that the sand available in natural deposits will require processing to provide a suitable gradation. Regardless of the source, the fine aggregates shall be well graded from fine to coarse and the gradation as delivered to the mixers shall conform to the following requirements unless otherwise approved:

Sieve Designation US Standard Square M e s h	Percent by Weight Passing Individual Sizes
3/8” [9.50mm]	100
No. 4 [4.75 mm]	95-100
No. 8 [2.36 mm]	85-95
No. 16 [1.18 mm]	60-85
No. 30 [600 um]	25-60
No. 50 [300 um]	10-30
No. 100 [150 um]	2-10

In addition to the grading limits shown above, the fine aggregates as delivered to the mixer shall have the fineness modulus of not less than 2.30 or more than 3.00. the grading of the fine aggregates also shall be controlled so that the fineness moduli of at least 9 to 10 test samples of the fine aggregates as delivered to the mixer shall not vary more than 0.10 from the average fineness modulus of all samples previously taken. The fineness modulus shall be determined by dividing by 100, the sum of the cumulative percentages retained on US Standard sieves No. 4, 8, 16, 30, 50 and 100. At the option of the Contractor fine aggregates may be separated into two or more sizes or classifications, but resulting sand when combined before entering the concrete mixer shall be of uniform grading within the limits specified above.

2. **Particle Shape**. The shape of the particles shall be generally spherical or cubical and reasonably free from flat and elongated particles is defined as a particle having a maximum dimension in excess of five times the minimum dimension. Rocks which break down into such shape, regardless of the type of processing equipment used, will not be approved for use in the production of fine aggregates.

3. **Deleterious Substances**. The maximum percentages of deleterious substances in the fine aggregates as delivered to the mixer shall not exceed to the following values:

	Percent by Weight
Materials passing No. 200 Screen [Designation 16] *	3
Shale [Designation 17]	1
Clay [Designation 13]	1

Total of other deleterious substances (such as alkali, mica, soft, flaky, particles and loam)	1

- the designation in parenthesis refers to methods of testing described in seventh [7th] edition of the US Bureau of Reclamation Concrete Manual and ASTM.

The sum of the percentages of all deleterious substances shall not exceed 5% by weight. Fine aggregates producing a color darker than the standard in the colometric test for organic impurity [USBR designation 14 or ASTM C-40] may be rejected. Fine aggregate having specific gravity [USBR designation 9 or ASTM C- 128, saturated surface dry basis] of less than 2.60 may be rejected. The fine aggregate may be rejected if the portion retained on No. 50 [300 um] screen, when subjected to five cycles of sodium sulphate test for soundness [USBR designation 19 or ASTM C-88] shows an average loss of more than 18% by weight. Fine aggregates delivered to the batching plant may be rejected if it is contains more than 0.15% soluble sulphate for any one sample or more than 0.10% for an average of at least 9 out of 10 consecutive test samples of finished sand, when samples are taken hourly. The percent soluble sulphate in the fine aggregates shall be determined in accordance with the method of test prescribed in sub-paragraph 4 below.

4. **Sampling. S**ampling of fine and coarse aggregates shall be done in accordance with paragraph 1509. The source from which fine and coarse aggregates is to be obtained shall be selected well in advance of the time when the materials will be required in the work. Unless otherwise specified, all test samples shall taken under the supervision of the engineer in sufficient time as approved to permit adequate testing and examination of results sufficiently in aggregates at various in the processing operation shall be made. The approval of a source shall not be construed as containing approval of the materials from the source, the Contractor will be held responsible for the specified quality of all materials used in the work.

c. Storage - Fine aggregates shall be stored in such a manner as to avoid the inclusion of any foreign materials in the concrete. The storage or stockpile shall be constructed so as to prevent segregation. Depositing of materials in storage and its removal there from shall be done in such a manner as to result in increasing the uniformity of the grading insofar as this is practicable. All fine aggregates shall remain in free drainage storage for at least seventy-two [72] hours prior to use. Sufficient live storage shall be maintained at all times to permit continuous placement of concrete.

d. Measurement and Payment. - Fine aggregates will not be measured for payment. The cost of excavation, stockpiling, transporting, processing, blending, handling and other cost for providing fine aggregates shall be considered in the unit price bid for the various items in the Bill of Quantities for which fine aggregates are used.

1507 COARSE AGGREGATES

a. General - The term " Coarse Aggregates" is used to designate of such size to fall within the range of 0.5 cm. to 7.5 cm or any or range of sizes within such limits. The coarse aggregates shall be reasonably well graded within the nominal size ranges hereinafter specified. Coarse aggregate for concrete shall be furnish by the Contractor and shall consist of crushed rock or mixture of natural gravel and crushed rock as provided in paragraph 1508. Coarse aggregate, as delivered to the batching plant shall have uniform and stable moisture content. Any rewashing found necessary to provide clean aggregates shall be done prior to finish screening. Rewashing shall not be performed in finish screen.

b. Quality - Coarse aggregates shall conform to the requirements of ASTM C-33 and shall consist of hard, dense, uncoated durable rock fragments.

1. **Grading** - The coarse aggregates shall be well graded from fine to coarse. It shall be separated into the following specific size groups. The grading of the aggregates within the separate size groups as delivered to the mixer shall be as follow:

	SIZE GROUPS				
Sieve Size	Percent by Weight		Passing Individuals		Size
US Std. Sq. Mesh	12.5 mm Size	18 mm Size	37.5 mm size	50 mm size	75 mm
6" [150mm]	-	-	-	-	
3" [75mm]	-	-	-	-	
2½" [63mm]	-	-	-	100	90
2" [50mm]	-	-	100	95-100	35
1½" [37.5mm]	-	-	90-100	-	0
1" [25mm]	-	100	20-55	35.7	
¾" [19mm]	100	90-100	0-15	-	
½" [12.5mm]	90-100	-	-	10-30	
3/8" [9.5mm]	40-70	20-55	0.5	-	
No. 4 [4.75mm]	0.15	0-10		-	0-5

Coarse aggregates shall contain not more than 1.5 percent pf materials padding the No 200 sieve by meshing, nor 5% of soft fragments.

It shall have an abrasion loss of not more than 45 percent at 500 revolutions.

Unless otherwise directed, the maximum sizes of aggregates to be used in concrete for the various parts of the works shall be in accordance with the following:

General Use	Maximum Aggregate Diameter
Lean Concrete to control water Intrusion and other miscellaneous uses	37.5 mm
Concrete for Footing, Walls, Slabs Beams, 0.22 to 0.75 meters thick	37.5 mm
Concrete for thin wall, slabs, beams, less than 0.22 meters thick	19 mm
Concrete for reinforced concrete pipes	12.5 mm

In all cases, the diameter of the aggregated shall not exceed ½ the distance between the reinforcing steel bars of the members being placed.

2. **Particle Shape** - The particle shape of the crushed coarse aggregate shall be generally spherical or cubical and reasonably free from flat or elongated particles. A flat or elongated particle is defined as the particle having a maximum dimension such shape will not be approved for the production of aggregate.

3. **Deleterious Substances** - The deleterious substances in any size of coarse aggregate, as delivered to the mixer, shall not exceed the following values:

	Percent By Weight
Material Passing no. 200	½
Shale [Designation 18]	1
Clay Lumps [Designation 13]	½
Other deleterious substances	1

- The designations in parenthesis refer to methods of Testing described in the seventh edition of the US Standard of Reclamation Manual and ASTM.

The sum of the percentages of all deleterious substances in any size, as delivered to the mixer, shall not exceed 3% by weight. Coarse aggregate may be rejected if it fails to meet the following:

1. **Petrographic Examination** - If more than 10% of poor aggregate particles can be identified in physical test in case 20% of the particles would be classified with respect to the chemical quality [USBR Designation 7 or ASTM C- 295].

2. **Soduim-sulphate test for soundness** [USBR Designation 9 or ASTM C-88] - If the weighted average loss, after 5 cycles is more than 10% by weight.

3. **Specific Gravity** [USBR Designation 10 or ASTM C-127] - If the specific gravity [saturate surface-dry basis] is less than 2.60.

4. **Sampling** - All sampling of coarse aggregates shall be in accordance with Paragraph 1500[b] 4.

c. Storage - Coarse aggregate storage or stockpiles shall be built in such a manner as to avoid the inclusion of any foreign materials in the concrete and to prevent segregation and excessive breakage. Water sprayers shall be installed to keep that portion of the coarse aggregate stockpile saturated which is for immediate use in the concrete. Sufficient live storage shall maintain at all times to permit continuous placement of concrete.]

d. Measurement and Payment - Coarse aggregates will not be measured for payment. The cost of excavation stockpiling, processing, blending, handling and other cost for providing coarse aggregates shall be considered included in the unit price bid for the various items in the Bill of Quantities for which coarse aggregates are used.

1508 PRODUCTION OF FINE AND COARSE AGGREGATES

a. **Source of aggregates** -Fine and coarse aggregates for concrete, and fine aggregate for mortar and grout may be obtained by the Contractor from any approved source. Approval of deposit shall not be construed as constituting approval of all materials taken from the deposit, and the Contractor shall maintain the specified quality of all materials used in concrete works. If the aggregates are to be obtained from the deposits or quarry sources not previously tested and approved by NIA, the Contractor shall submit, for preliminary test and approval, a representative, 90 kilograms [approximately 200 pounds] sample of the fine aggregate and of the 0.5 centimeters to 2 centimeters size of course aggregate and a 45 kilograms [approximately 100 pounds] sample of each of the other sizes of coarse aggregates proposed for use in the work, at least 90 days before the materials are required for use.

b. **Developing Aggregate Deposit** - The contractor shall carefully clear the area, from which aggregates are to be taken of tress, roots, brush, sod, soil, unsuitable sand and gravel or operated so as not to detract from the usefulness of the deposit or for any adjacent properly and so as to preserved insofar as practicable, the future usefulness or value of the deposit. Waster materials removed from aggregate borrow areas shall be disposed of in approved locations.

c. **Processing Raw Materials** - The contractor shall employ processing equipment which will ensure well-shaped particle in all aggregate sizes and a minimum of particle which

are flat or elongated. Processing of raw materials shall include screening washing, blending if necessary to produce fine and coarse aggregate meeting the requirements of Paragraph 1505 and 1507. Processing of aggregates produces from any source shall be done at an approved site. Water used for washing aggregates shall conform to paragraph 1505. To utilize the greatest practicable yield of suitable materials in the portion of the deposit being worked, the Contractor may crush oversize materials and any excess materials of the size of course aggregate to be furnished, until the required quantity of each size has been secured provided that the crushed aggregates shall be blended uniformly with the uncrushed aggregates. Crushing and blending operations shall at all times be subjected to approval by the engineer.

Aggregates, as delivered to the mixers, shall consist of clean, hard and uncoated particles. When required, dust shall be removed from the coarse aggregate by adequate washing.

d. **Moisture Control** - The free moisture control of the fine aggregate and smallest size group of coarse aggregate as delivered to the mixers shall be controlled so as not to exceed the value of 6.0 and 1.5, respectively, expressed as a percentage by weight of the saturates, surface dry aggregates. The percent variation of free moisture content in fine aggregate and the smallest size of coarse aggregate shall not exceed 0.5% and 2.0%, respectively, during any one hour of mixing plant operation. The free moisture of the other sizes of coarse aggregates shall be the least amount when delivered to mixers and variations shall be the least practical under all job conditions. Sand shall have uniform and stable moisture content. Under no conditions shall the other sizes of coarse aggregates be delivered to the mixing plant bins dripping wet. The Contractor may accomplish the required control by use of free drainage storage, mechanical dewatering devices, or any other satisfactory means of dewatering.

1509 AGGREGATE SAMPLING AND TESTING

Sampling of the aggregate materials approved for use in the work, shall be done by the contractor in accordance with ASTM Sampling Method at 10 days in advance of time when placing of concrete is expected to begin. Aggregate studies and test will be made by the contractor at its own expense. It shall be the responsibility of the contractor to designate the source[s] of aggregates early enough to give NIA sufficient time to obtain the necessary samples and have them subjected to tests.

The samples of aggregates shall be obtained and tested in accordance with the following ASTM standard methods:

Sampling aggregate	- C 75
Sieve Analysis	- C 136
Amount of material finer than 200 sieve	- C 117
Organic impurities	- C 40
Mortar Strength	- C 87
Soundness	- C 88
Soft Particles	- C 235

Abrasion	- C 131
Clay lumps	- C 142

No aggregate shall be used until official advice has been received that it has satisfactorily passed all test, at which time written authority shall be given for its use. Material from source which has been previously tested and shown satisfactory compliance with all the requirements given herein may be used without further testing upon written permission of NIA. Test reports for previous tests must be available before approval can be given.

During construction, aggregates will be sample as delivered to the mixer to determine compliance with specification provisions. Test shall be made in accordance with the applicable ASTM Standards. Routine control test and analysis of aggregates at various stages in processing Contractor shall provide such facilities as may be considered necessary for the ready procurement of representative test samples. All tests will be made by the contractor under the supervision of NIA.

1510 CLASSIFICATION AND PROPORTIONING OF CONCRETE MIXTURES

a. **Classification and Design Mixtures.** The mixture for all classes of concrete shall be designed by the contractor and approved by NIA to obtain the compressive strength at the age of 28 days as specified below:

Class	Minimum Strength [kg/cm²]	Maximum Aggregate Size [mm]	Minimum Cement [kg/m³]	Maximum Water/ Cement Ratio
X	300	19	375	0.55
Y	210	12.5	350	0.60
AA	210	19	325	0.60
A	210	37.5	300	0.60
B	170	50	250	0.70
C	170	75	225	0.70
Z	140	75	200	0.85
Blinding 70		37.5	150	No limit [Concrete]

b. **Aggregate Content** - Concrete mixtures shall be designed to use the largest size and the maximum amount of coarse aggregate as practicable for the intended use of the concrete.

c. **Consistency** - The amount of water to be used in the concrete shall be regulated as required to secure concrete of the proper consistency and to adjust for any variation in the moisture content or grading of the aggregates as they enter the mixer.

It shall be such consistency that it will flow around reinforcing steel bar but individual particles of the coarse aggregate when isolated shall have coating of mortar containing its proportionate amount of sand. The consistency shall be gauged by the ability of the equipment to properly place it and not by the difficulty in mixing or transporting. Addition of water to compensate for stiffening of the concrete before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

The slump of the concrete at the time of placing shall not exceed 5 centimeters in heavy concrete sections and at top of walls, piers and parapets, 10 centimeters for pumped or air placed concrete, and 7.5 centimeters for concrete elsewhere.

The engineer reserves the right to require a lesser slumps whenever concrete of lesser slumps can be consolidated easily into placed by means of the vibration specified in Paragraph 1517.

d. Notwithstanding the approval by NIA of the design mixtures and the above specified minimum cement content for different classes or gradation of aggregations, the Contractor shall responsible that all the concrete meet the desired strength.

1511 MEASUREMENT OF MATERIALS

All meters from which the concrete will be manufactured shall be mechanically measured by weight except as otherwise specified and/ or authorized by the Engineer and admixture solutions which may be measured by volume.

Measuring devices shall be suitably designed and constructed for the purpose and shall be weighing separately the cement, fine and coarse aggregates. The accuracy of all weighing devices shall be such that successive quantities can be measured to one percent of the desired weights. Cement is standard bags [40 kilograms] need not to be weighed. The water measuring devices shall be of such type and make to be readily controlled to obtain an accuracy of one-half percent of the desired quantity of water.

Whenever volumetric proportioning and measurements is permitted due to failure or malfunction of weighing devices the equivalent volumetric proportions of weighed representative samples of the concrete ingredients shall be computed taking into consideration bulking effect of cement and variation of moisture content of the aggregates.

When sack or bag of cement is used, the quantities of aggregates for each batch shall be for one or more full sack of cement. No batch requiring a fractional sack of cement will be tolerated.

1512 MIXING AND DELIVERY

Ready-mixed concrete shall be mixed and delivered to the point designated by the engineers by means of one of the following combination of operations:

- Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in a truck mixer operating at agitator speed or in non-agitating equipment when approved by the engineer. [known as central-mixed concrete].
- Mixed completely in a truck mixer at the batching point or while transit. [Known as transit-mixed concrete].

- Mixed completely in a truck mixer at the point of delivery following the addition of mixing water. [Known as truck-mixed concrete].

Truck mixers and truck agitators shall be operated within a capacity not to exceed 63 or 80 percent, respectively of the gross volume of the drum and at a speed of rotation for mixing or agitating as designated by the manufacturer of the equipment. A truck mixer or truck agitator used for transporting concrete that has been completely mixed in a stationary mixer shall be operated within the limits of capacity and speed rotation designated by the manufacturer for agitating, except that the agitator capacity shall in no event exceed 80 percent of gross drum volume.

When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a capacity of 10 cubic yards [7.6 m^3] or less shall be not less than 60 seconds. For mixers of more than 10 cubic yards [7.6 m^3] capacity, the mixing the time shall be determined by the engineer. The time is valid provide mixer efficiently test prove the concrete is satisfactorily fro uniformity and strength. Mixing time shall be measured from the time all cement and aggregates are in the drum. The batch shall be so charges into the Mixer that some water will enter in advance of cement and aggregates, and all water is in the drum by the end of first one-fourth of the specified mixing time.

When a truck-mixer is used for complete mixing, each batch concrete shall be mixed for not less than 70 or more than 700 or more than 100 revolutions of more than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment on the metal plate on the mixer as mixing speed. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determination of the number of revolutions of mixing.

When a truck mixer or truck agitator is used for transporting concrete that has been completely mixed in a stationary mixer, mixing during transport shall be at the speed at the speed designated by the manufacturer of the equipment as agitating speed.

When a truck-mixer or truck agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be completed within 1 hour after the addition of the cement to the aggregates. Each batch of concrete delivered at the job site shall be accomplished by a time issued at the batching plant, bearing the time of charging of the mixer drum with cement and aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30 C [85F] or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes. When mixer is used for the complete mixing of the

concrete, the mixing operation shall be within 30 minutes after the cement has been added to the aggregate.

- The concrete when discharged from truck mixers or truck agitators, shall be of the consistency and workability required for the job. The rate of discharge of the plastic concrete from the mixer drum shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open. If additional mixer water is required to maintain the specified slump and is added with the permission of the Engineer, a minimum of 20 revolutions of the truck mixer drum at mixing speed shall be required before discharge of any concrete.

When approved by the engineer, central-mixed concrete which is designated for the purpose may be transported in suitable non-agitating equipment.

When non-agitating equipment is used for transportation of concrete the following requirement shall apply.

- Bodies of equipment shall be smooth, water-tight, metal container equipped with gates that will permit control of the discharge of the concrete. Covers meeting the approval of the Engineer shall be provided for protection against the weather.

- The concrete shall be delivered to the site of the work in a thoroughly mixed and uniform mass and discharged with a satisfactory degree of uniformity. Slump test of representative samples taken during the discharge neither shall nor differ by more than 2 inches [50.8 mm]. Discharge shall be completed within 30 min. after introduction of the mixing water to the cement and aggregates.

Concrete delivered in outdoor temperatures lower than 5C [40F] shall arrive at the work having a temperature not less than 151.6 neither C [60F] nor greater than 32.2 C [90F].

The volume of concrete mixed or transported shall not be less than 15 percent of the gross volume of the drum.

1513 RE-TEMPERING

Concrete, mortar and grout mixers which have developed initial set shall not be used. Concrete, mortar and grout which have partially hardened shall not be re-tempered remixed.

1514 SAMPLING AND TESTING OF CONCRETE

The contractor shall provide the required samples of concrete to be furnished by the Contractor without cost to NIA. Sampling will, in all cases be performed by the Contractor under the direct supervision of the Engineer and Contractor shall provide without cost to NIA all available tools and labor as may be required. Concrete sampling shall be carried on during concrete operations at the rate of one standard sample for each 75 cubic meters of concrete or fraction thereof placed during each continuous placing operation but in no case shall there be less than one sample for each day concreting. Each standard sample shall consist of three standard cylinders [6-inches diameter by 12-inches high]. The Contractor shall keep a record

of the samples and the portion of the structures and volume represented which shall be available to NIA on demand.

Sampling shall conform to ASTM Designations C-172, preparation, storage and curing to ASTM Designation C-31 and testing ASTM Designation C-39. NIA shall have the sample tested by an approved testing laboratory at the expense of the Contractor.

1515 CONVEYING AND PLACING CONCRETE

a. **General**. Approval of the engineer shall be obtained before starting any concrete pour. Concrete placement will not be permitted when in the opinion of the Engineer; conditions prevent proper placement and consolidation. Before is placed, all saw dust, chips, and other construction debris and extraneous matters will be removed from the interior of forms, structures, stays, and braces, serving temporarily to hold the forms in correct shape and alignments, pending the placing of concrete at their location, shall be removed when the concrete placing has reach an elevation rendering their services unnecessary as may be. These temporary members shall be entirely removed from the forms and not be buried in concrete. Surfaces of existing concrete left partial demolition against which new concrete is to placed, shall be cleared thoroughly of all loose concrete coatings or concrete dust by brushing or other effective means followed by thorough washing or jetting. Such surfaces shall keep moist for at least 24 hours before pouring the new concrete.

Concrete shall be placed only n the presence of the Engineer or his duly authorized representatives. Any and all concrete places in the absence of the Engineer or his duly or his duly authorized representative/s will not be considered for measurement and payment, and shall be removed at the discretion of the Engineer with the Contractor assuming all losses.

Concrete shall be conveyed from mixed to forms, as rapidly as practicable, by methods which shall be used. These shall be no vertical drop greater than 1.50 meters except where suitable equipment is provided to prevent segregation and where specifically authorized by the Engineer. Belt conveyors. Clutch or similar continuously exposed flow, will not be permitted.

b. **Concrete on Earth Foundation**. All concrete shall be placed upon clean and dump surfaces free from standing or running water. Prior to placing concrete, the earth foundation shall be satisfactorily compacted in accordance with these Specifications.

c. **Concrete on Rock on Other Concrete**. Rock surface or hardened concrete upon or against which concrete to be placed shall be clean, free from oil, standing, or running water, mud, dummy rock objectionable coating, debris, loose and semi-detached or unsound fragments. Faults, fissures and seems in rock shall be cleaned to a satisfactory depth and to firm rock on the sides. Immediately before concrete is placed, all surfaces shall be clean thoroughly by the use of high velocity, air water jets, wet sand blasting or other satisfactory means. When required by the engineer, roughening by grooving with pneumatic tool, of existing concrete surfaces against which concrete is to be placed may be required. All surfaces are wetted before placing concrete and approximately horizontal surface shall be covered immediately, before the concrete is placed, with a layer of mortar not to exceed 15 millimeter in thickness and of the same cement-sand ratio as used in the concrete.

d. **Lift in Concrete**. The permissible depth of concrete placed in one lift will be as shown in the detailed drawings or as directed for each structure by the engineer. Unless otherwise authorized or shown, lifts of mass concrete shall not exceed 1.5 meters in height, and a minimum of 72 hours shall elapse between the placing of each successive lifts. Lifts of three meters will be permitted in piers and walls. Height of lift specified herein will not apply where the use of slip from has been approved. All concrete, when placed and vibrated shall be approximately horizontal layers not to exceed 50 centimeters in thickness unless otherwise specifically authorized. The placement of concrete surfaces shall not have reached their initial set before additional concrete is placed thereon. Slabs generally are placed in one lift unless the depth is so great that this procedure will produce objectionable results.

e. **Consolidation of Concrete**. Consolidation of concrete shall be by the use of the mechanical vibratory equipment. The vibrating equipment shall be of the internal type and shall at all times be adequate in number of units and power of each unit shall be capable to properly consolidate all concrete. The frequency of vibration shall not less than 6,000 revolutions per minute. Form or surface vibrators shall not be used, unless otherwise specified in other sections in this Technical Specifications. The duration shall be limited to that necessary to produce satisfactorily consolidation without causing objectionable segregation. In consolidating each layer of concrete the vibrating head shall be allowed to penetrate under the action of its own weight and re-vibrates the concrete in the upper portion of the underlying layer.

At least one spare vibrator in working order shall be available at any location where concrete is being placed.

f. **Finishing of Concrete Lift Surfaces**. The manipulation of the concrete adjacent to the surface of the lift in connection with completing lift placement shall be the minimum necessary to produce not only the degree of consolidation desired in the surface layer of concrete but also a surface with the desires degree of roughness for bond with the next lift. Surface vibration or excessive surface working will not permit. All unfinished top surface not covered by forms and which are not be covered by additional concrete or backfill, shall be carried slightly above grade, as directed and struck off by board finish.

g. **Placing Concrete Through Reinforcement**. In placing through reinforcement, care shall be taken so that no segregation of the coarse aggregate occurs. On the bottom of beams and slabs, where the congestions of the steel near the form make placing difficult, a layer of mortar of the same cement-sand ration as used in the concrete shall be first deposited to cover the surface.

h. **Depositing Concrete in Water**. When specifically authorized may be deposited in water. The methods and equipment used shall be subject to approval of the engineer.

1516 FORMS

a. **General**. Forms shall be used wherever necessary to confine the concrete during vibration and to shape it to the required lines. Forms shall have sufficient to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in position. The strength and rigidity of the forms shall be such that formed surfaces

will conform to specification requirements relating to surface irregularities and tolerances for concrete construction. Forms shall be tight to prevent loss of mortar from concrete.

Chamfer strips shall be placed in the corner of forms for exposed exterior corners so as to produces beveled edges. Interior corners and edges of formed joints shall not be beveled unless the requirement therefore is shown on the drawing

The tolerance limits specified in paragraph 1523 and the surface irregularity limits specified in paragraph 1523 and the surface irregularity limits specified in paragraph 1521 are the maximum permissive limits of misalignment or irregularity surface which may occur despite the workmanlike effort to construct and maintain the forms to the specified surfaces. These limits pertain only to inadvertent and occasional irregularities, even though these irregularities are within the maximum permissive limits will be rejected. Accordingly, these limits shall not be construed to be tolerances for aligning forms or determining acceptability of form materials.

Stub walls shall not used, except that such stub walls shall be used for walls having fillets at the bottom.

Concrete in such stub walls shall be re-vibrated after adjacent floor concrete is placed.

Forms for finishes F2 and F3 shall be constructed with grade strips at the horizontal construction joints, unless the use of groove strips is specified on the drawings. Such forms shall be removed and reset fro lift to lift; they shall continuous from lift to lift. Sheathing of reset forms shall overlap the previous lift by not less than 25 mm. Forms shall be tightened against the concrete so that the forms will not spread and permit abrupt irregularities or loss of mortar or paste. Supplementary bolts or form ties shall be used as necessary to hold the rest forms against the concrete.

Forms for all wall openings shall be constructed so as to facilitate loosening.

b. **Form Sheathing and Lining**. Wood sheathing or lining shall be of such kind of quality and shall be so treated or coated that there will be no chemical deterioration or discoloration of the formed concrete surfaces. The type of condition of form sheathing and lining, and the fabrication of forms for finishes F2, F3, and F4 shall be such that the form surfaces will be even and uniform. The ability of forms to withstand distortion caused by placement and vibration of concrete shall be such that formed surfaces will conform to applicable requirements of these specifications pertaining of formed surfaces. Where finish F3 is specified, the sheathing or lining shall be placed so that the joint marks on the concrete surfaces will be in general alignment, both horizontally and vertically.

Plywood used fro sheathing or lining shall be high density overlaid plywood specially manufactured for use in construction concrete as approved. Materials used for from sheathing or lining shall conform to the following requirements, or other materials producing equivalent results as approved by the engineer.

Req'd finish of formed Surfaces	Wood sheathing or lining	Steel sheathing of Ling
F1	Any grade, surface on 2 edges [S2E]	Steel Sheathing permitted

	with no limit to defects except imposed by other requirements of these Specifications.	Steel Lining permitted
F2	Selected lumber, surfaced on side and two edges [SIS2E] or plywood sheathing or lining	Steel Sheathing permitted Steel Lining permitted
F3	Selected lumber, surfaces on four sides [S4S] or plywood sheathing or lining	Steel sheathing permitted Steel lining not permitted
F4	For plane surfaces, selected lumber surfaces on four sides [S4S] T&G or plywood. For warped surfaces, the lumber shall be free from knots and other imperfections to the required curvatures without splintering or splitting.	Steel sheathing permitted

* Steel sheathing demotes steel sheets not supported by a backing of wood boards.

** The lumber shall be free from warp and knotholes and shall have no knots larger than five centimeters in diameter. All knots shall be sound and tight. There will be no pitch pockets, barb or lack of wood on the face of the lumber against which concrete is to be placed.

c. **Form Ties**. Embedded ties for holding forms shall remain embedded and, except for F1 finish, shall terminate within the concrete approximately two diameters or twice the minimum dimensions of the tie from the formed faces of the concrete. Embedded ties for F1 finish shall terminate within the concrete or shall be cut-off flush with the faces of the concrete, at the Contractor's option.

The ties shall be so constructed that ends and end fasteners can be removed by unskilled workmen without causing spalling at the faces of the concrete

d. **Cleaning and Oiling of Forms**. The surfaces of the forms in contract with the concrete shall be free from encrustation of mortar, grout or other foreign materials when the concrete is placed. The surfaces of the forms to be in contact with the concrete shall be coated with an approved coating which will be enable the ready release of the forms and will not contaminate the concrete surfaces. Except as provided below, forms for surfaces which are to be painted shall be coated with straight, refined, pale, paraffin mineral oil or other approved coating and the coating for steel forms shall consist of refined mineral oil suitability compounded for the purpose.

e. **Forms of Curved Surfaces**. Curved surfaces have been dimensioned at several sections. The contractor shall be interpolate intermediate as necessary and shall construct the form so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form lumber shall be built up to laminated plies cut to make tight, smooth form surfaces. The forms shall be constructed so that the joint marks on the concrete surfaces generally will follow the line of water flow. After the forms have been constructed, all surface imperfections shall be corrected, and all surface irregularities at packing faces of form materials shall be dressed to the specified curvature.

f. **Forms for Slopes and battered Structures**. Forms for slopes or battered surfaces shall be built so that the sheathing can be placed board-by-board immediately ahead of concrete placement so as enable ready access for placement, vibration and inspection of the concrete. The sheathing shall be built so that the sheathing can be removed board-by-board from the bottom to top.

g. **Forms for Open Channel Transitions**. When warped surfaces of transition are not back formed, natural or compacted earth be shaped to the specified surface and covered immediately with a plaster coat of cement-sand mortar at least 0.95 centimeter.

Forms for the warped surfaces shall be tied securely to the floor slab and braced against spreading. In the upper surface, forms shall be butt and removed as specified in sub-paragraph [j], so as to enable for placement, vibration, inspection, and repair and finishing of the concrete.

h. **Forms for Bridges**. Forms for girders and slabs be cambered as specified by the Engineer.

Forms shall be constructed so that form marks will conform to the general lines of the structure. Column form shall be spaces symmetrically.

Form bots or clamps shall be used to fasten forms. The use of ties consisting of twisted wire loops will not be permitted. Bolts or clamps shall be positive in action and shall be of sufficient strength and number to prevent displacement of the forms. They shall be of such type that they can be entirely removed or cut back one inch or more below the finished surface of the concrete leaving no metal within one inch of the concrete surface. All forms for the outside surfaces shall be constructed with rigid wales at right angles to the studs and all form clamps shall extend through and fasten such wales.

For exposed surfaces shall be constructed of plywood or material which will produce and equivalent surface. Form panels shall be furnished and placed in uniform width of not less than 90 centimeters and in uniform length of not less than 1.8 meters, except where the dimensions of the member formed are less than the specified panel dimensions. Plywood panels shall be placed within the grain of the outer piles perpendicular to the studding of joints, unless otherwise permitted by the Engineer. Where form panels are attached directly to the studding or joints, the panels shall not be less than 1.6 centimeters thick, and the studding or joints, shall be spaced not more than 30 centimeters center to center. From panels less than 1.6 centimeters thick, which otherwise conform to the requirements specified in this Paragraph, any be used with a continuous backing of surfaced materials 1.9 centimeters thick. Form panels more than 1.6 centimeters thick attached to studding or joints spaced at 30 centimeters center to center may be used, provided the deflection of the panel between

studding or joints does not exceed that of a 1.6 centimeters panel attached to a studding or joints spaced at 30 centimeters center to center. All form panels shall be placed in a neat, symmetrical pattern subject to the approval of the Engineer.

i. **False work for Bridges and Other Superstructures.** False work for the support of a bridge or other superstructures shall be designed and constructed to support the loads that would be imposed where the entire structure placed at one time.

Suitable jacks, wedges or camber strips shall be used in connection with false work or centering to set the forms to the required grade or camber and to take up any settlement in the formwork either before or during the placing of concrete.

j. **Forms for Large Circular Siphons**. The contractor shall submit to NIA a detailed Drawing for a collapsible steel form of the monolithic barrels. The length of one section of the barrels is at every 9.15 meters bar length intervals as shown on the Drawings. The outer forms intervals as shown on the Drawings. The outer forms of the concrete barrel shall be made with butt joints throughout and form surfaces to be in contract with concrete shall be smooth and true. All forms shall be sufficiently tight with suitable gaskets provided at all form joints and the gates to prevent leakage of mortar. Forms shall be braced and sufficiently stiff to withstand, without detrimental deformation, all operations incidental to the proper placement of concrete within the forms. All forms shall be cleaned and oiled before pouring concrete.

k. **Removal of Forms**. Forms shall be removed as soon as possible to enable the earliest practicable repair of surface imperfections, but in no case shall they remove before approval of the Engineer. Any needed repair or treatment shall be performed at once and followed immediately by the specified curing. Forms shall be removed with care so at to avoid injuring of the concrete and any concrete so damage shall be repaired.

In field operation that are not controlled by beam or cylinder test the removal of forms and supports shall be governed by the following:

Type Of Structure	Time of Removal After the last Pouring
Arch, beam, girders and slabs	14 days
Slabs in close span of less than three meters	7 days
Side forms for beams, railing, parapets, balustrade, walls and columns	Not less than 12 hours and more than 48 hours

1517 CONSTRUCTION JOINTS

a. **General**. After the top of a lift is finally compacted, it shall be immediately and carefully protected from direct rays of the sun, pedestrian traffic, materials being placed thereon, running water, heavy rains, or any activity upon the surface that in any manner will affect the setting of the concrete unless otherwise specified, vertical and horizontal joints on exposed faces shall be chamfered as shown on standard detailed drawings and formed to produce a uniform and neat appearance.

b. **Cleaning**. Horizontal construction joints on lifts with relatively open and accessible surfaces may be prepared for receiving the next lift by either wet sand blasting or by cutting with an all-water jet, as specified below. If the surface of the lift is congested with reinforcements, or is relatively inaccessible or, if for any other reason the Engineer considers it undesirable to disturb the surface of a lift before final set has taken place, surface cutting by means of air-water jets will not be permitted and the use of wet sand blasting or light brush hammering will be required. After approved cleaning, the surface of the construction joints shall be kept continuously wet for at least 12 hours immediately prior to placing concrete. A mortar coating surfaces immediately prior to the placing of the next lift of concrete. The mortar shall have same cement sand ratio as the concrete. Any free water on the joint surface shall be removed prior to placing the mortar. The contractor shall ensure the surface of any horizontal joints [and the form work in general] is completely clean of any dust, weed, wood showings or other deleterious material prior to the placing of concrete.

1. **Air-Water Cutting**. Air-water cutting joint shall be performed after initial set has taken place but before the concrete has obtained its final set. The surface shall be cut with a high pressure air-water jet remove all laitance and expose clean, sound aggregate, but no to undercut the edges of the larger particles of the aggregate. After cutting, the surface shall be washed and rinsed as long as there is a trace of cloudiness of was water.

2. **Wet Sandblasting**. When employed in the preparation of construction joints, wet sandblasting shall be performed immediately before placing the following lift. The operation shall be continued until all unsatisfactory concrete shall then be washed thoroughly to foreign materials are removed. The surface of the concrete shall then be washed thoroughly to remove all loose materials.

3. **Cleaning Vertical Construction Joint**. The vertical construction joints shall be cleaned by wet and blasting or by brush manner.

1518 REPAIR OF CONCRETE

No repair of work or plaster finish of formed concrete in structures will be permitted, unless otherwise provided in these Specifications or directed by the Engineer in writing. All defective concrete shall be removed and replaced with the contractor assuming all expenses and losses. Plastering without permission will be assumed as defective works. If directed, the Contractor shall notify the Engineer of the start of the repair work at least 24 hours in advance hereof and shall repair concrete in the presence of the engineer or his authorized representative/s, unless inspection of such repair work is waived.

Dry pack shall be used for filling holes having at least one surface dimension little, if any greater than the hole depth; for narrow slots cut for repair of cracks, for grout pipe

recesses; and for tie-road fastener recesses as specified. Dry pack shall not be used for filling behind reinforcement or for filling holes that extend completely through a concrete section. Mortar filling, placed under impost by use of a mortar gun, may be used for repairing defects on surfaces designated to receive F1 and F2 finishes where the defects are too wide for dry pack filling and too shallow for concrete filling and no deeper than the far side of the reinforcement that is nearest the surface. Concrete filling shall be used for holes extending entirely through concrete sections; for holes in which no reinforcement is encountered and which are greater in area than 900 square centimeters and deeper than centimeters are deeper than 20 cm.; and for holes in reinforced concrete which are greater in area than 400 square centimeters and which extends beyond reinforcement.

Workmanship method, preparation of concrete for repair, materials and curing shall be as directed. Only workmen skilled in repair of concrete shall perform such work. Repairs of defective concrete shall be made within 48 hours after removal of forms.

Surfaces to which concrete is to be bonded shall be clean and dry when coated with epoxy.

Surfaces of concrete to be repaired with sailing compound method shall be cured by the water curing method for one day before application of the sealing compound. All repair shall be sound and free from shrinkage cracks and dummy areas after they have been cured and have dried 30 days.

Surfaces of repairs which will be exposed to view shall blend inconspicuously with surrounding concrete surfaces.

Fins and encrustations shall be removed from surfaces which will be exposed to view.

1519 FINISHES AND FINISHING

a. **General**. Allowable deviations from established lines, grades and dimensions are not set forth in Paragraph 1523. these allowable deviations are defined are defined as “tolerance” and are to be distinguished from surface irregularities in finish as described herein. The class of finish and the requirements for finishing concrete shall be as specified in the paragraph.

Finishing of concrete surfaces shall be performed only by skilled workmen. The contractor shall be advise the Engineer as to when concrete will be finished. Unless inspection is waived in each specifications case, finishing concrete shall be performed only in the presence of the Engineer. Concrete surfaces will be tested by the engineer to determine that surface irregularities are within the limits hereinafter specified.

Surface irregularities are classified as “abrupt” or “gradual”. Offsets caused by displaced or misplaced form sheathing or form sections or by loose in forms or otherwise defective form lumber will be considered abrupt irregularities, and will be tested by direct measurements. All other irregularities will be considered to be gradual irregularities, and will be measured as the departure from the testing edge of an approved template held parallel to and in contact with surfaces. The template shall consist of the straight-edges or the equivalent thereof for curved surfaces.

b. **Formed Surfaces**. The classes of finished for formed concrete surfaces are referred to by symbols F1, F2, F3 and F4 faces. Grinding will not be required on formed surfaces except as necessary to reduce protrusions to specified limits. Recesses from removal of form ties shall be filled with dry pack or epoxy mortar at the Contractor's option; except that filling recesses in Finish F1 surfaces will be required only if the recesses are deeper than 2.5 centimeters in walls, less than 30 centimeters thick or if fulfilled, recesses would reduce the required cover over reinforcements.

The filled recesses shall be blend inconspicuously with the surrounding concrete surfaces or concrete that will be exposed to view.

The classes of finish and their application are as follows:

Finish F1 - Finished F1 applies to formed surfaces where fill materials or concrete is to be placed. The surfaces require no treatment after form removal except for repair of defective concrete and specified curing. Correction of surface irregularities will be required only for depressions which exceed 2.5 centimeters, when measured as described in sub-paragraph [a].

Abrupt irregularities on surface to which pre-molded joint filler is to be applied shall not exceed 0.30 centimeter.

Finish F2 - Finished F2 applies to all formed surfaces not permanently concealed by fill materials or concrete or not required to receive Finished F3. surfaces irregularities, measured as described in sub-paragraph [a] shall not exceed 0.60 centimeter for abrupt irregularities and 1.20 centimeters for gradual irregularities.

Finish F3 - Finish F3 applies to formed surfaces of the stop log guided, exposed faces of abutments, wing walls, girders, curbs, parapet railings, and decorative features on bridges. Surface irregularities, measured as decried in sub-paragraph [a] above, shall not exceed 0.60 centimeters for gradual irregularities and 0.30 centimeter for abrupt irregularities, except that abrupt irregularities will not be permitted at construction joints.

Finish F4 - Finish F4 applies to formed surfaces for which accurate alignment and evenness of surfaces are of paramount importance from the standpoint of eliminating destructive effects of high velocity flows. Formed surfaces to receive an F4 finish includes formed surfaces exposed to high velocity flowing water.

Except as hereinafter provided, abrupt irregularities on surfaces to receive F4 finish, when measured as described in sub-paragraph [a], shall not exceed 0.60 centimeter for irregularities parallel to the direction of the flow and 0.30 centimeter for irregularities not parallel to the direction of the flow. Gradual irregularities on surface to receive an F4finish shall not exceed 1.60 centimeters.

Abrupt irregularities on formed surfaces exposed to high velocity flows shall be eliminated by grinding a bevel of 1:20 ratio of height to length.

The contractor will not be entitled to ay payment or compensation for reducing or eliminating irregularities on formed concrete surfaces which do not meet specification limits.

c. **Uniformed Surfaces**. The classes of finish for unformed concrete surfaces are referred to by symbols U1, U2, U3 or U4. Exterior surfaces will be sloped for drainage where shown on the drawings or as directed by the engineer. Exterior surfaces which otherwise would be level shall be sloped for drainage. Unless the use of other slopes or level surfaces is indicated on the drawings or directed by the engineer narrow surfaces, such as tops of walls and burbs, shall be sloped approximately 3 centimeters per meter of width; broader surface, such as walks, roadways, platforms, and deck shall be sloped approximately 2 centimeters per meter. These classes of finish and their application are as follows:

Finish U1 - Finish U1 [screened finish] applies to unformed surfaces that will be covered by fill materials or by concrete. Finish U1 is also used as the first stage of finishes u2 and u3, Finishing shall consist of sufficient leveling and screening to produce even uniform surfaces. Surface irregularities, measured as described in- sub-paragraph [a] shall not exceed 0.60 centimeter.

Finish U2 - Finish U2 [floated finish] applies to unformed surfaces not permanently concealed by fill material or concrete, or not required to received finishes U3 and U4. Finish U2 is also used as the second stage of finish U3. Floating may be performed by use of hand or power driver equipment. Floating shall be started as soon as the screened surface has stiffened sufficiently, and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. If finish U3 is to be applied, floating shall be continues until a small amount of mortar without water is brought to the surface, so as to permit effective trowelling. Surface irregularities measured as described in sub-paragraph in sub-paragraph [a], shall not exceed 0.60 centimeter.

Finish U3 - Finish U3 [trowelled finish] applies to inside floors buildings. When the floated surface has hardened sufficiently to prevent excess of fine materials from being drawn to the surface, steel trowelling shall be started. Steel trowelling shall be performed with firm pressure, so as the flatten the sandy texture of the floated surface and produce a dense uniform surface, free from blemishes and trowel marks. Surface irregularities, measured as described in sub-paragraph [a], shall not exceed 0.60 centimeter.

Finish U4 - Finish U4 applies to canal lining. The finished surface shall be equivalent in evenness, smoothness and freedom from rock pocket and surface voids to that obtainable by effective use of a long-handled steel trowel. Light surface fitting and light trowel marks will not be considered objectionable. Surface irregularities measured as described in sub-paragraph [a], shall not exceed 0.60 centimeter for bottom slabs and 1.20 centimeter for side slopes.

d. **Moisture Control for Unformed Surfaces** - in warm, dry or windy weather the moisture control measurer specified herein shall be taken to inhibit loss of moisture from the surface of the concrete. Such surfaces shall be fog-sprayed, covered completely with white polyethylene sheet, or otherwise treated as approved. The curing specified in Paragraph 1522 shall be started as soon as the concrete hardens, however the surface of the concrete shall be kept wet during the change in curing methods.

If surfaces are fog sprayed, the fog spray shall maintain a sheet of moisture on the concrete but shall displace cement or create a wet surface during finishing operations. Surfaces shall be fog sprayed during and immediately following finishing operations, and fog spraying shall be interrupted only to able finishing operations. Such interruptions shall be of minimum duration and shall occur only in the immediate area being finished.

Plastic shrinkage cracks which occur before the concrete hardens shall be closed. Shrinkage cracks shall be closed by working; cracks not to be sealed by trowelling only.

1520 CURING

a. General

All concrete except interior surfaces, shall be cured for a period of not less than 14 consecutive days.

All horizontal slabs or surfaces shall be cured by water curing in accordance with paragraph [c] and all inclined or vertical surfaces of concrete shall be applied with membrane curing immediately after removal of forms to prevent dehydration in accordance with paragraph [b] except that membrane curing shall not be allowed for mass concrete and for construction joints. Contractor shall have all equipment for adequate curing and protection of the concrete on hand and ready for use before actual concrete placement begins. The curing medium and method or the combination of mediums and methods used shall be subject to the approval of the Engineer.

i. Floors, stair treads, and horizontal construction joints shall be cured for 14 days by a covering of damp sand or curing mats, except that curing of construction joints surfaces may be discontinued in less than 14 days when the surfaces are to be covered with fresh concrete. The sand or curing mats shall not be kept so wet as to allow water to drain from it and stain concrete walls. The sand or curing mats shall be removed after the expiration of the curing period.

ii. Interior Surfaces

Concrete surfaces of interior walls, including ceiling and surfaces of construction joints and vertical construction joints will require no curing other than resulting from forms being left in place for at least two days. Interior walls shall be washed during and after completion of concrete operations at higher elevations. The washing shall be sufficient to keep the walls free from drips or runs of material that would cause streaking or staining of the concrete. Stair risers and large repairs on interior walls shall be cured for at least four days by damp mats but the mats shall not be wet enough to cause dripping of water on completed concrete. Small repairs and filled core holes walls shall be cured for at least four days by masking or similar covering.

b. Membrane Curing Method

The concrete shall be sprayed uniformly with seal compound in accordance with the manufacturer’s written recommendation, copies of which shall be furnished to the Engineer

for approval in advance of the material being used. The sealing compound shall conform to AASH Designation: M-148, Type II. The component shall be of uniform consistency and quality within each container of each shipment and from shipment to shipment. Sealing compound used in confined spaces shall not be toxic to workmen. The contractor shall furnish a manufacturers certificate of compliance for the compound prior to its use on the work. The certificate shall identify the batch and include certified test results covering all requirements of the specifications for the sealing compound material.

Sealing compound shall be applied to unformed concrete surfaces immediately upon completion of moisture control measures taken as specified in Paragraph 1521 [d]. where such measures are not required, sealing compound shall be applied as soon as the concrete is hard enough to preclude damage from application of the sealing compound. The engineer will require that the side slopes and the bottom of the canal lining be sprayed separately unless the surfaces are ready, simultaneously, to receive the sealing compound.

Sealing compound shall be applied to formed concrete surfaces immediately upon removal of the forms as specified in paragraph 1518. the moisture control measures shall be taken until the forms have been removed. From surfaces shall be sprayed with water immediately after the forms have been removed until the surfaces are saturated. The sealing compound shall be applied as soon as the surface film or water has disappeared but while the surface is still damp.

Scaling compound shall be applied in one coat to provide a continuous uniform membrane. Special are shall be taken to ensure coverage of edges, corners and rough spots of formed surfaces. The compound shall be agitated continuously in the pressure tank.

Concrete repair work shall be performed after the sealing compound has been applied and is dry to touch. In event that the application of sealing is delayed or interrupted, water shall be applied as approved, until application of sealing compound is started or resumed.

Any membrane that is damage or us determined to be defective within 28 days after application shall be repaired or replaced without delay, as approved. If the contractor's operations require traffic on coated surfaces, the membrane shall be protected from damage

Payment for membrane curing shall be included in the contract unit price for concrete in the Bill of Quantities where they are required.

c. Water Curing

Water curing shall start as soon as practicable after placement of the concrete and shall continue until completion of the specified curing period or until covered with fresh concrete. Concrete, if cured by water, shall be kept wet by pounding method or by covering with an approved water saturated materials, or by a system of perforated pipes, mechanical sprinklers, porous hose, or by any other methods approved by the Engineer which will keep all surfaces to be cured continuously [not periodically] wet.

Water used for curing shall be free of chemicals which may have an adverse effect on the concrete. For example, water containing sulfates or chlorides is not acceptable.

1521 TOLERANCES FOR CONCRETE CONSTRUCTION

a. **General**. Permissible surface irregularities for the various classes of concrete surface finish, specified in Paragraph 1521 are defined as "finishes", and are to be distinguished from tolerances that are consistent with modern construction practice, yet governed by the effect that permissible deviations will not have upon the structural action or operational of the structure. Deviations from the established lines, grades and dimensions will be permitted to the extend set forth herein.

Where tolerances are not stated in the specifications or drawings for any individual structure of feature thereof, permissible deviations will be interrupted in conformity with the provisions of this paragraph. Concrete work that exceeds the tolerance limits specified will be rejected and shall be corrected or removed and replaced, as ordered.

b. Tolerance for Canal Structure

1. Concrete canal lining

   Departure from established alignment
   - 5cm. on tangents
   - 10 cm. on curves

   Departure from established profile grade
   - 2.50 cm

   Reduction in thickness of lining:
   10 percent of the specified thickness; provided that the average of all thickness measurements made in 40 meters of lining shall not less than the specified thickness, and provided further that the quantity of concrete actually used in 40 meters of lining shall be not less than the theoretical quantity, based on the lines shown on the drawings.

   Variation from specified width of section at any dept. - 3 cm

   Variation from established depth of lining - 3.7 cm.

   Variation in surface:
   Invert, in 3 meter - 0.60 cm.
   Side slopes, in 3 meter - 1.20 cm

2. Bridges, inlets, chutes, and structures:

   Departure from established alignment - 1.20 cm.

   Departure from established grades - 1.20 cm.

   Variation from the plumb or the specified batter in in the lines and surfaces of columns, piers, walls and in arises:
   Exposed in 3 meters - 1.20 cm.

Backfilled in 3 meters	- 2.00 cm.
Variation in cross-sectional dimensions of columns, walls, piers, slabs, beams and similar parts:	
Minus	- 0.60 cm.
Plus	- 1.20 cm

3. Bridge Slabs:

Variation in thickness of slab:	
Minus	- 0.30 cm.
Plus	- 0.60 cm.
Variation from specified with over curbs	- 0.60 cm.
Variation from specified form specified grade of top or curb in cambered position	- 0.60 cm.

4. Foundations:

Variations in dimensions in plan:	
Minus	- 2.50 cm.
Plus	- 5.00 cm.
Variation from established grade:	
Minus	- 1.20 cm.
Plus	- 2.00 cm
Misplacement eccentricity: 2 percent of the footing width in the direction of misplacement but not more than	- 5.00 cm.

5. Bridge Seats:

Variation of any one bearing from established elevation	- 0.30 cm
Difference in elevations of bearings for adjacent spans, maximum	- 0.60 cm.
Difference in elevations of bearings for zone span on any one pier maximum	- 0.30 cm.
Horizontal misplacement for any one bearing, maximum	- 0.70 cm.
Variation in the sizes and locations of slabs and	

wall opening -1.20 cm.

Skills and side walls for radial gates and similar watertight joints:

Variation from the plump level not greater than 0.30 cm. in 3 meters

6. Stop Long Slots:

Variation from a common plate between the sealing surfaces of each pair of related stop log slots shall be greater than - 0.15 cm.

Variation of width of stops log guides:
Minus - 0.30 cm.
Plus - 0.60 cm.

c. Tolerance for Cast-In-Place Concrete Pipe

Departure from established alignment or from established grade - 2.50 cm

Variation in thickness at any point:

Minus 2½% or 0.60 cm. whichever is greater Plus 5% or 1.20 cm.

Variation from inside diameter - 0.5 %

Variation from surface invert - 0.60 cm In 3meters

d. Tolerances for placing reinforcement steel.

Variation from indicated protective cover:

For 5 cm. cover - 0.60 cm.
FOR 7.5 cm. cover - 1.20 cm.

Variation from indicated spacing - 2.50 cm.

1522 FAILURE TO CURE

The Engineer shall have the authority to suspend the work whole or in part, by written order, for such period as he may deem necessary for failure on the part of the Contractor to perform proper curing of the concrete work and withhold payment for the corresponding work pending results of tests, that shall subsequently be made on these concrete works. The contractor shall immediately secure more samples of such members and from part of the

structure as shall be designated by the engineer and shall have been testes in a Testing Laboratory approved by the NIA. If the results of tests are found satisfactory, payment of the concrete in question shall be made and the work ordered resumed, but if the results of tests are unsatisfactory to meet the structural requirements, the contractor shall remove, wholly or partly, the concrete work in question at the discretion and upon written order of the Engineer and the Contractor shall replace such parts at his own expense.

1523 FAILURE TO MEET CONCRETE REQUIREMENTS

All concrete designed, prepared and places by the contractor for all structure that fails to meet the specified strengths shall be removed and replaces by the contractor at his own expense.

1524 PROTECTION OF CONCRETE WORKS

The contractor shall protect all concrete against injury until final acceptance by the NIA. Final acceptance shall be construed to mean acceptance of the whole work after the Contract has been completed or satisfactorily terminated.

CONCRETE STRUCTURES

1701 SCOPE

The Contractor shall construct all concrete structures shown on the Drawings.

Concrete shall be proportioned, mixed, placed, finished and cured as specified in Section XV, Concrete, except as modified herein. The sequence of construction of the structures shall be subject to the approval of the Engineer. Where the thickness of any portion of a concrete structure is variable, it shall vary uniformly between the dimensions shown. Cement mortar plastering is not allowed in the construction of structures, unless otherwisespecified elsewhere in these Specifications.

1702 CONCRETE CONSTRUCTION

All concrete construction shall conform to the provisions of Section XV, Concrete and the detailed requirements of the following paragraphs. Concrete finished shall conform to Paragraph 1519 and/or shall be as noted on the Drawings.

All structures shall be built to the specified lines, grades and dimensions. The location of all construction joints shall be shown on the Drawings or as approved by the Engineer. Construction joints shall be constructed as shown on the Drawings. The Contractor shall place and embed or attach to each structure all timber, metal or other accessories necessary for its completion as shown on the Drawings or as directed by the Engineer.

The dimensions of each structure shown on the Drawings will be subject to change as may be found necessary by the Engineer to adopt the structures to actual field conditions and conditions disclosed by excavation.

1703 METHOD OF MEASUREMENT

Measurement for payment of any and all classes of concrete will be made by the number of cubic meter computed to the neat lines of the structure, unless otherwise specifically shown on the Drawings or specified in these Specifications. In the event cavities resulting from careless excavation or from excavation performed to facilitate the Contractor's operations, as determined by the Engineer, are required to be filled with concrete. Such refilling will be made by at the expense of the Contractor. In measuring concrete for payment, the volume of all openings, embedded pipes, woodwork and metal work within the concrete will be deducted.

1704 BASIS OF PAYMENT

Payment for any and all classes of concrete in various parts of the work will be made at the applicable contract unit prices per cubic meter which price and payment shall include cost for furnishing all materials, equipment and labor, and all operations required in the construction as specified under Section XV, Concrete, except that payment for reinforcing bars and joint materials will be made at the applicable separate contract unit prices in the Bill of Quantities.

If during the implementation of the project, the sources of aggregates differ from those chosen by the Contractor considered in the derivation of his unit bid price for concrete, the Contractor shall not be entitled to any claim for unit price adjustment as a result of such alteration of sources.

1705 CONCRETE FOR ALL STRUCTURES

(a) **General**

The item "Concrete for All Structures" in the Bill of Quantities include all concrete in diversion works (except Rubble Masonry), canal structures and road structures such as siphons, bridges, drainage culverts, road crossings, pipe crossings, ungated thresher crossings, control structures, drop structures, headgates and turnouts and all other structures not otherwise specified elsewhere in these Specifications.

Small concrete structures, at the option of the Contractor, may be installed as precast units provided that precast structures installed in place are equal in all respect to cast-in-place construction as specified in these specifications.

Concrete for diversion works, canal structures and other structures will be measured and paid for as specified in Paragraphs 1703 and 1704, respectively. Structures not fully and acceptably completed will not be measured for payment. Precast structures installed and acceptably completed in place shall be paid for as specified in Paragraph 1704.

All materials used like cement, admixtures, aggregates and steel reinforcing bars shall conform to the provisions of Section XV, Concrete and Section XXIII, Reinforcing Steel Bars, respectively. Classes of concrete to be used shall be those specified in the Drawings.

(b) **Curing and Joints**

All concrete shall be cured in accordance with paragraph 1522, except that concrete for canal siphon shall be cured until the concrete test cylinders shall have attained a strength of at least 210 kg. per square cm. (3,000 pounds per square inch).

The Contractor shall construct expansion and construction joints at sections specified on the drawings all in accordance with the provisions of paragraph 1517 and Section XXI, Concrete Joints and Joint Materials, and elsewhere in these Specifications.

1706 PRE CAST CONSTRUCTION

(a) **Scope and Description**

Pre-casting of reinforced concrete may be resorted to as an alternative to poured-in-place concrete for certain structures such as headwalls and collars, parshall flumes, turnouts, division boxes, and other structures. Should the Contractor choose to employ pre-cast construction on these structures, he must so inform the NIA in writing, submitting in detail his proposed design, modifications of concrete sections, concrete specifications, reinforcements and schemes of construction of all pre-cast units. The NIA may further require the Contractor to submit all other additional informations as may deemed necessary.

The NIA may approve the construction proposed on precasting of concrete with or without correction. The approval, however, does not relieve the Contractor of any responsibility if such work does not meet specified results.

Reinforced concrete pipes and concrete hollow blocks are not considered pre-cast construction, hence, are excluded under this Section.

(b) **Transporting and Placing**

Extreme care should be observed in handling, storing, moving and erecting to avoid cracking, twisting, or other distortions that would result to cracking or damage to the precast concrete. Pre-cast concrete members shall be handled, transported and erected in an upright position and the points of support and directions of the reactions with respect to the members shall be approximately the same as when the member is in final position.

(c) **Sampling and Testing**

The individual components of precast concrete structures, shall conform to the applicable provision of Section XV, Concrete and will be subject to the usual test for reinforced concrete.

(d) **Measurement and Payment**

Measurement of concrete in pre-cast structures will be measured by the number of cubic meter. It shall be computed to the neat lines as if these structures were constructed to the details shown on the Drawings.

The Contractor will be paid for all pre-cast structures acceptably installed or completed in place. He shall be paid for each pre-cast unit as if the units were constructed to the details shown on the Drawings, regardless of the actual dimensions of the pre-cast unit.

1707 LEAN CONCRETE

In the construction of siphons, the bottom of the cast-in-place concrete barrels will be exposed to high velocity flow of seepage during pouring which will absorb or washout the cement in the concrete poured. To minimize the effect of seepage, a blinding concrete with minimum strength of 70 kg/sq. cm. shall first be poured to the lines, grade and dimensions on which the barrels will be constructed as shown on the Drawings.

Lean concrete shall be measured and paid for as specified in paragraphs 1703and1704, respectively.

1708 STAFF GAGES

The Contractor shall install two vertical staff gages, one upstream and one downstream, in all parshall flumes and turnouts with valve structures and in all check structures in the laterals as shown on the Drawings or as directed by the Engineer. The porcelain plated or enameled steel staff gages and other materials and accessories necessary for the installation shall be supplied by the Contractor.

Installation of staff gages will not be measured for payment including all the channels, anchors, anchor bolts and other metal materials necessary to install the staff gages at the parshall flumes and check structures. The cost of installation and other materials supplied by the Contractor shall be included in the contract unit price for concrete in the respective structure where gages are required

CONCRETE CANAL LINING

2001 SCOPE

The work under this section shall include the trimming of foundations and the construction of the canal lining with the necessary construction joints as specified herein, the work shall also consist of furnishing and installation of asphalt impregnated building paper or its equivalent and flap valve weeps and complete accessories, all in accordance with the drawings and these specifications or as directed by the engineer. The building shall only be used if it is necessary to prevent concrete from penetrating into any under drainage.

2002 METHOD OF CONSTRUCTION

a. Trimming Foundation for canal lining

Trimming work will consist of excavation and removal of earth materials bounded by the exposed upper and underside surfaces of the canal lining including the portion where gravel blanket is to be laid except on portion where filter drain is to be constructed.

The contractor must exercise extra care in order that trimming work will extend beyond the neat lines of the underside of the canal lining. Over excavation or trimming work will not be permitted. In the case of slight over excavation, backfilling with soil is not obliged to backfill with concrete [as part of the lining] with no additional cost to NIA.

Any under excavation of the earthworks should not be permitted since this wick result in either the lining closing them of the canal being undersized.

Where canal lining is to be constructed over a gravel blanket, the gravel blanket foundation shall be prepared in conformity with the applicable provisions of section XIC, Roads.

b. Pouring of Concrete

Concrete for canal lining shall conform to the provisions of section XV. The surface of the lining shall be finished as specified for finish under Finish U4 in paragraph 1521, section XV, concrete.

Pouring of concrete shall not be done after finishing the installation of asphalt impregnated building paper or equivalent as shown on the drawings. Likewise, on portion where flap valve weeps are to be installed, pouring of concrete shall only be done after the installation of flap valve weeps have been completed and acceptably laid in accordance with the drawings and as directed by the engineer.

When concrete lining operations are stopped for the day because of equipment breakdown or delayed by other causes, the end of fresh concrete shall be bulk headed to a vertical surface and a construction joint be provided.

2003 METHOD OF MEASUREMENT

Concrete canal lining measured in cubic meters in placed and computed based on the neat lines and dimensions shown in the drawings, unless otherwise specified.

2004 BASIS OF PAYMENT

Payment of concrete for canal lining measured as provided above will be made on the contract unit price per cubic meter, which price and payment shall constitute full compensation for furnishing and installation of flap valve weeps with complete accessories and asphalt impregnated building paper or equivalent whenever shown on the drawings.

RUBBLE MASONRY

1901 SCOPE

The work under this section shall include furnishing all materials, supplies, tools and equipment; construction of all necessary form work; placing rubble stone and concrete binder on an approved foundation and form work; the removal of forms and curing of the rubble masonry, all in accordance with the drawings and these specification or as directed by the engineer.

1902 MATERIALS

Rubble stones consists of filed stones that are cleans, sound durable, resistant the action of water, and must have specific gravity of at least two and six tenths [2.6], and diameter ranging from 15 centimeters to 60 centimeters, sixty percent[60%] which comprises the bigger sizes. Stones shall have the prior approval of the engineer before their use. Materials for concrete binder shall be in accordance with the applicable provisions of Section XV. Concrete binder shall be Class "A" concrete with 37.50 millimeters maximum size of aggregates.

1903 METHOD OF CONSTRUCTION

Preparation and handling of the concrete binder shall been in accordance with section XV. The stones shall be thoroughly wet before they are installed in place. The entire surface of every stone shall be thoroughly covered with concrete binder. In general, one cubic meter of rubble masonry will require one-half cubic meter of concrete binder. Actual variation in this proportion will not entitle the contractor to any price adjustment. It is expected that the whole rubble masonry especially in the case of dam and apron as well as other structures should be well encased and covered by the concrete so that it forms the heating of the body of dam and apron and will act contiguous with the concrete shell. This can be achieved by tamping the stones into the concrete using heavy wooden blocks handled by one or two people. After the bed has been prepared as required the first layer of mortar should be laid and rubble embedded in them. The thickness of mortar should be such that each rubble embedded at least 50% of its longest dimension in the mortar so that when the next layer of mortar is poured the rubble which has been embedded is not disturbed. The next layer of boulders can be arranged in the mortar now placed following the same procedure. This will ensure that all the boulders are fully covered with mortar and they are well entrenched and stable in the mortar so that they are not disturbed when subsequent layers of mortar stones are poured. The stones shall be well set such that no stone will protect beyond the lines on the drawings.

The concrete binder shall be properly worked into the spaces between stones so that no void is left within the rubble masonry. In case reinforcements are placed, no stone shall be closer than four inches [10 centimeters] to the nearest reinforcing bars. Rubble masonry shall be cured by water for five days.

The general construction procedure should be always to start from lowest elevations so that the sub-grade on which the concrete is laid is not disturbed by the seepage forces when concrete is laid is not disturbed by the seepage forces when the higher layers are excavated and prepared for concrete pouring.

In situation when rubble masonry is directly constructed on the sub-grade should be prepared exactly as for any other concrete structures. In these cases, also the first layer can consist of concrete of 15 centimeters thickness in the case of minor structures and 20 centimeters in the case of major structures. The concrete manufacture etc. will be as specified under section XV and the strength will be as of Class “A” concrete.

1904 METHOD OF MEASUREMENT

“Rubble Masonry” will be measured in cubic meters in its final position based on the treat lines of the structure as shown on the drawings.

1905 BASIS OF PAYMENT

The volume measured as provided above will be paid at the contract unit price per cubic meter, which price and payment shall constitute full compensation for furnishing all materials, supplies, labor, tools, equipment and all incidentals or subsidiary works necessary for the success completion of the work described under this section.

GROUTED RIPRAP

2701 SCOPE

The work under this Section shall include furnishing and placing appropriate sizesofstones or spalls for riprap and grouting the riprap with cement mortar, in accordance withtheDrawings and these Specifications or as directed by the Engineer. The stones and spalls shall be obtained from quarry areas or stockpile areas designated by the Engineer.

2702 MATERIALS

Stones for riprap shall be at least 15 centimeters in diameter and shall be sound, tough, durable, dense and resistant to the action of air and water with a specific gravityof at least two and six tenths (2.6).

Mortar for grouted riprap shall consist of one part cement to three parts sandbyvolume and sufficient water to produce a thick and creamy mixture conformingtotheprovisions of Section XV, Concrete.

2703 METHOD OF CONSTRUCTION

A) NON-SLOPING GROUTED RIPRAP

The foundation bed shall be moistened, well compacted and brought to the required elevation. The stones shall be well laid with close joints by hands. The stones shall bewell arranged in such a manner that the stones can resist disturbance. If big spaces occur between stones and formation bed, said spaces shall be well packed with spall of appropriate sizes of stones. The stones so arranged shall be moistened before placing the grout. All spaces between the stones shall be completely filled with grout from bottom to top and the surface swept with stiff broom. The first layer shall consist of at least 15 centimeters mortar and the boulders should be embedded in this mortar. Thus the mortar poured is worked into the interstices so that the whole mass of boulders from bottom to top is covered and connected with mortar and will act as one mass. The grouted riprap shall be cured with water for a minimum period of three (3) days.

B) SLOPING GROUTED RIPRAP

The slope where the grouted riprap is going to be constructed should be well cured and compacted and trimmed to the required grade and elevation. If the grouted riprap is on the slopes of the embankment , the embankment is constructed to the required degree of compaction. The first layer of 15 centimeters thick mortar should be laid to a height of 60centimeters to 90 centimeters and to a length which can be handled conveniently so that there is no initial set of mortar. The stones shall be well laid with close joints by hands and shall be well arranged in such a manner that the stones can resist disturbances. If big spaces occur between stones and formation bed, said spaces shall be well packed with spalls of appropriate sizes of stones. The stones so arranged shall be moistened before placing the grout. This will act as base to the subsequent lifts. The next lift can be 1 to 1.25 meters height. Thus the whole sloping grouted riprap should be constructed in 1 to 1.25 meters height lifts at a time. All spaces between the stones shall be completely filled with grout from

bottom to top and the surfaces swept with stiff broom. Thus the mortar poured is worked into the interstices so that the whole mass of boulders from bottom to top is covered and connected with mortar and 56 will act as one mass. The grouted riprap shall be cured with water for a period of three(3)days.

The general construction procedure should be always to start from lowest elevations.

2704 METHOD OF MEASUREMENT

Grouted riprap will be measured by the number of cubic meter of materials acceptably placed and computed based on the neat lines as shown on the Drawings.

2705 BASIS OF PAYMENT

The volume measured as provided above shall be paid at the contract unit price per cubic meter, which price and payment shall constitute full compensation for furnishing all labor, tools, equipment, supplies and materials and all incidentals or subsidiary works necessary for the successful completion of the work described under this Section. Excavation involved under this Section is not considered a subsidiary work hence, it will not be measured for payment under this Section. Rather, it will be measured and paid for under "Structure Excavation".

BOULDER RIPRAP

2501 SCOPE

The work under this section shall include furnishing and placing the boulders and spalls of appropriate sizes of filler stones or pre-cast concrete blocks for riprap on the prepared subgrade, all in accordance with the drawings and these specifications or as directed by the engineer. Boulders and spalls shall be obtained from sources designated by the Engineer.

2502 MATERIALS

Rocks, boulders or stone materials for riprap shall be hard, durable and free of fissures or defects that would tend to foster deterioration from natural causes. Rock or boulder materials shall have specific gravity of not less than 2.6, saturate surface dry when tested as specified in the Department of Water Resources manual of "Testing Procedures for Soils", Designation 508, Part C and D.

The shape of rock or boulders shall be such that the minimum dimensions of a rock or boulders is not less than 50% of the maximum dimension.

The sizes of rocks or boulders or pre-cast concrete blocks shall be specified on the drawings. If pre-cast concrete blocks is specified in the Bill of Quantities, materials shall conform to the applicable provisions of Section XV, Concrete and Section XXIII, reinforcing steel bars, and shall also be in accordance with the drawings or as directed by the engineer. All reinforcing bars to be used in the fabrication of pre-cast concrete blocks shall be supplied by contractor unless otherwise specified in the Bill of Quantities.

2503 METHOD OF CONSTRUCTION

Boulder riprap shall be places immediately following completion of embankment, channel or section of the structure involved, unless otherwise directed by the engineer.

On the prepared gravel blanket or sub grade, the boulder shall be laid and arranged property as shown on the drawings to offer maximum resistance to displacement due to high water velocity. Spalls of appropriate size filler stones shall be placed to fill spaced between the boulders. The rocks or boulders for riprap and boulder rockfill bank protection, after placement in their final position, shall conform to the lines and grades as shown on the drawings.

2504 METHOD OF MEASUREMENT

Boulder riprap or boulder rockfill specified on the drawings will be measured by the number of cubic meter of materials acceptably placed and computed based on the neat lines as shown on the drawings.

Pre-cast concrete blocks if specified in the Bill of Quantities will be measured by the number of cubic meter of materials acceptably fabricated and placed in accordance with the drawings.

2505 BASIS OF PAYMENT

The volumes measured as provided above shall be paid for at the respective contract unit price per cubic meter, which price and payment shall constitute full compensation for furnishing all materials except reinforcing bars for pre-cast concrete blocks [if supplied by NA] supplies , labor, tools, equipment and other incidentals or the work under this section. Any excavation involved under this section, is not considered a subsidiary hence it will not be measured for payment under this section. Rather, it will be measured and paid for under "Structure Excavation".

STRUCTURE EXCAVATION

601 SCOPE

Structure excavation includes the removal of all materials within the structure lines including necessary dewatering operations not otherwise specified. It shall also include additional excavation within the vicinity of the structure in order to shape the ground shown on the Drawing or as directed by the Engineer.

602 CLASSIFICATION

Structure excavation shall be classified in accordance with paragraph 402.

603 CONSTRUCTION REQUIREMENTS

All excavation requirements described 403 are applicable under this section.

604 METHOD OF CONSTRUCTION

All structure where practicable shall be constructed in open excavation. The method of construction or excavations shall be in accordance with the applicable provisions of paragraph 404 and the following requirements.

Foundation shall be excavated according to the outline of the footing and floors of structure as shown on the Drawings or as directed by the Engineers and shall be of sufficient size to permit free movement of workers.

On excavation of common materials the foundation bed upon which structures are to be placed shall be finished accurately to the established lines and grades after a thorough compaction and trimming of the foundation with the use of suitable tools and equipment. As soon as the foundation excavations have been trimmed to their final level, it should be protected from degradation by weathering. Should the foundation materials soften exposure then the soft materials shall be removed and replaces at the Contractor's expense. If at any point, material is excavated beyond the lines and grades of any part of the structure, the over-excavation shall be more filled with selected materials approved by the engineer and shall be placed in the layers of not more than 20 centimeters think, moistened and thoroughly compacted by special roller mechanical tempers or by other approved methods. A density not less than 90% of the maximum dry density determines by ASTM test D-698 is required. The cost of filling over-excavation ordered by the Engineer shall be borne by the contractor.

On excavation of rock materials, the bottom and side surfaces of excavated rock excavation upon or against which concrete and weep holes are to place shall conform to the required grades and dimensions as shown on the drawings or as established by the engineer. If at any point, materials are excavated beyond the required limits the over-excavation shall be filled with concrete at the expense of the Contractor including the cost of all materials required.

When concrete is to be placed upon or against rock, the excavation shall be of sufficient dept to provide for the minimum thickness of concrete at all points and any deviation from the required minimum thickness of concrete shall be avoid as much as possible. The surface on which concrete will be laid shall be trimmed ad thoroughly cleaned as directed by the engineer.

When excavation of rock materials reaches the surface upon or against which concrete is to be placed, blasting shall be stopped and the remaining mass of rocks shall be carefully removed by means of jack-hammer or any appropriate hand tool. The point beyond which blasting will not be allowed shall be determined by the engineer. All damages to the rock foundation caused by improper blasting operation shall be repaired by the contractor at his own expense in a manner acceptance to the engineer.

All foundations for bridge pier footing shall be excavated to such depths as may be necessary to secure stable bearing for the structure. Whenever the safe bearing power of the soil as uncovered is less that that called for on the drawing, pilings or appropriate spread footings will be used. The elevations of the bottoms of footings, as shown in the drawings shall be considered as approximate, and the engineers may order, in writing, such changes in elevations and dimensions of footings as may be necessary to ensure a satisfactory foundations. Bearing test, upon written order of the engineer, shall be taken to determine the supporting power of the soil. Cost of bearing test will be paid as "Extra work".

If, in the opinion of the engineer, the material at the base of the excavation is unsuitable for the foundation he shall instruct the contractor to either a] carry out additional excavation to a depth of 50 cm. below the proposed bottom of concrete shown on the drawings and to maximum depth of 60 cm. outside of the outermost lines of said base and replace with backfill compacted to at least 90% of the maximum dry density or b] strengthen the soft materials by ramming in gravel and cobbles until a firm foundation is obtained. Measurement and payment for the backfill shall be made under section XII, "Structure backfill".

605 METHOD OF MEASUREMENT

Structure excavation shall be measured by the cubic meter in its original position before being excavated in accordance with the drawings, or as may be ordered by the engineer, no excavation beyond the pay lines shown on the drawings will be measured for payment. For canal structures, the limit of measurement along the lines perpendicular to the flow of water shall be the vertical planes at the outer edges of the inlet cut-ff walls. The upper limits of the solid, measured for payment shall be the canal bottom for canal structures of the original ground surface in case of diversion structures. The lower limits shall be the bottom of the required excavation. Excavated materials not vertically above the boundaries as specified above shall not be measures for payment. The volume measured shall not include water and other liquids removable by pumping. Such materials as mud, quagmire and other similar semi-solid not removable by ordinary pumping shall be considered pay quantities and shall be measured and paid for as "Structure Excavation".

However, in case of structure excavation for canal structures is done before canal excavation, the upper limit of the solid measured for payment shall be the original ground surface in accordance with the surface in accordance with the structure excavation pay lines.

606 BASIS OF PAYMENT

The volume measured as provided above will be paid per cubic meter, which price and payment shall constitute full compensation for furnishing all materials, supplies, labor, equipment, tools and accidents and subsidiary works necessary to complete the work described under this section.

For diversion works, canal siphons and bridge structure excavations, the cost of the dewatering operation unless otherwise specifies in the Bill of Quantities shall be paid under a separate item in the Bill of Quantities. For all other structure excavations, dewatering operations involved are considered subsidiary work and the cost thereof shall be considered included in the unit price of structure excavation.

The contractor shall be paid sixty percent [60%] of the pay quantities of the actual excavation acceptably accomplished in accordance with the pay lines as shown on the drawings or as directed by the engineer. The remaining forty percent [40%] will be paid upon pouring of concrete for the foundation or upon placing the riprap, gravel blanket or grouted riprap in accordance with drawings and specifications.

CANAL EXCAVATION

401 SCOPE

The work under this Section shall consist of excavating and removal of all classes of materials in canal prism including placing into canal embankments within excavated suitable materials, stocking of excavated materials suitable for embankment and backfilling, and trimming of side slopes inside canal prism and canal beds except on portion of the canal where concrete lining is required [trimming of the foundation bed will be considered included under Section XX. Concrete Canal Ling] all in accordance with the Drawing and these Specifications or as directed by the Engineers.

402 CLASSIFICATION

All excavated materials under this Section shall be classified as follows:

1. **Rock Excavation-** For purpose of classification of excavation, rock is defined as sound and solid masses or formation, layers or ledges of mineral matter in place of such hardness and texture that:

    a. Cannot be effectively loosened or broken down by ripping in a single pass with a latest model tractor mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor above 300 HP.

    b. In the areas where it is impracticable to classify the use of the ripper described above, rock is defined as sound and solid material of such hardness and texture which cannot be loosened or broken by 2.72 kg. [6 pound] drifting pick.

    c. Can only be loosened or broken by a special equipment such as jack hammer and pencil hammer attached to an excavator.

All formation of materials as defined above whose volume is one [1] cubic meter or more will be classified as rock.

2. **Common Excavation-** Excavation of any materials and boulders [whose volume is less than cubic meter] that can be ripped to be loosened by, a dozer of equal or below 180 HP capacity.

3. **Hard Excavation -** Excavation of any materials and boulders [volume of which is at least one cubic meter] that can only be ripped to be loosed by a dozer of above 180 HP to 300 HP.

403 CONSTRUCTION REQUIREMENTS

[a] Explosives and Blasting

1. Explosives

Caps or other exploders or fuses shall in no case be stored in the same place in which dynamite or other explosives are stored, transported to keep. The location and design of powder magazines, the magazines, the methods of transporting explosives and the precautions taken to prevent accidents shall be in accordance with the provisions of all laws, orders, regulations and decrees that are in force in the Philippines or may be issued from time to time by the Government.

The Contractor shall maintain an inventory for storage and withdrawal of power stocks and detonators. The NIA shall be notified immediately of any loss or theft of explosives. The Contractor shall provide such reasonable and adequate subversive action or sabotage to any property. Only reliable personnel shall be permitted to store and handle explosives.

Explosives, if used, shall be of such quantity and power and shall be used in such locations so as to minimize opening of seams and disturbing of material outside the prescribed limits of excavation. As excavation approaches its final limits, the depth of hole for blasting and the quantity of explosives used for each hole shall be reduced so that the underlying or adjacent material will not be disturbed or shattered. Whenever further might blasting injure the surface of the final excavation and determined by the Engineer, the use of explosive shall be discontinued.

The Cost of furnishing, hauling, storing and handling all explosives shall be included in the contract unit price of the work for which they are required.

2. Blasting

Blasting will be permitted only when no proper precautions are taken for the protection of persons, the works, and public or private property. The Contractor shall satisfactorily cover all shots in deep cut excavations and shall take extra precautions on all blasting work as maybe required by the NIA. The Contractor shall blast to the extent necessary and in such a manner that the excavation will not be unduly large or irregular, nor unduly disturb the ground and make it unstable, nor shatter the rock, if encountered, upon or against which concrete is to be placed, nor injure concrete already placed or existing structures at the site or in the vicinity thereof. Whenever, in NIA's opinion, the Contractor's operations are liable to result in duly large excavations or unstable ground, as to injure the rock, concrete or structures, the Contractor shall drill shorter holes and use lighter charges. Approval by the NIA of any of the Contractor's blasting operations shall not relive the Contractor of his responsibility under this paragraph.

The Contractor shall submit his drilling and blasting operations for approval of the Engineers before commencing with his blasting works. No blasting operations shall be undertaken without the approval of the Engineer.

When concrete is to be placed upon or against rock, the excavation shall be of sufficient depth to provide for the minimum thickness of concrete at all points and any deviation from the required minimum thickness of concrete shall be avoided as much as possible. The surface on which concrete will be laid shall be trimmed and thoroughly cleaned as directed by the Engineer.

When excavation of rock materials reaches the surface upon or against which concrete is to be placed, blasting shall be stopped and the remaining mass of rock shall be carefully

removed by means of jackhammer or any appropriate hand tool. The point beyond which blasting will not be allowed shall be determined by the Engineers. The damages to the rocks foundation caused by improper blasting operation shall be repaired by the Contractor at his own expenses in a manner acceptable to the Engineer.

[b] Section and Slopes

Excavation sections, profiles and slopes shall be cut true and straight in conformity with the lines and grades shown on the Drawings within the following tolerances, measured normal to the excavated surfaces:

ITEM	TOLERANCES
1. Side slopes above minimum elevation of cms. operating	± 30 cms.
2. Profile of operating roads, access roads and protection dike	± 9 cms.
3. Profile of invert of canals	± 3 cms.
4. Side slopes inside canal prism for canal and laterals	± 15 cms.
5. Side slopes inside canal prism for canal and laterals	± 15 cms.

The extreme of the above tolerance shall not be continuous over a distance of 40 meters measured at any place, in any direction, parallel to the excavated surface.

[c] Excavation Beyond Established Lines

Precautions shall be taken to preserve, in an undisturbed condition, materials beyond the designated limits of excavation as shown on the Drawings except unsuitable materials ordered removed by the Engineers. Material loosened beyond the excavation limits as result of excavation limits as a result of excavation operations shall be considered defective work and shall be compacted or removed and replaced with compacted embankment at the Contractor's expenses, as directed by the Engineer.

404 METHOD OF CONSTRUCTION

Canal excavation shall include all excavation works in the canal prism whether common, indurate or rock materials, except additional at structure sites which is specified to be done and measured for payment under excavation for structure.

The Contractor shall only excavate after the area of operation is acceptably cleared grubbed in accordance with Section II, "Clearing and Grubbing". Excavation of all canals shall be accordance with the cross section, lines and grades shown on the Drawings. On portion of the canal where concrete lining is required, canal excavation shall not extend beyond the neat lines of the underside face of the canal lining as shown on the Drawing. The Contractor must exercise care not to extend his excavation beyond the limits called for in the Drawings. Excavation operations shall be such that all materials suitable for embankment or backfilling and filling shall be separated from objectionable materials which are to be wasted.

All surfaces from excavation shall be trimmed to the required slopes and grades within the specified tolerances under paragraph 403 [b]. blasting if permitted by the NIA, shall be in accordance with paragraph 403 [a]. “Explosive and Blasting”.

In sections of deep cut in which the canal section is continuous with the road way section and its side slopes, excavation for roadway shall be included under this section. If slides occur on excavated slopes or if run-off flows deposit additional materials in excavations before acceptance of the works, the removal of said slides and/or deposits shall be at the expense of the Contractor.

Large canals like main canals should preferably be excavated with the use of motorized scrapers, excavating in successive layers of about 30 centimeters followed subsequently by trimming of the side slopes using a Grader. Medium sized canals like laterals should preferably be excavated by initially using a D-6 or D-7 Bulldozer for the upper layers and then excavating the bottom layers and side slopes with the use of a Backhoe. Should the Contractor propose to do excavation works by some other means, prior approval of the Engineer must be secured.

405 FINISHING CANAL AND ROADWAYS

Upon completion of all construction operations, the canal section, including slopes embankments, and roadway embankments, shall be finished as specified and shown on the Drawings. Canal beds, canal embankments and side slopes shall be trimmed and shaped to the finished cross-section to produce smooth surfaces and slopes, and uniform cross-sections.

Stockpiling of materials on finished canal sections, roadways and embankments shall not be permitted. All finished works and surfaces shall be cleaned of all dirt and foreign materials.

The contractor shall also be required to clear the entire right-of-way and areas outside the limits of the right-of-way for all excess of objectionable materials, if such excess or objectionable materials are the result of the Contractor’s operation as determined by the Engineer.

All weeds and other objectionable growth, roots, excess earth, debris, loosened rock larger than 7.5 centimeters shall be removed and disposed off in approved sites outside the right-of-way as specified or directed by the Engineer.

The entire canal sections including roadways, side slopes and structure approaches shall be left in a neat and presentable condition.

406 METHOD OF MEASUREMENT

Canal excavation will be measured for every cubic meter of material excavated from the canal prism. Measurement shall be made in its original position after undertaking clearing and grubbing including stripping operations and computed by the Average-End-Area method for every 20 meter section of finished canal within the pay lines or neat lines shown on the Drawings, acceptably excavated and formed into embankments or used for structure backfill, or wasted as directed.

Hauling of excavated materials within the free haul distance either for embankment or disposal to waste areas and trimming of side slopes in canal prism and canal beds except on portion of the canal where concrete lining is required subsidiary work under canal excavation, thus, shall be paid under his section and the cost thereof shall be considered included in the contract unit price for Canal Excavation. Hauling beyond the free haul distance [for waste materials only] and spreading of excavated materials into a canal and roadway embankments and structure backfill shall be paid under Section IX and XII, respectively. Hauling or overhauling for disposal of excavated materials into canal embankments is a subsidiary work for embankment construction and compaction, thus, it will not be measured for payment and the cost thereof is considered included in the contract unit price for Embankment Construction and compaction.

407 BASIS OF PAYMENT

The volume measured as provided above shall be paid per cubic meter, which price and payment shall constitute full compensation for furnishing all materials, supplies, labor, equipment, tools and all incidentals necessary for the successful completion of work described under this Section and for all subsidiary works except for hauling of excavated materials beyond the free haul distance for disposal to waste areas which shall be paid under Section IX, OVERHAUL, and except for trimming of side slopes on portion of canal where concrete lining is required which shall be considered as a subsidiary work under Section XX, Concrete canal Lining.

STRUCTURE BACKFILL

1201 SCOPE

The work under this section shall include hauling [if necessary] and backfilling with suitable materials taken either from Structure excavation, canal excavation, side borrow or borrow haul all spaces excavated and not occupied by the structure and spaces between the natural ground surface and the finished lines indicted to be filled and all other sections directed to be filled by the engineer, all in accordance with these specifications and in conformity with the lines, grades and dimensions shown in the drawings or as ordered by the engineer. It shall also include the dewatering and removal of all unsuitable materials as ordered by the Engineer from the spaces to the backfilled or filled.

1202 METHOD OF CONSTRUCTION

All spaces to be backfilled or filled shall be cleared of all rubbish and other objectionable matter. The excavation pit to be backfilled shall be dewatered and all mud and loose materials shall be removed before backfilling. The filling materials, with the proper moisture content determined by the Engineer, shall be deposited loose and in layers not exceeding 30 centimeters and then thoroughly compacted by ramming rolling or by means of mechanical tampers or portable vibratory compactors to obtain at least 85% compaction bridge abutments, increasing to at least 90% compaction up to the surface of the roadway in the case of approaches to bridges, Road Crossing or Culvert Structures. The time when to start backfilling operation shall be determined by the Engineer.

Materials for structure backfill shall be as described in paragraph 902 [c].

1203 METHOD OF MEASUREMENT

Structure backfill shall be measured in cubic meters in its final compacted and uncompacted position within the limits of structure excavation pay lines and surfaces of concrete in contact with the backfilled materials as shown on the drawings or directed by the engineer. Volumes occupied by the structure and other features will not be included.

1204 BASIS OF PAYMENT

Structure backfill will be paid for at the contract unit price cubic meter, which price and payment shall constitute full compensation for side borrow, borrow haul and overhaul operations and for furnishing all labor, equipments, tools and all incidentals and subsidiary works necessary for the successful completion of the work under this section.

For newly constructed drainage culvert, the volume between the original ground surface and the top of the canal embankment construction operation and therefore shall not be included for payment under this section [which payment shall be included under Embankment construction and compaction].

SIDE BORROW

1001 SCOPE

When suitable materials from canal excavation are not sufficient to form the required section of canal embankment, roadway embankment [especially at stretches of canal where both cut and fill are encountered], additional suitable materials from the adjacent sides of the embankment within 60 meters from the center line of the canal shall be obtained by the borrowing as directed by the Engineer. Side borrow may also be done to form the required section of bridge abutment approaches.

The work under this section shall include clearing and grubbing and stripping of the top soil on the side borrow area; excavation and placing or dumping of the side borrow materials to canal embankment, roadway embankment or dike and spreading the stripped top soil after the side borrow operations.

1002 METHOD OF OPERATION

After having been determined that materials obtainable from side borrow areas are suitable for embankment construction in accordance with paragraph 902 [b], these side borrow areas shall be cleared, grubbed and stripped to about 10 cm. thick top soil before starting any excavation, pushing and dumping operation. The cleared and grubbed materials and /or stripped top soil shall be placed outside the limits of the entire canal right-of-way and side borrow areas as directed by the engineer, all in accordance with the provisions of section II, clearing and grubbing.

Excavation of side borrow materials needed for the construction of embankments shall be made more or less uniform in depth within the limits staked by the engineer and shall no case exceed a depth of 30 cm. measured from the original ground surface; a berm of not less than five meter in width shall be left between the outside toe of the embankment and the edge of the borrow pit with side slope provisions not steeper than 3:1 or unless otherwise shown on the Drawings or as directed by the Engineers.

Materials from side borrow areas shall be placed and/or spread in the canal embankment or roadway of section XIII, embankment construction and compaction.

Before the contractor leaves any particular work after completion of side borrow operations, the side borrow area shall be releveled and destroyed paddy dikes restored; and the cleared and grubbed materials or stripped top soil deposited outside work area shall be returned and spread uniformly throughout the borrow area to the satisfaction of the Engineer. The contractor shall not be allowed to shift his operation to another work area unless said works are completed and approved by the engineer.

1003 MEASUREMENT AND PAYMENT

Side borrow is a subsidiary work for embankment construction and compaction, this it will not be measured for payment. The cost of which is considered included in the contract unit price for embankment construction and compaction or for structure backfill as the case maybe.

REINFORCING STEEL BARS

2301 SCOPE

All reinforcing steel bars required for the works as detailed in the construction drawings or as directed by the engineer shall be furnished by the contractor.

The work under this section includes the hauling of all reinforcing steel bars required for the works to the project site, storing, cutting, bending and proper placing, all in accordance with the drawings in these Specifications.

The length for each size of reinforcing steel bar to be furnished by the contractor shall be computed by taking the theoretical length required for the work. All reinforcing steel bars shall be furnished in commercial standard lengths and the contractor shall cut and bend the reinforcing steel bars to the detail and dimensions shown on the drawings.

2302 MATERIALS

All reinforcing steel bars to be furnished by the contractor shall be Grade 40or PS 275, deformed type and conforming to the requirements of ASTM A-615. The nominal dimensions and unit weights of bars designation shall be in accordance with the following table:

Nominal Perimeter Bar Diameter	Unit wt. Kg/m. Area (sq. mm.)	Nominal Dimensions Cross Section	(mm.)
6 mm	0.222	28.27	18.85
8 mm	0.395	50.27	25.13
10 mm.	0.616	78.54	31.42
12 mm.	0.888	113.10	37.70
16 mm.	1.579	201.10	50.17
20 mm.	2.466	314.20	62.83
25 mm.	3.854	491.90	78.54
28 mm.	4.833	615.75	87.96
32 mm.	6.313	804.15	13.10
36 mm.	7991	1,017.90	113.10

The nominal diameter of a deformed bar is equivalent to the diameter of a plain bar having the same weight per unit length of the deformed bar.

2303 CONSTRUCTION REQUIREMENT

Workmanship shall be the highest grade and shall be in accordance with the latest standard practice of the industry.

1. Cutting and Bending - Cutting and bending of reinforcing bars may be done in shop or at the job site. All bending works shall be in accordance with the latest standard practice and by approved machine methods. Radii for bends

and hooks will be specified on the approved detailed reinforcement drawings in accordance with sound design procedures.

2. Placing- Reinforcement shall be laid, anchored and embedded in the concrete as shown on the drawings or as directed by the engineer. Unless otherwise directed, the spacing of reinforcement bars shall be measured along the center line of the bars. Reinforcement shall be inspected for compliance with requirements as to size, length, splicing, position and number after placement based on the approved reinforcement drawings.

   Before reinforcement are placed, the surfaces of the bars and the surfaces of any metal support shall be cleaned of heavy flaky rust, loose scales, dirt, grease or other foreign substances which, in the opinion of the Engineer, are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap or equivalent treatment is considered objectionable. After being placed, the reinforcing bars shall be maintained in a clean condition until in a clean condition until completely embedded in concrete.

   Reinforcing bars shall be accurately placed and secured in position so as to avoid displacement during the pouring of concrete. Special care shall be exercised to prevent any disturbance of the embedded reinforcement during the setting of concrete. Metal chairs, hangers, spacers or other approved support may be used by the Contractor for supporting bars. Metal supports shall be galvanized when they are to be exposed to view on completed concrete surfaces or where it is contribute in any way to discoloration or deterioration of the concrete.

3. Relation of Bars to concrete surfaces - the minimum cover for all reinforcements shall conform to the dimensions shown on the reinforcement drawings.
4. Splicing - all splices in reinforcement shall be as shown on the drawings or as directed by the Engineer. The lapped ends bars shall be either supported sufficiently to permit the embedment of the entire surface of each bar in concrete or shall be securely wired.

5. Welding - welding of bars shall be performed only where shown on the Drawings or as authorized in writing by the Engineer and shall conform to the requirements of LAWS: D12.1, latest revision. All welders employed shall be shown proof of their welding qualifications to the engineer. All welding shall be done using metal arc welding, pressure gas welding, submerged arc welding or thermo welding. A electric shall be acceptable to NIA. Covering of low hydrogen electrodes must be thoroughly dry when used. The surfaces to be welds shall be clean and shall be clean and shall be free from rust and dirt. All welds shall be develop the full strength of the bar or the smaller bar when two different sizes are welded. Test will be required of not more than five percent of the welds. Approved testing equipment for testing welds shall be furnished by Contractor.

6. Protection - Reinforcement to remain exposed and intended for future concrete embedment shall be protected from corrosion or other damages in an approved manner where directed. The reinforcement protection shall be of such nature that it can be thoroughly cleaned without difficulty prior to encasement in concrete.

2304 PREPARATION OR REINFORCEMENT DRAWINGS

Contractor shall submit for the approval of NA detailed reinforcement drawings in accordance with Article GC-47. These drawings will include bar-placing drawings, bar bending drawings, bar list, and any other reinforcement drawings as may be required to facilitate placement and checking of reinforcing bars. No work shall be done by contractor until such approval has been secured from NA.

The reinforcement drawings submitted shall show the name of the structure location by stationing where the reinforcement drawings is intended and all the necessary information required by NA. It shall likewise bear the stamp or seal of Contractor as evidence that the drawings have been checked by contractor.

Contractor shall be held responsible for any delay in the progress of the work occasioned by his failure to observe the requirements and the time for the completion of the contract will not be extended on account of his failure to promptly submit said drawings in strict adherence herewith.

2305 SAMPLING FOR TESTING AND ACCEPTANCE OF MATERIALS THAT FAIL TO MEET CONTRACT REQUIREMENTS (FOR STEEL BARS FURNISHED BY CONTRACTOR)

Sampling of reinforcing steel bars furnished by the contractor for incorporation in the Permanent Works shall be carried out by NA at the Manufacturer's stockyard before delivery to the project site. The NA authorized representative shall, at random, take two representative samples of reinforcing steel bars per lot covered by the manufacturer's mill certificate. A lot shall consist of all steel bars of the same heat or blow as shown in the mill certificate, and the same nominal cross-section and grade. Samples shall be tested at the manufacturer's testing laboratory, if any, or to any approved Government testing laboratory at Contractor's expense. A lot or lots represented by samples tested which failed to meet specified requirements shall be rejected and will not be counted for delivery to the project site. Sampling and testing shall be in accordance with ASTM requirements. All deliveries shall be subject to prior approval of NA.

The NA reserves the right to accept steel bars that fail to meet the contract requirement provided that the deficiency is not more than nine percent {9%) of the requirement per each type of test and provided further that a corresponding reduction in the unit price will be made. The percentage of reduction equal to the percentage of deficiency based on the minimum requirement of the ASTM A-615 Standard. For example, if the value of the test result for one type of test is five percent [5%] below the minimum requirement, the unit price for payment will be reduced by 5%. If the non-compliance with the test requirements is on two or more tests, the price reduction will be the summation of the percentage of the deficiencies.

2603 NA FINANCING FOR STEEL BARS, IF FURNISHED BY CONTRACTOR

Contractor will be paid 80% of the procurement cost of the reinforcing steel bars delivered to the project site [but in no case shall the cumulative amount exceed 80% of the total contract amount for furnishing steel bars] after presentation of the following documents:

a. Delivery receipt duly acknowledged by the Engineer and the Project Auditor or their duly authorized representatives.
b. Manufacturer's certificate showing the details manufacture, completion and physical properties of the steel bars.
c. All invoices and all other documents covering the deliveries.
d. Certificate of acceptance from the engineer.

The basis for payment of these steel bars will be the unit cost indicated in the invoice or the unit bed price, whichever is lower.

All amounts paid for these steel bars shall be deducted from the monthly progress payment for furnishing and installing reinforcing steel bars. If at any time the amount of monthly payment for furnishing and installing reinforcing steel bars shall be less than the amount deductible there from the balance shall be carried forward and be added to the sum deductible from the next monthly payment.

2307 METHOD OF MEASUREMENT

Measurement for payment of reinforcing steel bars will be made on the weight of reinforcing steel bars actually places with the concrete structure in accordance with the drawings and bar schedule approved by NA or as directed by the Engineer and weights or in the absence thereof on the weights specified in the table presented in Paragraph 2302. Steel bars in laps or splices indicated in the approved reinforcement Drawings, as required by NA will be measured for payment. Additional steel bars in laps which are authorized for the convenience of the Contractor and such items are wires, clips, or other devices for securing the steel bars in place will not be measured for payment. Where weld splices are specified on the drawings, weld splices will not be measured for payment but the weight for its equivalent lap splices will be measured for payment instead. Where contractor chooses to weld reinforcement bars for his convenience and welding is not specified, no separate payment will be made for such welds. Where contractor substitute welded splices for lapped splices, separate payment will not be made for such welds, but instead the weight for the lapped splices shown on the Drawings will be measured payment.

2308 BASIS OF PAYMENT

Payment for reinforcing steel bars measured as provided above, will be paid for at the Contract unit price per kilogram which price and payment shall constitute full compensation for furnishing all labor, tools, equipment and all incidentals and subsidiary works necessary for the successful completion of the work descried under this Section.

As indicated in the Bill of Quantities, payment per kilogram of reinforcing steel bars [same measurement as provided above] shall be made separately for the:

a. Furnishing and delivery cost which shall include all labor, tools, equipment and supplies involves in the manufacture and delivery to the project site which include loading, hauling, unloading and stockpiling at the delivery site;

b. Installation cost which shall include all labor, tools and equipment involved in cutting, bending and placing into permanent structures and all incidentals necessary for the successful completion of the work under this section.

TEMPORARY WORKS, CONSTRUCTIONS PLANT, MOBILIZATION OF CONSTRUCTION EQUIPMENT AND DEMOBILIZATION WORK

101 SCOPE

[a] Temporary works

The contractor shall furnish all materials, labor, equipments, tools and install such temporary works as are necessary for the successful completion of the Contract Work. The Contractor shall negotiate the site for his construction camp, office and work areas.

The temporary works and construction plant shall include but will not be limited to the following:

1. Construction camp for housing, feeding and accommodating of all the Contractor's employees. The Contractor shall also, within close proximity of his camp, provide an office and sleeping quarters for NIA employees, complete with facilities [specifies in item 2 below] and shall have a minimum floor are of 80 square meters.

2. Facilities such as potable water, drainage, sewage, disposal, sanitation, first aid and fire protection facilities.

3. Workshops, warehouses, site offices, stockpile areas, storage areas for materials, equipment, spare parts, fuel and oil.

4. All other temporary facilities not specifically listed but nevertheless required for the proper functioning of the camp set-up and construction activities.

Temporary works shall conform to all government standards and codes and shall meet the sanitary requirements of the Department of Health.

Contractor shall submit to the assistant Administrator for the Project Development and Implementation for approval layout drawings, program of erection and specifications for the Temporary Works within 30 calendar days following the date of the Notice to Proceed. No construction or erection of Temporary Works shall be started without the approval layout drawings, program of erections and specifications.

[b] Mobilization of Equipment

The Contractor shall mobilize and move into Project Site within 20 calendar days after receipt of Notice to Proceed the required initial equipment requirement as listed under Item 7 of Appendix I, Volume II of the Bid Documents.

Notwithstanding the mobilization of the initial equipment requirements, the Contractor shall mobilize to the site the additional equipment requirement within 20 calendar days upon receipt of the approval Equipment Moving-in and Utilization Schedule.

If for the reasons or causes other than "major calamities", the Contractor fails to mobilize fully the initial equipment required with said period, and all other equipments listed in his approved Equipment Moving-in and Utilization Schedule, at the discretion of the Administrator, he may be given an extension of time to mobilize them fully but in no case shall it exceed 30 calendar days. Failure to fully mobilize the required construction equipments within said period will be a ground for contract rescission. During said extension period liquidated damages equivalent to the daily operated ACEL rental rate of eight hours of the undelivered equipment per day of delay shall be imposed and collectible from any subsequent payment due the Contractor. If delays are caused by "major calamities", the corresponding number of calendar days caused by such calamities will not be counted. Delays shall be reckoned starting at 12:00 O'clock noon of the succeeding day after the date scheduled for the mobilization of the programmed equipment. The Engineer shall certify to the date of actual mobilization of the programmed equipment to the site.

The Engineer shall check and verify the number, type and actual condition of the equipment moved into the Project Site. The NIA reserves the right to order the removal of such equipment that are not in good working condition from the Project Site at the Contractor's expenses and said equipments are not be counted for as mobilized.

Construction equipment once moved into the Project Site, checked and accounted for by the Engineer shall not be permitted, prior to the completion of the Contract Work, to be moved out or transferred by the Contractor to another Project Site without the written approval of the Engineer.

Periodic check-up of the Contractor's equipments moved-in for the Contract Work shall be conducted by NIA. The Contractor will pay to NIA the amount equivalent to the ACEL Rental Rate of any equipment not accounted for during said check-up for the number of calendar days the equipment have been removed [without the written consent of the Engineers] from the Project Site until said equipment have been returned. Such cases are grounds for disapproval of claims by the Contractor for time extensions.

[c] Demobilization

Demobilization shall include dismantlement and removal from the site of Contractor's Plant, materials and equipments and all Temporary Facilities with the exception of some facilities which NIA shall consider to remain and which shall be handed over to NIA at the time of demobilization in a fully operational condition. Demobilization shall also include clean up of the site after completion of the Contract Work as approved and accepted by NIA and transportation of Contractor's employees from the site.

102. BASIS OF PAYMENT

Payment for furnishing of all materials, equipment and labor for the temporary works, mobilization of construction equipments including demobilization work, shall be made at the fixed lump sum price or lump sum bid price whichever is stated in the Bid of Quantities which shall not be subject to price escalation and adjustment, in accordance with the following:

1. Twenty percent [20%] of the lump sum price will be paid upon complete mobilization of the initial equipment requirement.

2. Ten percent [10%] of the lump sum price will be paid upon submittal and approval by the NIA of the Contractor's plan for the temporary works including list of equipment based on his work schedule as approved by NIA.

3. Twenty percent [20%] of the lump sum price will be paid upon the completion of the Contractor temporary works.

4. Thirty percent [30%] of the lump sum price will be paid upon the completion of moving-in of all the construction equipments approved under Equipment Moving-in and Utilization Schedule, duly certified by the Engineer, Project Auditor or their duly authorized representatives. Partial payment of this 30 % may be given on a pro-rata basis after fifty percent [50%] of the approved equipment has been moved-in to the project site.

   For the purposes of computing the percentage of equipment moved-in. corresponding number of points of each equipment listed in the Equipment Moving-in and Utilization Schedule shall be provided by NIA to serve as the basis for any partial payment.

5. The remaining twenty percent [20%] of the lump sum price will be paid to the contractor upon final acceptance of the Contract Work.

CONSTRUCTION SAFETY AND HEALTH

A. BASIC PPE'S FOR WORKERS:

A.1. Helmet/Safety Hardhat
A.2. Safety Shoes/Rubber Boots
A.3. Protection/Working Gloves
A.4. Raincoats

B. FIRST AID/EMERGENCY RESPONSE

B.1. Safety Kit
- B.1.1. Medical Box
- B.1.2. 70% Rubbing Alcohol
- B.1.3. Amonia Water
- B.1.4. Amoxillin 500mg
- B.1.5. Antiseptic (Adhesive Bandage) 100's
- B.1.6. Cotton Balls
- B.1.7. Hyperacidity (Antacid) Tablet
- B.1.8. Loperamide Hydrochloride 32mg caps
- B.1.9. Sterilized Gauze Pads 12 ply 2"x2"
- B.1.10. Mefenamic Acid 500mg
- B.1.11. Micropore Tape 1inch/3m (3M)
- B.1.12. Paracetamol 500mg
- B.1.13. Povidone-Iodine 120ml
- B.1.14. Cetirizine Dihydrochloride 10mg tablet
- B.1.15. Phenylephrine Hydrochloride + Paracetamol 500mg tablet

B.2. Fire Extinguisher
B.3. Safety Signages at Construction Site
B.4. Safety Officer

INSTALLATION OF PROJECT SIGNAGE

The Project Signage/Billboard shall consist of two (2) signages/billboards. It shall be in the standard format of the signage of the Commission on Audit (COA) with a standard dimension of 8'x8' and of the Procuring Entity which is 8'x4'. The said signages/billboards shall be placed near the project site that is visible to the public.

Section VII. Drawings

Section VIII. Bill of Quantities

BILL OF QUANTITIES AND BID PRICES

Contract No.: BCSIMO - LMC - 12- 2023

Description of Contract: CANLAMBONG CIS (REHABILITATION OF SPILLWAY, CANAL STRUCTURES AND CONCRETE CANAL LINING)

Location: DIMIAO, BOHOL

ITEM NO.	DESCRIPTION	QTY.	UNIT
A.	**INSTALLATION OF PROJECT SIGNAGE**	1.00	unit
B.	**REHBAILITATION OF SPILLWAY**		
1	3,000 psi Concrete, Class "A" (211 kgs./cm2)	47.00	cu.m.
2	RSB (All sizes)	3,055.00	cu.m.
3	Rubble Masonry w/ 211 kgsc Concrete Binder	19.20	cu.m.
4	Plain Boulder Riprap	16.64	cu.m.
5	Grouted Riprap	14.08	cu.m.
6	Common Struc. Excav. w/o Dtwrg	53.76	cu.m.
7	Common Struc. Excav. w/ Dtwrg	13.44	cu.m.
8	Loose Rocks Struc. Excav. w/o Dtwrg	37.12	cu.m.
9	Loose Rocks Struc. Excav. w/ Dtwrg	9.28	cu.m.
10	Structure Backfill w/ Compaction	51.20	cu.m.
C.	**CANAL STRUCTURES**		
1	3,000 psi Concrete, Class "A" (211 kgs./cm2)	12.39	cu.m.
2	RSB (All sizes)	807.57	cu.m.

3	Common Struc. Excav. w/o Dtwrg	64.94	kg.
4	Structure Backfill w/ Compaction	45.67	cu.m.
D.	**CANALIZATION**		
1	2,400 psi Concrete, Class "B" (170 kgs./cm2)	135.78	cu.m.
2	RSB (All sizes)	7,570.35	kg.
3	Common Excavation	342.60	cu.m.
4	Side Borrow w/ Compaction	439.41	cu.m.
E.	**TEMPORARY BODEGA/BUNKHOUSE**	1.00	unit
F.	**SAFETY & HEALTH**	1.00	l.s.

Section IX LOCAL CONDITION

LC-01 PROJECT LOCATION

Canlambong CIS is located at Dimiao, Bohol. The project site is approximately 56 kilometers from Tagbilaran City accessible through Bohol Circumferential Road (Tagbilaran – Albur – Loay – Lila - Dimiao) route.

LC-02 ACCESS TO THE SITE

The contract work is located at Dimiao, Bohol. Passing through different service roads by fairly to well graveled road which may deteriorate if used during rainy days. Maintenance and repair of these service roads by the contractor is necessary if so used by them. The cost of maintenance and repair shall be included in the unit bid price of the contractor.

LC-03 FUEL AND POWER SUPPLIES

The major fuel station outlets such as Petron, Caltex and Shell are found in the nearest city of the project and other surrounding municipalities.

The main source of energy is supplied by the National Grid Corporation of the Philippines (NGCP) and locally distributed by the respective electric cooperatives and is presently available at the above-stated address of the project site.

LC-04 CLIMATE AND HYDROLOGY

Bohol belongs to the type IV climate zone of the Philippines. It has a characteristic that the rainfall distribution is fairly even throughout the year as seen in the climatic data, three months from March to May are comparatively dry. Heavy rains are always brought by typhoons. During the past twenty years two super-typhoon visited Bohol: Ining in November, 1964 (record rainfall typhoons were accompanied by big floods in Wahig River. The peak flood water level of Ining reached the hand rail of the national highway bridge over the Wahig river.

But most of the normal rainfalls are strong showers but short. Earth gets dry very quickly after rainfall. On this account considerable working days will be secured even in the wet season.

Rainfall summarized in the following table, but NIA will assume no responsibility whatsoever for the accuracy of these data. Any risk arising from the interpretation of such data is to be entirely borne by the Contractor.

CLIMATE

Month	Rainfall in BES/1 (mm)	Rainy Days BES/2
Jan.	199.40	10
Feb.	170.50	8
March	127.40	8
April	90.06	5
May	178.30	7
June	174.03	8
July	142.65	9
Aug.	163.00	10
Sept.	165.25	8
Oct.	196.00	8
Nov.	212.30	9
Dec.	164.60	9
Total	2049.6	

/1: BES is the rainfall station close to the project area

/2: Daily rainfall less than 5 mm is deemed zero and not counted as rainy day.

LC-05 BANKING FACILITIES

Most rural banks are available at nearby of the project area while major banking facilities are found in Tagbilaran City like; Development Bank of the Philippines, Land Bank of the Philippines, Philippine National Bank and other private banks.

LC-06 COMMUNITY AND FIRST AID FACILITIES

The Contractor is advised that the NIA will take no direct part in providing community facilities such as churches, shops, community center and recreation facilities for Contractor's employees. The Contractor shall make his own arrangements for such as he considers being necessary for the approval of the NIA and shall meet all codes or regulations in effect. It shall be the responsibility of the Contractor to furnish and operate first aid for his personnel. Such facilities may be integrated with the NIA facilities, if any, upon mutual agreement.

LC-07 CONTRACTOR'S WORKING AREA AND SITE OFFICE

The Contractor shall, at his own expense, be responsible for housing, feeding and accommodation of all his employees for the execution of the Contract Work. Construction equipment, materials, tools, supplies, and other incidentals, and all cost incurred for the protection and safety shall be borne by him.

LC-08 WATER SUPPLY

The Contractor shall, at his own expense, be responsible for the provision or

installation, operation and maintenance of a safe, adequate and temporary supply of drinking and domestic water, and the adequate water supply for his construction purposes.

LC-09 RIGHT OF WAY

The NIA will provide all right of way, free of charge to the contractor, which, in the opinion of the Regional Manager, necessary for carrying out the contract work.

LC-10 SITE INVESTIGATION

It is the responsibility of the Contractor to visit the work site to make their own investigation to satisfy themselves as to the existing conditions affecting the work to be done under these Specifications.

The Contractor shall assume all responsibilities for deduction and conclusions that he may obtain or arrive at from the site inspection.

INFORMATION AND DATA REFERRED TO IN THESE BID DOCUMENTS

PROJECT: Canlambong CIS (Rehabilitation of Spillway, Canal Structures and Concrete Canal Lining), Dimiao, Bohol

1. Site Visit and Inspection

   Register at NIA, Regional Office No.7, Dao District, Tagbilaran City, Bohol

2. Wet Season Period, Article LC-04

3. Contract Duration, Article SCC 1.16, ITB

   150 calendar days

4. List of Officers/Offices to be furnished correspondence from the Contractor

   The Regional Manager
   NIA Regional Office 7
   Dao District, Tagbilaran City

5. Minimum Equipment Requirement for the Contract:

Equipment		Capacity	Number of Units
1.	Cargo/Dump truck		2
2.	Concrete Mixer	1 Bagger	1
3.	Concrete Vibrator		1
4.	Vibratory Plate/Rammer Compactor		2
5.	Survey Instrument (Automatic Level/Total Station)	set	1
6.	Bar Cutter		1
7.	Materials Test Apparatus a. Concrete Cylinder Molds (1 set = 3 cylinder molds)	set	1
	b. Slump Cone	set	1

6. List of Initial Equipment required to be mobilized within ten (10) calendar days after receipt of Notice to Proceed

Equipment		Capacity	Number of Units
1.	Cargo/Dump truck		2
2.	Concrete Mixer	1 Bagger	1
3.	Concrete Vibrator		1
4.	Vibratory Plate/Rammer Compactor		2
5.	Survey Instrument (Automatic Level/Total Station)	set	1
6.	Bar Cutter		1
7.	Materials Test Apparatus a. Concrete Cylinder Molds (1 set = 3 cylinder molds) b. Slump Cone	set set	1 1

Section X. Checklist of Technical and Financial Documents

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);

Technical Documents

☐ (b) 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**

☐ (c) 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**

☐ (d) Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**

☐ (e) 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**

(f) Project Requirements, which shall include the following:

☐ a. Organizational chart for the contract to be bid;

☐ b. 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;

☐ c. 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; **and**

☐ (g) 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.

Financial Documents

☐ (h) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

☐ (i) 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.

II. FINANCIAL COMPONENT ENVELOPE

☐ (j) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

☐ (k) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (l) Duly accomplished Detailed Estimates Form, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (m) Cash Flow by Quarter.

Section XI. BIDDING FORMS

National Irrigation Administration
Region 7

STATEMENT OF THE BIDDERS OF ALL ITS ONGOING GOVERNMENT & PRIVATE CONTRACTS INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED

Business Name : _____

Business Address : _____

NAME OF CONTRACT	CONTRACT DATE	CONTRACT PERIOD	CONTRACT AMOUNT	Amount or Value of Outstanding Works or Unperformed Portion
Government				
Private				

Submitted by : _____
(Printed Name & Signature)

Designation : _____

Date : _____

National Irrigation Administration
Region 7

STATEMENT OF THE BIDDER'S SINGLE LARGEST COMPLETED CONTRACTS (SLCC) SIMILAR TO THE CONTRACT TO BE BID

Business Name : _____

Business Address : _____

NAME OF COMPLETED CONTRACT	DATE OF CONTRACT	CONTRACT DURATION	CONTRACT AMOUNT
Government			
Private			

Note: This statement shall be supported with:

Owner's Certificate of Final Acceptance or a final rating of at least Satisfactory in the CPES

Submitted by : _____
(Printed Name & Signature)

Designation : _____

Date : _____

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID SECURING DECLARATION
Project Identification No.: BCSIMO-LMC-12-2023

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:
   a. Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
   b. 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
   c. 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]

LIST OF CONTRACTOR'S EQUIPMENT PLEDGE TO THE CONTRACT TO BE BID.

CONTRACT No. _____

NAME OF CONTRACT: _____

Name of Equipment	Unit	Plate No./Model	Motor No./Body No./Engine No.	Proof of Ownership	Present Location	Remarks

Submitted by :

_____ Date: _____

(Name of Contractor & Signature)

_____

(Name of Firm)

Omnibus Sworn Statement

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];

2. [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;)];

3. [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;**

4. 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;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. [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;

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

8. [Name of Bidder] is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

a. Carefully examining all of the Bidding Documents;
b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the [Name of the Project].

9. [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.

10. 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]

BID FORM

Date: _____

Project Identification No.: BCSIMO-LMC-12-2023

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:

a. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: [insert name of contract];

b. We offer to execute the Works for this Contract in accordance with the PBDs;

c. The total price of our Bid in words and figures, excluding any discounts offered below is: [insert information];

d. The discounts offered and the methodology for their application are: [insert information];

e. 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,

f. 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;

g. 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[12] for this purpose;

h. 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;

i. 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

j. We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.

k. 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].

l. 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: _____

BILL OF QUANTITIES AND BID PRICES

Contract No.: BCSIMO - LMC - 12- 2023
Description of Contract: CANLAMBONG CIS (REHABILITATION OF SPILLWAY, CANAL STRUCTURES AND CONCRETE CANAL LINING)
Location: DIMIAO, BOHOL

ITEM NO.	DESCRIPTION	QTY.	UNIT	UNIT BID PRICE IN WORDS & IN FIGURES	TOTAL
A.	**INSTALLATION OF PROJECT SIGNAGE**	1.00	unit	P	P
B.	**REHBAILITATION OF SPILLWAY**				
1	3,000 psi Concrete, Class "A" (211 kgs./cm2)	47.00	cu.m.	P	P
2	RSB (All sizes)	3,055.00	cu.m.	P	P
3	Rubble Masonry w/ 211 kgsc Concrete Binder	19.20	cu.m.	P	P
4	Plain Boulder Riprap	16.64	cu.m.	P	P
5	Grouted Riprap	14.08	cu.m.	P	P
6	Common Struc. Excav. w/o Dtwrg	53.76	cu.m.	P	P
7	Common Struc. Excav. w/ Dtwrg	13.44	cu.m.	P	P
8	Loose Rocks Struc. Excav. w/o Dtwrg	37.12	cu.m.	P	P
9	Loose Rocks Struc. Excav. w/ Dtwrg	9.28	cu.m.	P	P
10	Structure Backfill w/ Compaction	51.20	cu.m.	P	P
C.	**CANAL STRUCTURES**				
1	3,000 psi Concrete, Class "A" (211 kgs./cm2)	12.39	cu.m.	P	P

2	RSB (All sizes)	807.57	cu.m.	P	P
3	Common Struc. Excav. w/o Dtwrg	64.94	kg.	P	P
4	Structure Backfill w/ Compaction	45.67	cu.m.	P	P
D.	**CANALIZATION**				
1	2,400 psi Concrete, Class "B" (170 kgs./cm2)	135.78	cu.m.	P	P
2	RSB (All sizes)	7,570.35	kg.	P	P
3	Common Excavation	342.60	cu.m.	P	P
4	Side Borrow w/ Compaction	439.41	cu.m.	P	P
E.	**TEMPORARY BODEGA/BUNKHOUSE**	1.00	unit	P	P
F.	**SAFETY & HEALTH**	1.00	l.s.	P	P
	TOTAL AMOUNT OF BIDS (In words and Figures)				P

The undersigned bidder hereby certifies that he has fully informed himself of all condition, local and otherwise affecting the carrying out of the Contract works and that his bid has been prepared in strict accordance with the terms and condition.

Name of Firm: _____

_____
Name in Print & Signature of Bidder


NATIONAL IRRIGATION ADMINISTRATION
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