PHILIPPINE BIDDING DOCUMENTS

(As Harmonized with Development Partners)

Procurement of INFRASTRUCTURE PROJECT: SLOPE PROTECTION AT HILLSIDE BARANGAY

Government of the Republic of the Philippines

Sixth Edition
July 2020

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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

Invitation to Bid for
Slope Protection at Hillside Barangay

1. The John Hay Management Corporation (JHMC), through the Corporate Operating Budget for CY 2020 intends to apply the sum of One Million Pesos (PhP1,000,000.00) being the Approved Budget for the Contract (ABC) to payments under the contract for Slope Protection at Hillside Barangay (Contract No. INFRA-06 2020). Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The John Hay Management Corporation (JHMC) now invites bids for the above Procurement Project. Completion of the Works is required Thirty (30) Calendar Days. Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

3. Bidding will be conducted through open competitive bidding procedures using non-discretionary "pass/fail" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

   JHMC allows the participation of prospective bidders through personal appearance or video conferencing. Bidders may submit their bids using the two (2) separate sealed bid envelopes system or **two (2) password-protected Bidding Documents in compressed archive folders, in case of electronic bid submission**, and which shall be submitted simultaneously. The first shall contain the technical component of the bid, including the eligibility requirements, and the second shall contain the financial component of the bid.

4. Interested bidders may obtain further information from John Hay Management Corporation (JHMC) and inspect the Bidding Documents at the address given below from 8 October 2020 from 10 A.M to 2 P.M., Tuesday and Wednesday.

5. A complete set of Bidding Documents may be acquired by interested bidders on 8 October 2020 from given address and website/s below and upon payment of the applicable fee for Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of Php 5,000.00. The Procuring Entity shall allow the bidder to present its proof of payment for the fees and may be presented in person, by facsimile, or through electronic means.

6. The John Hay Management Corporation (JHMC) will hold a Pre-Bid Conference[1] at 1:00 P.M. on 14 October 2020 at the JHMC Conference Room, Sheridan Drive, Camp John Hay, Baguio City and/or through videoconferencing/webcasting.

The Pre-bid conference will be conducted in person/face-to-face or through video conferencing. Prospective Bidders who opt for video conferencing must inform the BAC Secretariat of their intent through the electronic mail address listed below. The Pre-Bid Conference is open to prospective bidders but attendance shall not be mandatory.

7. Bids must be duly received by the BAC Secretariat through manual submission at the JHMC Conference Room, Sheridan Drive, Camp John Hay, Baguio City on or before 9:00 A.M. on 28 October 2020. 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 16.

9. Bid opening shall be at 10:00 A.M on 28 October, 2020 at the JHMC Conference Room, Sheridan Drive, Camp John Hay, Baguio City and/or through video conferencing. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. In compliance with the health protocols against the COVID-19 Pandemic, JHMC is limiting the physical presence of participants for the Pre-bid conference and Bid Opening to ten (10) persons with one (1) representative from each prospective bidder. Selection of the ten (10) participants shall be based on the earliest time such a request was made. It is highly encouraged that other prospective bidders attend the Pre-Bid Conference and Bid Opening through video conferencing.

    Prospective Bidders who are confirmed to attend in person shall submit themselves to the DOH and /or LGU permits/passes and certificates.

11. The John Hay Management Corporation (JHMC) 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.

12. For further information, please refer to:

    FLORENCE JOY MALLARE-ABAD
    Head, BAC Secretariat
    John Hay Management Corporation
    JHMC Office, Camp John Hay, Baguio City
    Telephone Number 074-444-5824
    E-mail: **bac@jhmc.com.ph**

13. You may visit the following websites:

    For downloading of Bidding Documents: www.jhmc.com.ph

    For online bid submission: bac@jhmc.com.ph

08 October 2020

(SGD) JANE THERESA G. TABALINGCOS
BAC Chairperson

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, John Hay Management Corporation invites Bids for the Slope Protection at Hillside Barangay, with Project Identification Number *INFRA-06-2020.*

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 Corporate Operating Budget for CY 2020 in the amount of One Million Pesos (PhP1,000,000.00)

2.2. The source of funding is:

JHMC Corporate Operating Budget 2020.

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. 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. 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 JHMC Conference Room, Sheridan Drive, Camp John Hay, Baguio City 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 One Hundred Twenty Days. 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

<table>
<tr><th>ITB Clause</th><th></th></tr>
<tr><td>5.2</td><td>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be:
Slope Protection: Construction of Gabion Wall</td></tr>
<tr><td>7.1</td><td>Sub-contracting is not allowed.</td></tr>
<tr><td>10.3</td><td>No further instructions.</td></tr>
<tr><td>10.4</td><td>The key personnel must meet the required minimum years of experience set below:

Key Personnel — General Experience — Relevant Experience

Project Engineer — Five(5) Years — Slope Protection and Drainage
Materials Engineer — Five(5) Years — Slope Protection and Drainage
Construction Safety and Health Officer — Three(3) Years — Slope Protection and Drainage
Foreman — Three(3) Years — Slope Protection and Drainage</td></tr>
<tr><td>10.5</td><td>The minimum major equipment requirements are the following:

Equipment — Capacity — Number of Unit(s)
Cargo Truck — 2-5 Tonnes — One (1)
Dumptruck — One (1)
Plate Compactor — One (1)
Bar Cutter — One (1)
Bar Bender — 10 tonnes — One (1)
One Bagger Mixer — 1000 gal — One (1)
Concrete Vibrator — 5 tonnes — One (1)
Water Truck/Pump — 1000 gal — One (1)</td></tr>
<tr><td>12</td><td>No further instructions.</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 Twenty Thousand Pesos (PhP 20,000.00), 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 Fifty Thousand Pesos (PhP 50,000.00) if bid security is in Surety Bond.</td></tr>
<tr><td>19.2</td><td>Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.</td></tr>
<tr><td>20</td><td>Applicable JHMC Regulatory Permits/Licenses/Fees</td></tr>
</table>

21	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, other acceptable tools of project scheduling, and the JHMC Construction Environment Management Plan (CEMP).

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	Target date of completion is Thirty (30) Calendar Days upon the issuance of Notice to Proceed.
4.1	Upon issuance of Notice to Proceed.
6	The site investigation reports are: existing site conditions
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	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 Five (5) Calendar days from delivery of the Notice of Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is One Thousand Pesos (Php1,000.00)
13	The amount of the advance payment is fifteen (15) percent to be released within 20 days from receipt of letter and other requirements.
14	No further instructions.
15.1	The date by which "as built" drawings are required is upon request for progress and final billings.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is One Thousand Pesos (Php1,000.00) per day of non-submission.

Section VI. Specifications

Specifications

1. SCOPE OF WORK FOR BIDDERS

1.1 To provide slope stabilization infrastructure near Seow Residence at Hillside Barangay.

1.2 To impose required construction safety practices during the implementation of the project in compliance with the approved Traffic Management Plan and Occupational Safety and Health Program as established by the Department of Labor and Employment (DOLE).

1.3 To provide and maintain an accessible temporary field office/storage, portable toilets/latrines for workers and/or testing laboratory. The Contractor shall be held responsible for the maintenance and protection of all facilities to be provided during the duration of the Contract.

1.4 To conduct removal and proper disposal of structures and/or obstructions as indicated in the approved plans. All designated salvageable material shall be removed, without unnecessary damages, for safekeeping and turn-over to the end-user.

1.5 To properly and safely dispose all wastes generated during the construction phase.

1.6 To supervise or monitor the presence of the assigned Project Personnel (Project Engineer, Materials Engineer or Safety Officer) during project implementation.

1.7 To conduct site visits to familiarize with the on-site conditions and existing facilities.

1.8 To provide as-staked and as-built plans for the slope protection, one (1) set original CAD drawing in A3 size, two (2) additional copies, and electronic file of the following:

a. Actual layout of the slope protection
b. Details of the constructed slope protection
c. All other details of the project that may be required.

1.9 As-built plans shall indicate the details specified in Section 1.8 in any scale not less than 1:100 meters

1.10 To submit weekly accomplishment reports during the duration of the Contract.

1.11 To shoulder all costs for power and water utilities to be used during the implementation of the project.

1.12 The contractor shall be responsible for all tests and engineering services required by the Specifications. The cost for inspection or test not required by the specifications but which are required by JHMC, will be borne by JHMC.

1.13 All tests shall be performed by accredited testing facilities and approved by JHMC, and shall be in accordance with the current standards of the American Society for testing and materials, otherwise specified by JHMC. Two (2) copies of the test procedures including results shall be furnished to JHMC.

1.14 To immediately report to JHMC all unearthed hazardous materials, buried treasures or artifacts, and shall be coordinated by JHMC to the concerned agencies for their appropriate action. All activities in area of concern shall cease until such time that the hazardous materials, treasures have been properly dealt with.

2. DPWH STANDARDS and SPECIFICATIONS

The scope of work shall be in conformity with of the DPWH standards and specifications.

ITEM 100 - CLEARING AND GRUBBING

100.1 Description

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

100.2 Construction Requirements

100.2.1 General

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

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

100.2.2 Clearing and Grubbing

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

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

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

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

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

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

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

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

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

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

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

The disposal areas shall be seeded, fertilized and mulched at the Contractor's expense.

Woody material may be disposed off by chipping. The wood chips may be used for mulch, slope erosion control or may be uniformly spread over selected areas as directed by the Engineer. Wood chips used as mulch for slope erosion control shall

have a maximum thickness of 12 mm and faces not exceeding 3900 mm^2 on any individual surface area. Wood chips not designated for use under other sections shall be spread over the designated areas in layers not to exceed 75 mm loose thickness. Diseased trees shall be buried or disposed off as directed by the Engineer.

All merchantable timber in the clearing area which has not been removed from the right of way prior to the beginning of construction, shall become the property of the Contractor, unless otherwise provided. Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be trimmed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 6 m above the roadbed surface. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices.

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

100.2.3 Individual Removal of Trees or Stumps

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

100.3 Method of Measurement

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

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

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

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

ITEM 102 – EXCAVATION

102.1 Description

This Item shall consist of roadway drainage and borrow excavation, and the disposal of material in accordance with this Specification and in conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

102.1.1 Roadway Excavation

Roadway excavation will include excavation and grading for roadways, parking areas, intersections, approaches, slope rounding, benching, waterways and ditches; removal of unsuitable material from the roadbed and beneath embankment areas; and excavating selected

material found in the roadway as ordered by the Engineer for specific use in the improvement. Roadway excavation will be classified as "unclassified excavation", "rock excavation", "common excavation", or "muck excavation" as indicated in the Bill of Quantities and hereinafter described.

(1) Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all materials regardless of its nature, not classified and included in the Bill of Quantities under other pay items.

(2) Rock Excavation. Rock excavation shall consist of excavation of igneous, sedimentary and metamorphic rocks which cannot be excavated without blasting or the use of rippers, and all boulders or other detached stones each having a volume of 1 cubic meter or more as determined by physical measurements or visually by the Engineer.

(3) Common Excavation. Common excavations shall consist of all excavation not included in the Bill of Quantities under "rock excavation" or other pay items.

(4) Muck Excavation. Muck excavation shall consist of the removal and disposal of deposits of saturated or unsaturated mixtures of soils and organic matter not suitable for foundation materials regardless of moisture content.

102.1.2 Borrow Excavation

Borrow excavation shall consist of the excavation and utilization of approved materials required for the construction of embankments or for other portions of the work, and shall be obtained from approved sources, in accordance with Clause 61, Standard Specifications for Public Works and Highways, Volume I and the following:

(1) Borrow, Case 1

Borrow Case 1 will consist of material obtained from sources designated on the Plans or in the Special Provisions.

(2) Borrow, Case 2

Borrow Case 2 will consist of material obtained from sources provided by the Contractor. The material shall meet the quality requirements determined by the Engineer unless otherwise provided in the Contract.

102.2 Construction Requirements

102.2.1 General

When there is evidence of discrepancies on the actual elevations and that shown on the Plans, a pre-construction survey referred to the datum plane used in the approved Plan shall be undertaken by the Contractor under the control of the Engineer to serve as basis for the computation of the actual volume of the excavated materials.

All excavations shall be finished to reasonably smooth and uniform surfaces. No materials shall be wasted without authority of the Engineer. Excavation operations shall be conducted so that material outside of the limits of slopes will not be disturbed. Prior to excavation, all necessary clearing and grubbing in that area shall have been performed in accordance with Item 100, Clearing and Grubbing.

102.2.2 Conservation of Topsoil

Where provided for on the Plans or in the Special Provisions, suitable topsoil encountered in excavation and on areas where embankment is to be placed shall be removed to such extent and to such depth as the Engineer may direct. The removed topsoil shall be transported and deposited in storage piles at locations approved by the Engineer. The topsoil shall be completely removed to the required depth from any designated area prior to the beginning of regular excavation or embankment work in the area and shall be kept separate from other excavated materials for later use.

102.2.3 Utilization of Excavated Materials

All suitable materials removed from the excavation shall be used in the formation of the embankment, subgrade, shoulders, slopes, bedding, and backfill for structures, and for other purposes shown on the Plans or as directed.

The Engineer will designate as unsuitable those soils that cannot be properly compacted in embankments. All unsuitable materials shall be disposed off as shown on the Plans or as directed without delay to the Contractor.

Only approved materials shall be used in the construction of embankments and backfills.

All excess materials, including rock and boulders that cannot be used in embankments shall be disposed off as directed.

Materials encountered in the excavation and determined by the Engineer as suitable for topping, road finishing, slope protection, or other purposes shall be conserved and utilized as directed by the Engineer.

Borrow materials shall not be placed until after the readily accessible materials from roadway excavation has been placed in the fill, unless otherwise permitted or directed by the Engineer. If the Contractor places more borrow than is required and thereby

causes a waste of excavation, the amount of such waste will be deducted from the borrow volume.

102.2.4 Prewatering

Excavation areas and borrow pits may be prewatered before excavating the material. When prewatering is used, the areas to be excavated shall be moistened to the full depth, from the surface to the bottom of the excavation. The water shall be controlled so that the excavated material will contain the proper moisture to permit compaction to the specified density with the use of standard compacting equipment. Prewatering shall be supplemented where necessary, by truck watenng units, to ensure that the embankment material contains the proper moisture at the time of compaction.

The Contractor shall provide drilling equipment capable of suitably checking the moisture penetration to the full depth of the excavation.

102.2.5 Presplitting

Unless otherwise provided in the Contract, rock excavation which requires drilling and shooting shall be presplit.

Presplitting to obtain faces in the rock and shale formations shall be performed by: (1) drilling holes at uniform intervals along the slope lines, (2) loading and stemming the holes with appropriate explosives and stemming material, and (3) detonating the holes simultaneously.

Prior to starting drilling operations for presplitting, the Contractor shall furnish the Engineer a plan outlining the position of all drill holes depth of drilling, type of explosives to be used, loading pattern and sequence of firing. The drilling and blasting plan is for record purposes only and. Will not absolve the Contractor of his responsibility for using proper driling and blasting procedures. Controlled blasting shall begin with a short test section of a length approved by the Engineer. The test section shall be presplit, production drilled and blasted and sufficient material excavated whereby the Engineer can determine if the Contractor's methods are satisfactory. The Engineer may order discontinuance of the presplitting when he determines that the materials encountered have become unsuitable for being presplit.

The holes shall be charged with explosives of the size, kind, strength, and at the spacing suitable for the formations being presplit, and with stemming material which passes a 9.5 mm standard sieve and which has the qualities for proper confinement of the explosives.

The finished presplit slope shall be reasonably uniform and free of loose rock. Variance from the true plane of the excavated backs lope shall not exceed 300 mm; however, localized irregularities or surface variations that do not constitute a safety hazard or an impairment to drainage courses or facilities will be permitted.

A maximum offset of 600 mm will be permitted for a construction wo

rking bench at the bottom of each lift for use in drilling the next lower presplitting pattern.

102.2.6 Excavation of Ditches, Gutters, etc.

All materials excavated from side ditches and gutters, channel changes, irrigation ditches, inlet and outlet ditches, toe ditches, furrow ditches and such other ditches as may be designated on the Plans or staked' by the Engineer, shall be utilized as provided in Subsection 102.2.3.

Ditches shall conform to the slope, grade, and shape of the required cross-section, with no projections of roots, stumps, rock, or similar matter. The Contractor shall maintain and keep open and free rom leaves, sticks, and other debris all ditches dug by him until final acceptance of the work.

Furrow ditches shall be formed by plowing a continuous furrow along the line staked by the Engineer. Methods other than plowing may be used if acceptable to the Engineer. The ditches shall be cleaned out by hand shovel work, by ditcher, or by some other Suitable method, throwing all loose materials on the downhill side so that the bottom of the finished ditch shall be approximately 450 mm below the crest of the loose material piled on the downhill side. Hand finish will not be required, but the flow lines shall be in satisfactory shape to provide drainage without overflow.

102.2.7 Excavation of Roadbed Level

Rock shall be excavated to a depth of 150 mm below subgrade within the limits of the roadbed, and the excavation backfilled with material designated on the Plans or approved by the Engineer and compacted to the required density.

When excavation methods employed by the Contractor leave undrained pockets in the rock surface, the Contractor shall at his own expense, properly drain such depressions or when permitted by the Engineer fill the depressions with approved impermeable material.

Material below subgrade, other than solid rock shall be thoroughly scarified to a depth of 150 mm and the moisture content increased or reduced, as necessary, to bring the material throughout this 150 mm layer to the moisture content suitable for maximum compaction. This layer shall then be compacted in accordance with Subsection 104.3.3.

102.2.8 Borrow Areas

The Contractor shall notify the Engineer sufficiently in advance of opening any borrow areas so that cross-section elevations and measurements of the ground surface

after stripping may be taken, and the borrow material can be tested before being used. Sufficient time for testing the borrow material shall be allowed.

All borrow areas shall be bladed and left in such shape as to permit accurate measurements after excavation has been completed. The Contractor shall not excavate beyond the dimensions and elevations established, and no material shall be removed prior to the staking out and cross-sectioning of the site. The finished borrow areas shall be approximately true to line and grade established and specified and shall be finished, as prescribed in Clause 61, Standard Specifications for Public Works and Highways, Volume 1. When necessary to remove fencing, the fencing shall be replaced in at least as good condition as it was originally. The Contractor shall be responsible for the confinement of livestock when a portion of the fence is removed.

102.2.9 Removal of Unsuitable Material

Where the Plans show the top portion of the roadbed to be selected topping, all unsuitable materials shall be excavated to the depth necessary for replacement of the selected topping to the required compacted thickness.

Where excavation to the finished graded section results in a subgrade or slopes of unsuitable soil, the Engineer may require the Contractor to remove the unsuitable material and backfill to the finished graded section with approved material. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary cross-sectional measurements before the backfill is placed.

The excavation of muck shall be handled in a manner that will not permit the entrapment of muck within the backfill. The material used for backfilling up to the ground line or water level, whichever is higher, shall be rock or other suitable granular material selected from the roadway excavation, if available. If not available, suitable material shall be obtained from other approved sources. Unsuitable material removed shall be disposed off in designated areas shown on the Plans or approved by the Engineer.

102.3 Method of Measurement

The cost of excavation of material which is incorporated in the Works or in other areas of fill shall be deemed to be included in the Items of Work where the material is used.

Measurement of Unsuitable or Surplus Material shall be the net volume in its original position.

For measurement purposes, surplus suitable material shall be calculated as the difference between the net volume of suitable material required to be used in embankment corrected by applying a shrinkage factor or a swell factor in case of rock excavation, determined by laboratory tests to get its original volume measurement, and the net volume of suitable material from excavation In the original position. Separate pay items shall be provided for surplus common, unclassified and rock material.

The Contractor shall be deemed to have included in the contract unit prices all costs of obtaining land for the disposal of unsuitable or surplus material.

102.4 Basis of Payment

The accepted quantities, measured as prescribed in Section 102.3 shall be paid for at the contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities which price and payment shall be full compensation for the removal and disposal of excavated materials including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

ITEM 104 – EMBANKMENT

104.1 Description

This Item shall consist of the construction of embankment in accordance with this Specification and in conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

104.2 Material Requirements

Embankments shall be constructed of suitable materials, in consonance with the following definitions:

1. Suitable Material - Material which is acceptable in accordance with the Contract and which can be compacted in the manner specified in this Item. It can be common material or rock.

Selected Borrow, for topping - soil of such gradation that all particles will pass a sieve with 75 mm square openings and not more than 15 mass percent will pass the 0.075 mm (No. 200) sieve, as determined by AASHTO T 11. The material shall have a plasticity index of not more than 6 as determined by AASHTO T 90 and a liquid limit of not more than 30 as determined by AASHTO T 89.

2. Unsuitable Material - Material other than suitable materials such as:

(a) Materials containing detrimental quantities of organic materials, such as grass, roots and sewerage.

(b) Organic soils such as peat and muck.

(c) Soils with liquid limit exceeding 80 and/or plasticity index exceeding 55.

(d) Soils with a natural water content exceeding 100%.

(e) Soils with very low natural density, 800 kg/m3 or lower.

(f) Soils that cannot be properly compacted as determined

by the Engineer.

104.3 Construction Requirements

104.3.1 General

Prior to construction of embankment, all necessary clearing and grubbing in that area shall have been performed in conformity with Item 100, Clearing and Grubbing.

Embankment construction shall consist of constructing roadway embankments, including preparation of the areas upon which they are to be placed; the construction of dikes within or adjacent to the roadway; the placinq and compacting of approved material within roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits, and other depressions within the roadway area.

Embankments and backfills shall contain no muck, peat, sod, roots or other deleterious matter. Rocks, broken concrete or other solid, bulky materials shall not be placed in embankment areas where piling is to be placed or driven.

Where shown on the Plans or directed by the Engineer, the surface of the existing ground shall be compacted to a depth of 150 mm and to the specified requirements of this Item.

Where provided on the Plans and Bill of Quantities the top portions of the roadbed in both cuts and embankments, as indicated, shall consist of selected borrow for topping from excavations.

104.3.2 Methods of Construction

Where there is evidence of discrepancies on the actual elevations and that shown on the Plans, a preconstruction survey referred to the datum plane used in the approved Plan shall be undertaken by the Contractor under the control of the Engineer to serve as basis for the computation of the actual volume of the embankment materials.

When embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when embankment

is built one-half width at a time, the existing slopes that are steeper than 3: 1 when measured at right angles to the roadway shall be continuously benched over those areas as the work is brought up in layers. Benching will be subject to the Engineer's approval and shall be of sufficient width to permit operation of placement and compaction equipment. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cuts. Material thus excavated shall be placed and compacted along with the embankment material in accordance with the procedure described in this Section.

Unless shown otherwise on the Plans or special Provisions, where an embankment of less than 1.2 m below subgrade is to be made, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surfaced shall be completely broken up by plowing, scarifying, or steeping to a minimum depth of 150 mm except as provided in Subsection 102.2.2. This area shall then be compacted as provided in Subsection 104.3.3. Sod not required to be removed shall be thoroughly disc harrowed or scarified before construction of embankment. Wherever a compacted road surface containing granular materials lies within 900 mm of the subgrade, such old road surface shall be scarified to a depth of at least 150 mm whenever directed by the Engineer. This scarified materials shall then be compacted as provided in Subsection 104.3.3.

When shoulder excavation is specified, the roadway shoulders shall be excavated to the depth and width shown on the Plans. The shoulder material shall be removed without disturbing the adjacent existing base course material, and all excess excavated materials shall be disposed off as provided in Subsection 102.2.3. If necessary, the areas shall be compacted before being backfilled.

Roadway embankment of earth material shall be placed in horizontal layers not exceeding 200 mm, loose measurement, and shall be compacted as specified before the next layer is placed. However, thicker layer maybe placed if vibratory roller with high compactive effort is used provided that density requirement is attained and as approved by the Engineer. Trial section to this effect must be conducted and approved by the Engineer. Effective spreading equipment shall be used on each lift to obtain uniform thickness as determined in the trial section prior to compaction. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Removal of water shall be accomplished through aeration by plowing, blading, discing, or other methods satisfactory to the Engineer.

Where embankment is to be constructed across low swampy ground that will not support the mass of trucks or other hauling equipment, the lower part of the fill may be constructed by dumping successive loads in a uniformly distributed layer of a thickness not greater than necessary to support the hauling equipment while placing subsequent layers.

When excavated material contains more than 25 mass percent of rock larger than 150 mm in greatest diameter and cannot be placed in layers of the thickness prescribed without crushing, pulverizing or further breaking down the pieces resulting from excavation methods, such materials may be placed on the embankment in layers not exceeding in thickness the approximate average size of the larger rocks, but not greater than 600 mm.

Even though the thickness of layers is limited as provided above, the placinq of individual rocks and boulders greater than 600 mm in diameter will be permitted provided that when placed, they do not exceed 1200 mm in height and provided they are carefully distributed,

with the interstices filled with finer material to form a dense and compact mass.

Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of earth. Lifts of material containing more than 25 mass percent of rock larger than 150 mm in greatest dimensions shall not be constructed above an elevation 300 mm below the finished subgrade. The balance of the

embankment shall be composed of suitable material smoothed and placed in layers not exceeding 200 mm in loose thickness and compacted as specified for embankments.

Dumping and rolling areas shall be kept separate, and no lift shall be covered by another until compaction complies with the requirements of Subsection 104.3.3.

Hauling and leveling equipment shall be so routed and distributed over each layer of the fill in such a manner as to make use of compaction effort afforded thereby and to minimize rutting and uneven compaction.

104.3.3 Compaction

Compaction Trials

Before commencing the formation of embankments, the Contractor shall submit in writing to the Engineer for approval his proposals for the compaction of each type of fill material to be used in the works. The proposals shall include the relationship between the types of compaction equipment, the number of passes required and the method of adjusting moisture content. The Contractor shall carry out full scale compaction trials on areas not less than 10m wide and 50 m long as required by the Engineer and using his proposed procedures or such amendments thereto as may be found necessary to satisfy the Engineer that all the specified requirements regarding compaction can be consistently achieved. Compaction trials with the main types of fill material to be used in the works shall be completed before work with the corresponding materials will be allowed to commence.

Throughout the periods when compaction of earthwork is in progress, the Contractor shall adhere to the compaction procedures found from compaction trials for each type of material being compacted, each type of compaction equipment employed and each degree of compaction specified.

Earth

The Contractor shall compact the material placed in all embankment layers and the material scarified to the designated depth below subgrade in cut sections, until a uniform density of not less than 95 mass percent of the maximum dry density determined by AASHTO T 99 Method C, is attained, at a moisture content determined by Engineer to be suitable for such density. Acceptance of compaction may be based on adherence to an approved roller pattern developed as set forth in Item 106, Compaction Equipment and Density Control Strips.

The Engineer shall during progress of the Work, make density tests of compacted material in accordance with AASHTO T 191, T 205, or other approved field density tests, including the use of properly calibrated nuclear testing devices. A correction for coarse particles may

be made in accordance with AASHTO T 224. If, by such tests, the Engineer determines that the specified density and moisture conditions have not been attained, the Contractor shall perform additional work as may be necessary to attain the specified conditions.

At least one group of three in-situ density tests shall be carried out for each 500 m2 of each layer of compacted fill.

Rock

Density requirements will not apply to portions of embankments constructed of materials which cannot be tested in accordance with approved methods.

Embankment materials classified as rock shall be deposited, spread and leveled the full width of the fill with sufficient earth or other fine material so deposited to fill the interstices to produce a dense compact embankment. In addition, one of the rollers, vibrators, or compactors meeting the requirements set forth in Subsection 106.2.1, Compaction Equipment, shall compact the embankment full width with a minimum of three-complete passes for each layer of embankment.

104.3.4 Protection of Roadbed During Construction

During the construction of the roadway, the roadbed shall be maintained in such condition that it will be well drained at all times. Side ditches or gutters emptying

from cuts to embankments or otherwise shall be so constructed as to avoid damage to embankments

by erosion.

104.3.5 Protection of Structure

If embankment can be deposited on one-side only of abutments, wing walls, piers or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning of, or excessive pressure against the structure. When noted on the Plans, the fill adjacent to the end bent of a bridge shall not be placed higher than the bottom of the backfill of the bent until the superstructure is in place. When embankment is to be placed on both sides of a concrete wall or box type structure: operations shall be so conducted that the embankment is always at approximately the same elevation on both sides of the structure.

104.3.6 Rounding and Warping Slopes

Rounding-Except in solid rock, the tops and bottoms of all slopes, including the slopes of drainage ditches, shall be rounded as indicated on the Plans. A layer of earth overlaying rock shall be rounded above the rock as done in earth slopes.

Warping-adjustments in slopes shall be made to avoid injury in standing trees or marring of weathered rock, or to harmonize with existing landscape features, and the transition to such adjusted slopes shall be gradual. At intersections of cuts and fills, slopes shall be adjusted and warped to flow into each other or into the natural ground surfaces without noticeable break.

104.3.7 Finishing Roadbed and Slopes

After the roadbed has been substantially completed, the full width shall be conditioned by removing any soft or other unstable material that will not compact properly or serve the intended purpose. The resulting areas and all other low sections, holes or depressions shall be brought to grade with suitable selected material. Scarifying, blading, dragging, rolling, or other methods of work shall be performed or used as necessary to provide a thoroughly compacted roadbed shaped to the grades and cross-sections shown on the Plans or as staked by the Engineer.

All earth slopes shall be left with roughened surfaces but shall be reasonably uniform, without any noticeable break, and in reasonably close conformity with the Plans or other surfaces indicated on the Plans or as staked by the Engineer, with no variations therefrom readily discernible as viewed from the road.

104.3.8 Serrated Slopes

Cut slopes in rippable material (soft rock) having slope ratios between 0.75:1 and 2:1 shall be constructed so that the final slope line shall consist of a series of small horizontal steps. The step rise and tread dimensions shall be shown on the Plans. No

scaling shall be performed on the stepped slopes except for removal of large rocks which will obviously be a safety hazard if they fall into the ditch line or roadway.

104.3.9 Earth Berms

When called for in the Contract, permanent earth berms shall be constructed of well graded materials with no rocks having a diameter greater than 0.25 the height of the berm. When local material is not acceptable, acceptable material shall be imported, as directed by the Engineer.

Compacted Berm

Compacted berm construction shall consist of moistening or drying and placing material as necessary in locations shown on the drawinqs or as established by the Engineer. Material shall contain no frozen material, roots, sod, or other deleterious materials. Contractor shall

take precaution to prevent material from escaping over the embankment slope. Shoulder surface beneath berm will be roughened to provide a bond between the berm and shoulder when completed. The Contractor shall compact the material placed until at least 90 mass percent of the maximum density is obtained as determined by AASHTO T 99, Method C. The cross-section of the finished compacted berm shall reasonably conform to the typical cross-section as shown on the Plans.

Uncompacted Berm

Uncompacted berm construction shall consist of drying, if necessary and placing material in locations shown on the Plans or as established by the Engineer. Material shall contain no frozen material, roots, sod or other deleterious materials. Contractor shall take precautions to prevent material from escaping over the embankment slope.

104.4 Method of Measurement

The quantity of embankment to be paid for shall be the volume of material compacted in place, accepted by the Engineer and formed with material obtained from any source.

Material from excavation per Item 102 which is used in embankment and accepted by the Engineer will be paid under Embankment and such payment will be deemed to include the cost of excavating, hauling, stockpiling and all other costs incidental to the work.

Material for Selected Borrow topping will be measured and paid for under the same conditions specified in the preceding paragraph.

104.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 104.4, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities. The payment shall continue full compensation for placing and compacting all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

ITEM 404 – REINFORCING STEEL

404.1 Description

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

404.2 Material Requirements

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

404.3 Construction Requirements

404.3.1 Order Lists

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

404.3.2 Protection of Material

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

the size and grade of steel specified.

404.3.3 Bending

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

Nominal diameter, d, mm	Pin diameter (D)
10 to 20	6d
25 to 28	8d

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

404.3.4 Placing and Fastening

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

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

404.3.5 Splicing

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

where shown on the Plans.

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

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

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

404.4 Method of Measurement

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

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

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

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

404.5 Basis of Payment

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

ITEM 405 – STRUCTURAL CONCRETE

405.1 Description

405.1.1 Scope

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

405.1.2 Classes and Uses of Concrete

The classes of concrete will generally be used as follows:

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

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

405.2 Material Requirements

405.2.1 Portland Cement

It shall conform to all the requirements of Subsection 311.2.1.

405.2.2 Fine Aggregate

It shall conform to all the requirements of Subsection 311.2.2.

405.2.3 Coarse Aggregate

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

Table 405.1 – Grading Requirements for Coarse Aggregate

Sieve Designation		Mass Percent Passing				
Standard	Alternate	Class	Class	Class	Class	Class
63	2-1/2”		100			
50	2”	100	95 – 100			
37.5	1-1/2”	95 – 100	-			100
25	1”	-	35 – 70		100	95 – 100
19.0	¾”	35 – 70	-	100	95 – 100	-
12.5	½”	-	10 – 30	90 – 100	-	25 – 60

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

405.2.4 Water

It shall conform to the requirements of Subsection 311.2.4

405.2.5 Reinforcing Steel

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

405.2.11 Storage of Cement and Aggregates

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

405.3 Sampling and Testing of Structural Concrete

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

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

Sampling of fresh concrete T 141

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

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

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

405.4 Production Requirements

405.4.1 Proportioning and Strength of Structural Concrete

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

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

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

Class Of Concrete	Minimum Cement Content Per m^3	Maximum Water/Cement Ratio kg/kg	Consistency Range in Slump	Designated Size of Coarse Aggregate Square Opening	Minimum Compressive Strength of 150x300mm Concrete
A	360	0.53	50 – 100	37.5 – 4.75	20.7
B	320	0.58	50 – 100	50 – 4.75	16.5
C	380	0.55	100 max.	12.5 – 4.75	20.7
P	440	0.49	100 – 200	19.0 – 4.75	37.7

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

** *Based on 40 kg/bag*

405.4.2 Consistency

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

405.4.4 Mixing and Delivery

Concrete shall be mixed at the site of construction. Mixing of concrete shall be in accordance with the appropriate requirements of AASHTO M 157.

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

Mixer having a rated capacity of less than a one-bag batch shall not be used. The volume of concrete mixed per batch shall not exceed the mixer's nominal capacity as shown on the manufacturer's standard rating plate on the mixer except that an overload up to 10 percent above the mixer's nominal capacity may be permitted,

provided concrete test data for strength, segregation, and uniform consistency are satisfactory and provided no spillage of concrete takes place.

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

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

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

1. Mixing Concrete: General

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

   All concrete shall be mixed in mechanically operated mixers. The auxiliary supply of concrete shall be sufficient to complete the casting of a section up to a construction joint that will meet the approval of the JHMC representative.

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

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

   Materials shall be measured by weighing. The apparatus provided for weighing the aggregates and cement shall be suitably designed and

constructed for this purpose.

The accuracy of all weighing devices except that for water shall be such that successive quantities can be measured to within one percent of the desired amounts. The water measuring device shall be accurate to plus or minus 0.5 mass percent. All measuring devices shall be subject to the approval of the JHMC representative. Scales and measuring devices shall be tested at the expense of the Contractor as frequently as the JHMC representative may deem necessary to insure their accuracy.

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

2. Mixing Concrete at Site

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

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

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

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

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

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

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

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

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

405.5 Method of Measurement

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

405.6 Basis of Payment

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

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

ITEM 511 — GABIONS AND MATTRESSES

511.1 Description

This Item shall consist of furnishing, forming wire mesh baskets, and placing rocks installed at the locations designated, in accordance with this Specification and in conformity with the lines, grades, dimensions, and arrangements shown on the Plans or as directed by the Engineer.

511.2 Material Requirement

511.2.1 General

Gabions shall be constructed of wire mesh and shall be supplied in various lengths and heights. A double twisted wire mesh container of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stones at the project site to form flexible, permeable, monolithic structures such as retaining walls, sea walls, channel linings, revetments and weirs for erosion control. The lengths shall be multiples of 2, 3 or 4 times the width of the gabion and heights shall be 0.50 m to 1.00 m or as shown on the plans. The horizontal width shall not be less than one meter. Gabion furnished shall be of uniform width.

The width, height and length of the gabion as manufactured shall not differ more than +5% from the ordered size prior to filling.

Mattresses are double twisted wire mesh container uniformly partitioned into internal cells with relatively small height in relation to other dimensions, having smaller mesh openings than the mesh used for gabions. Mattresses are generally used for riverbank protection and channel linings. The length shall be 3.00 m to 6.00 m, the width shall be 2.00 m and the height shall be 0.17 m, 0.23 m or 0.30 m or as shown on the Plans.

511.2.2.1 zinc-coated steel wire conforming to Specification ASTM A 641, Class 3 coating, soft temper.

511.2.2.2 Style 2 double-twisted mesh shall be manufactured from Zn-5A1-MM-coat ed steel wire conforming to Specification ASTM A 856/A 856 M, Class 3 coating, soft temper.

511.2.2.3. Style 3 double-twisted mesh shall be manufactured from the same type of metallic-coated steel wire as style 1 with an additional PVG coating extruded into the metallic- coated steel wire. The PVC coating shall conform to the following requirements:

		Test Method
1. Specific Gravity	1.30 to 1.35	D 792
2. Tensile Strength, min	20.6 MPa	D 412
3. Modulus of Elasticity, min	18.6 MPa	D 412
4. Hardness, shore "D"	between 50 & 60	D 2240
5. Brittleness Temp, max	-9^0C (15^0F) or lower	D 746
6. Resistance to Abrasion, % weight loss, max.	temperature 12%	D 1242

The PVC coating shall not show cracks or breaks after the wires are twisted in the fabrication of the mesh.

511.2.2.4 Style 4 double twisted mesh shall be manufactured from aluminum-coated steel wire ASTM A 809, soft temper.

511.2.3. Lacing and Wire Stiffener

Lacing wire and stiffeners shall be made of wire having the same coating material as the double-twisted wire mesh conforming to Specification ASTM A 641, A 856/A 856 M or A 809 with a tensile strength in accordance with Subsection 511.2.7.

511.2.4. Fasteners made from zinc-coated steel wire, zinc - 5% aluminum mischmetal alloy-coated steel wire and aluminum-coated steel wire shall conform to specification **A** 764, Type A, B, or C, Table 2 or Table 3.

511.2.5

Gabions and mattresses shall be manufactured with all components mechanically connected at the production facility with the exception of the mattresses lid that is produced separately from the base. All gabions and mattresses shall be supplied in collapsed form, either folded and bundled or rolled, for shipping.

511.2.6 **Dimensions**

The minimum size of the galvanized and PVC coated wire to be used in the fabrication of the gabion and mattresses shall be as follows:

Gabions and Mattresses Wires	Diameter , mm			
	Gabion		Mattresses	
	Metallic Coated	PVC Coated	Metallic Coated	PVC Coated
Body Wire	3.05	2.70	2.20	2.20

Selvedge or Perimeter Wire	3.80	3.40	2.70	2.70
Tying and Connecting Wire	2.20	2.20	2.20	2.20

Diameter Tolerances for Galvanized Wire to be used in the fabrication of gabion and mattress shall be ± 0.10 mm.

The nominal and the minimum thickness of PVC coating shall be 0.50 mm and 0.38 mm, respectively .

511.2.7 **Mechanical Properties**

Tensile Strength - The tensile strength of Zinc-coated wire used in the fabrication of gabion and mattresses when tested in accordance with ASTM A 370, shall be as follows:

Gabions and Mattresses Wires	Strength , MPa	
	Gabions	Mattresses
Body Wire	350-485	350 - 515
Selvedge or Perimeter Wire	350 -485	350 - 485
Tying and Connecting Wire	350-515	350 – 515

7.2.

7.3. **511.2.8 Weight of Coating**

The minimum weight of zinc per unit area of uncoated wire surface shall be in accordance with ASTM A 975 or as follows:

Wire Diameter , mm	Class 3 or A Coating, g/m^2, ASTM A 641
Over 1.90 to 2.30	220
Over 2.30 to 2.70	230
Over 2.70 to 3.10	240
Over 3.10 to 3.50	260
Over 3.50 to 3.90	270

7.4. **511.2. 9 Rock Fill**

Rocks used in gabions and mattresses shall consist of hard, durable rock pieces that will not deteriorate when submerged in water or exposed to severe

weather conditions. Rock pieces shall be generally uniformly graded in sizes ranging from 100 mm to 200 mm. Filled 3 gabions shall have a minimum density of 1,400 kg/m. Voids shall be evenly distributed.

No rock size shall exceed 2/3 the mattress depth and at least 85% by weight of the stone shall have a size greater than 80 mm. No stone shall be able to pass through the mesh.

The rock shall meet the requirements of MSHTO **M** 63 except that the sodium sulphate soundness loss shall not exceed 9% after 5 cycles

7.5. **511.2.10 Filter Fabric**

Filter cloth shall consist of 70% polypropylene and 30 % polyethylene.

511.3 Construction Requirements

511.3.1 Fabrication

1. Gabions and mattresses shall be in the form of rectangular baskets of the required dimensions and shall be manufactured from wire as specified in subsection 511.2.2. Gabions shall be made of steel wire double twisted forming a uniform hexagonal mesh type 8 x 10 having a nominal mesh openings of 83 by 114 mm. Mattresses shall be made of steel wire double twisted forming a uniform hexagonal mesh type 6 x 8 havinga nominal mesh openings of 64 by 83 mm. Tolerances on the hexagonal, double-twisted wire mesh openings ha ll not exceed ± 10 % on the nominal dimension D values, 64mm for mattresses and 83 mm for gabions. The edges shall be formed into a securely connected selvedge adequate to prevent raveling.

Individual basket ties and connections shall be made by using a quantity of wire not less than 8% of the weight of each basket.

2. When the gabion length exceeds its width it shall have securely tied diaphragms connected at all edges to form individual cells of equal length and width.

Gabions shall be fabricated in such a manner that the sides, ends, lids and diaphragms can be assembled at the construction site into rectangular baskets of the specified sizes. Gabions shall be of single unit construction, base, lids, ends and sides shall beeither woven intoa single unit or one edge of these members connected to the base section of the gabion in such a

manner that the strength and flexibility at the point of connection is at least equal to that of the mesh.

The gabion shall be equally divided by diaphragms, placed at not more than 1.0 m intervals, and of the same mesh and gauge as the body of the gabions, into cells the length of which does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base in such a manner that no additional tying at this junction will be necessary.

511.4 Four cross-connecting wires shall be provided in each cell having a height of one half the width or less, and eight cross-connecting wires shall be provided in each cell having a height greater than one half the width.

All perimeter edge of the mesh forming the gabion shall be securely selvedged so that the joints by tying the selvedges have at least the same strength as the body of the mesh.

Selvedge wire used through all the edges (perimeter wire) shall not be less than 3.80 mm diameter and shall meet the same specifications as the wire mesh.

511.3.2. Assembly and Construction

1. Gabions shall be installed in a workmanlike manner. The gabions shall be placed on a smooth foundation. The final line and grade shall be approved by the Engineer.

Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately 152 mm spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil every 102 mm. Empty gabion units shall be set to line and grade as shown on the Plans or as described by the Engineer. Wire ties or connecting wires shall be used to join the units together in the same manner as described above for assembling. Internal tie wires shall be uniformly spaced and securely fastened in each cell of the structure.

A standard fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

2. When possible the subgrade of the mattress and gabion shall be properly compacted to a depth of 150 mm. The Contractor shall consider the cost of subgrade preparation in the unit prices. Filter fabric as beds of gabions and mattresses forming the structure shall be suitably leveled and shall be securely

connected along the complete length of all contact edges by means of the above specified tying and connecting wire.

3. Before the filling material is placed, the gabions and mattresses shall be carefully selected for uniformity of size, and the pieces shall be handplaced to provide a neat appearance as approved by the Engineer.

The gabions shall be filled with stone carefully placed by hand or machine to assure alignment and avoid bulges with minimum voids. Alternate placing of rock and connection wires shall be performed until the gabion is filled. After a gabion has been filled, the lid shall be bent over until it meets the sides and edges . The lid shall then be secured to the sides, ends and diaphragms with the wire ties or connecting wire in the manner described for assembling.

The vertical joints of gabions and mattress baskets shall be staggered as in running bond in brickwork .

4. The cells in any row shall be filled in stage so that local deformation may be avoid ed. That is at no time shall the cell be filled to a depth exceeding 300 mm more than the adjoining cell.

5. Filter fabric shall be placed between earth surface and gabion or mattress structures. Filter fabric shall be rolled out into a flat non-rutted surface free from sharp objects, weighing down the edges. Construction equipment shall not be allowed into unprotected fabric. Jointing is normally affected by overlapping not less than 300 mm, but it is preferable to joint by sewing or industrial stapling. Joint edges should be facing downwards to avoid protruding through the surface material.

511.5 Method of Measurement

The quantities to be paid for shall be the number of cubic meter of gabions and mattresses and the area of filter cloth completed and accepted.

511.6 Basis of Payment

Quantities determined as provided above shall be paid for at the appropriate contract unit price per unit of measurement for the Pay Item shown in the Bid Schedule, which price and payment shall constitute full compensation for all necessary excavation, subgrade preparation, for furnishing, placing wire baskets and fill materials and for all labor, equipment accessories, tools, and incidentals necessary to complete the Item.

ITEM 622 - COCONET BIO-ENGINEERING SOLUTIONS

622.1 Description

This item covers installation of coconut coir fiber made into geonets such as coconets, coco-logs, coco twines and coco peat as bioengineering materials for controlling soil erosion and slope stabilization in accordance with the cross section shown on the Plans or as directed by the Engineer.

622.2 Definition

For the purpose of this item, the following terms shall be defined:

a) Coconut Geonets - Any coconut coir fiber-based material such as Coconets , Cocologs , Coco peat , placed in sloping lands and embankments to hold the vulnerable soil and permit vegetative growth to control surface erosion and conserve the productivity of the soil.

b) Coconet - Handspun Coconut coir fiber twine woven into blankets of different density

c) Coco-log - a tubular structure of coconut coir fiber blankets of different diameter filled with coco coir, and/or coco peat.

d) Coco coir twine - a string made of coconut coir strands twisted together.

e) Coco coir peat - a natural and residual materials from coconut coir which serves as soil conditioner

f) Machine Spun Coco Coir Twine - coco coir twine made by using a spinning machine

g) Hand Spun Coco Coir Twine - coco coir twine made by using hand or hand made

622.3. Material Requirements

622.3.1. Coconut Coir

Coconut coir fiber materials for use in fabrication of coconut geonets shall be a multi-cellular fiber with 12 to 24 microns in diameter and the ratio of length to diameter shall be 35. The fiber shall also be hygroscopic, with moisture content of 10% to 12% at 65% humidity and 22% to 55% at 95% relative humidity.

622.3.2 Coco -net and Coco-log/Fascine

Coco-net and Coco-log shall conform to Table 1 and Table 2 respectively.

Table 1 - Physical Properties of Coco-net

PROPERTIES		COCONET 400	COCONET 700	COCONET 900
Thickness, mm		10.0 Min.		
Width, m		1.0 Min.		
Length, m		25.0 Min.		
Unit Weight 1 g/m²		400±20	100±35	900±45
Diameter of Twine, mm Hand and Machine Sounds		5.0 mm± 0.50 mm		
No. of Twines/m (Hand & Machine Sounds)	Crosswise direction	40 Min	40 Min	70 Min
	Lengthwise direction	40 Min	70 Min	70 Min

Material		Woven Netting made from High Strength 100% Coconut fiber twine		
Color		Natural Earth Tone		
Tensile Strength, N/twine		150 Min.		
Elongation	(Machine Direction), %	26 Min.	34 Min.	42 Min
	(Cross Machine Direction), %	32 Min.	38 Min.	32 Min.
"C" Factor		0.002		
Water Velocity, m/sec		2.7 Min.	3.35 Min.	4.26 Min.
Water Absorption, %		163 Min.	146 Min.	132 Min.
Slope Inclination, H : V		:s 1:1	1:1 to 60°	75°

"C" Factor - Safety factor

Table 2 - Physical Properties of Coco-log

Type of Coco-log/Fascine	Diameter (mm)	Weight (min.) (Kg/m)
Cocolog 100	100	2.0
Cocolog 200	200	4.5
Cocolog 300	300	10
Cocolog 400	400	20
Cocolog 500	500	30

622.3.2. Backfill

Backfill shall be in accordance with the approved Plan and shall conform to the requirements of Item 104 - Embankment.

622.3.4 Bamboo Stakes

Bamboo stakes shall be mature and shall be 30 to 40 mm in width and 300 mm long.

622.3.5 Live Plant Stakes (Live Kakuate or lpil-ipil or Equivalent Species)

Live plant stakes shall be kept moist and installed the same day they were prepared and shall be 50 to 150 mm in diameter and 500 mm to 1000 mm in length.

622.4. Construction Requirements

622.4.1 Quality Control

The coconut geonets manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of this specification.

622.4.2 Equipment

Equipment and tools necessary for handling materials and performing all parts of the works shall be approved by the Engineer as to design, capacity and mechanical condition. The equipment shall be at the jobsite sufficiently ahead of the start of construction operations.

622.4.3 Site Measurement

Site measurements shall be done to prepare specific lengths of the coco-nets to conform the necessary area requirements and the necessary length for coco-logs to be installed/placed.

622.4.4 Preparation of Bed

Site for net installation shall be graded and sloped to the approved design and any runoff control such as diversions, dikes and berms shall be completed prior to installation. All depression/gullies and eroded portions shall be backfilled for the coco-nets to snugly come in contact with the soil surface. The face of the slope shall be smoothened. Rocks, clods, vegetation (deemed detrimental to the erosion control system to be installed), and other obstructions shall be removed from tip to toe of the slope to ensure complete contact of the coco-nets with the soil.

Existing vegetations that are considered not detrimental shall be retained, but shall be trimmed down to facilitate the installation of the coconut geonets.

622.4.5 Anchoring

1. Common Soil

The coconut geonets shall be secured to the ground using bamboo pegs. An average of 3 pegs per square meter shall

be used to ensure uniform contact of coco-net to the ground surface. For loose soils, longer pegs shall be used to have sufficient ground penetration to resist pullout.

622.5 Certification

The manufacturer shall file with the purchaser a certificate stating the name of the manufacturer, the composition of the coconut geonets as bioengineering materials and other pertinent information so as to fully describe the coir materials. The manufacturer shall include in the certificate a guarantee stating that the bioengineering materials that are furnished meet the required specifications . The certificate shall be attested by a person having legal authority to bind the company. Either

mismarking or misrepresentation by the manufacturer shall be reason to discontinue acceptance under these specifications. The discontinuance of acceptance will be considered to be notice to all wholesaler, jobbers, distributors, agents and other intermediates handling the manufacturer's product.

622.6. Method of Measurement

The area to be paid for under this Item shall be the number of square meter (m^2) of coco-net, linear meter for coco-log, square meter (m^2) of live vetiver grass hedgerow and square meter (m^2) of effective

vegetative growth for grass cover, installed/placed and accepted into the completed project.

622.6 Basis of Payment

The accepted quantity, measured as prescribed in Section 622.6 shall be paid for at the contract unit price for coconut geonets, which price and payment shall be full compensation for preparation of bed and furnishing of all materials for placing/installation of coconut geonets and for furnishing all labor, maintenance of plants, equipment, tools and incidentals necessary to complete the Item.

DPWH STANDARD SPECIFICATION AND MINIMUM TEST REQUIREMENTS

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Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification, 1 Laboratory Compaction Test

5 For every **2500 cu.m or fraction thereof**, Material passing 19mm (3/4") sieve shall have a soaked CBR **= 80% min** obtain at MDD

6 Filler shall be free from hard lumps and **not more than 15%** retain on 4.75mm (no.4)

7 Required thickness when compacted is **150mm max. per one layer**, At least one group of three in situ FDT should be conducted in Trial Section for about **500 sq.m or fraction thereof** per material or procedure, Result of compaction shall have **100% MDD min.** (FDT result)

202 Crushed Aggregate Base Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof**)
- A Fraction passing the 0.075 (no.200) sieve < 2/3 fraction passing 0.425mm (No.40)
- B Fraction passing 0.425mm (no.40) shall have **LL = 25% max**, **PI = 6% max**

2 For every **1500 cu.m or fraction thereof**, 1 Laboratory Compaction Test and coarse portion retain on a.2.00 mm (no.10) sieve shall have a mass percent of wear (abrasion loss)**45% max** by Los Angeles Abrasion Test, **not less than 50%** mass shall have at least 1 fracture face, Sample is 50kg for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification, 1 Laboratory Compaction Test

5 Material passing 19mm (3/4") sieve shall have a soaked CBR **= 80% min** obtain at MDD

6 Filler shall be free from hard lumps and **not more than 15%** retain on 4.75mm (no.4)

7 Result of compaction shall have **100% MDD** min.

8 Trial Section for about **500 sq.m** per material or procedure

203 Lime Stabilized Roadmix Aggregate Base Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof**)
- A Soil Aggregate Fraction passing **4.75mm (no.4)** shall have **PI = 4% to 10% only**
- B 1 Laboratory Compaction Test (Proctor Test)
- C Unconfined Compression Test (UCT) molded and compacted **must not be less than 2.1 Mpa (300psi)** at **100% MDD**
- D Mixture passing 19mm (3/4") sieve shall have a soaked CBR **= 100% min** obtain at MDD

2 Soil Aggregate. For every **1500 cu.m or fraction thereof,mass percent of wear (abrasion loss) 50% max** Sample is 50kg for Routinary Test, Moisture Density Relation and CBR and 20kg for Classification, 1 Laboratory Compaction Test

3 **Lime 3% to 12%** mass percent of dry soil

4 For every **150m or fraction thereof** and @ **150mm** layer compacted depth
- A **100% min** MDD must be attain (FDT)
- B 1 Thickness Determination

5 For every **100t or fraction thereof, 1 Quality Test** should be conducted

6 If lime slurry is employed the typical ratio is **1 tonne lime to 2 cu.m water**

7 Curing Period (at least **5 days** of protection)
Different Methods
- A maintain moist condition by **sprinkling water**
- B cover **50mm** of sand or earth and maintain moist condition
- C apply on surface **asphalt membrane** of the type and qty approved by the Engr.
- D apply on surface **liquid membrane curing compound** of the type and qty approved by the Engr.

8 Trial Section must be at **least 2 weeks** before actual execution of work

9 Trial Section for about **500 sq.m** per material or procedure

204 Portland Cement Stabilized Aggregate Base Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof**)
- A Soil Aggregate Fraction passing **4.75mm (no.4)** shall have **PI = 4% to 10% only**
- B 1 Laboratory Compaction Test (Proctor Test)
- C Unconfined Compression Test (UCT) molded and compacted **must not be less than 2.1 Mpa (300psi)** at **100% MDD**
- D Mixture passing 19mm (3/4") sieve shall have a soaked CBR **= 100% min** obtain at MDD

2 Soil Aggregate. For every **1500 cu.m or fraction thereof,mass percent of wear (abrasion loss) 50% max** Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

3 **Cement. 6% to 10%** mass percent of dry soil

4 For every **150m or fraction thereof** and @ **150mm** layer compacted depth
- A **100% min** MDD must be attain (FDT)
- B 1 Thickness Determination

5 For every **2000 bags or fraction thereof** of cement, **1 (10kg) Quality Test** should be conducted

5 If portland cement slurry is employed the typical ratio is **1 tonne portland cement to 2 cu.m water**

7 Curing Period (at least **5 days** of protection)
Different Methods
- A maintain moist condition by **sprinkling water**
- B cover **50mm** of sand or earth and maintain moist condition
- C apply on surface **asphalt membrane** of the type and qty approved by the Engr.
- D apply on surface **liquid membrane curing compound** of the type and qty approved by the Engr.

8 Trial Section must be at **least 2 weeks** before actual execution of work

9 Trial Section for about **500 sq.m** per material or procedure

205 Asphalt Stabilized Aggregate Base Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof**)

- A Soil Aggregate Fraction passing **4.75mm (no.4)** shall have **PI = 4% to 10% only**
- B 1 Laboratory Compaction Test (Proctor Test)
- C Unconfined Compression Test (UCT) molded and compacted **must not be less than 2.1 Mpa (300psi)** at **100% MDD**
- D Mixture passing 19mm (3/4") sieve shall have a soaked CBR **= 100% min** obtain at MDD

2 Soil Aggregate. For every **1500 cu.m or fraction thereof,mass percent of wear (abrasion loss) 50% max** Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

3 Asphaltic Material
- A shall be **Anionic or Cationic Emulsified Asphalt**
- B **4% to 7%** mass percent of dry soil

4 For every **150m or fraction thereof** and @ **150mm** layer compacted depth
- A **100% min** MDD must be attain (FDT)
- B 1 Thickness Determination

5 For every **40t or 200drums or fraction thereof** of emulsified asphalt, **1 Quality Test (5 liters)** should be conducted

6 Trial Section for about **500 sq.m** per material or procedure

206 Portland Cement Treated Plant Mix Base Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof)**
- A Soil Aggregate Fraction passing **4.75mm (no.4)** shall have **PI = 4% to 10% only**
- B 1 Laboratory Compaction Test (Proctor Test)
- C Unconfined Compression Test (UCT) molded and compacted **must not be less than 2.1 Mpa (300psi)** at **100% MDD**
- D Mixture passing 19mm (3/4") sieve shall have a soaked CBR **= 100% min** obtain at MDD

2 Soil Aggregate. For every **1500 cu.m or fraction thereof,mass percent of wear (abrasion loss) 50% max** Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

3 **Cement. 6% to 10%** mass percent of dry soil

4 For every **150m or fraction thereof** and @ **150mm** layer compacted depth
- A **100% min** MDD must be attain (FDT)
- B 1 Thickness Determination

5 For every **2000 bags or fraction thereof** of cement, **1 Quality Test (10 kgs.)** should be conducted
Trial Section must be at **least 2 weeks** before actual execution of work

6 Method
- A **Travel Plant Method**
- A.1 Soil Aggregate shall be pulverized until **at least 80%** pass 4.75mm (no.4) except for gravel & stone
- A.2 **Any Material** Retained on 50mm (2") sieve shall be removed
- A.3 **Max 2hrs.** Shall be permitted for wet mixing, lay down and finishing
- B **Central Plant Method**

7 no more than **60mins.** Elapsed from the start of mixing and the time start of compaction

8 Curing Compund. **Bituminous Curing Seal,** applied **0.5 L/m^2 to 1 L/m^2** of surface, maintain **at least 5 days**

207 Aggregate Stockpile

Part E SURFACE COURSE

Item No.

300 Surface Aggregate Course

1 Sample Test for grading and plasticity test (for every **300 cu.m or fraction thereof)**
- A Fraction passing the 0.075 (no.200) sieve < 2/3 fraction passing 0.425mm (No.40)
- B Fraction passing 0.425mm (no.40) shall have **LL = 35% max, PI = range from 4% to 9%**

2 For every **1500 cu.m or fraction thereof**, Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and 20kg for Classification
- A 1 Laboratory Compaction Test (Proctor Test)
- B The coarse portion retain on a.2.00 mm (no.10) sieve shall have **amass percent of wear 45% max** by Los Angeles Abrasion Test

3 Required thickness when compacted is **150mm max. per one layer**, At least one group of three in situ FDT should be conducted in Trial Section for about **500 sq.m or fraction thereof** per material or procedure, Result of compaction shall have **100% MDD min.** (FDT result)

4 When crushed aggregate is used,
- A For every 1500 cu.m or fraction thereof, 50% min of particle retain on 4.75mm (no.4) shall have at least 1 fractured face
- B Soak CBR value at MDD, **25%min** for gravel surface course and **80%min** for crushed aggregate surface course

301 Bituminous Prime Coat

1 Definition. Application of low viscosity cutback to an absoerbent surface. It is used only on untreated base prior to placement of asphalt pavement.

2 Material shall either be **Rapid Curing (RC)** or **Medium Curing (MC)** Cut-Back Asphalt

3 Equipment used must be a pressure distributor w/ cap. **1000 lit. min.** w/ a heating device attached to a tank able to heat up to 150 °C

4 Bituminous Material shall be applied **1 to 2 liters per sq.m**

5 It shall be left undisturbed at least **24 hours.**

6 Conduct 1 **(5 liters)** Quality Test for every **40t or 200 drums or fraction thereof**

7 It shall be applied only to dry surface or slightly moist. Also applied for newly pavement as in on top of well graded and compacted base course

DPWH STANDARD SPECIFICATION AND MINIMUM TEST REQUIREMENTS

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302 Bituminous Tack Coat

1. Tack coat serve as a **bonding** b/n the new asphalt to the existing one. Tack coat is applied on existing asphalt or concrete pavement. The new asphalt can be laid when the coat is already **sticky.**
2. Material shall either be **Rapid Curing (RC) Cut-Back Asphalt** or **Emulsified Asphalt** (Cationic or Anionic)
3. Bituminous Material shall be applied **0.2 to 0.7 liters per sq.m**
4. Conduct 1 **(5 liters)** Quality Test for every **40t or 200 drums or fraction thereof**

303 Bituminous Seal Coat

1. Serve as a **preservation** of asphalt **original color, protect from the sunlight and water**. This may also be used in existing bituminous surface with or w/o application of **aggregates.**
2.

	Type 1	Type 2	Type 3
Bituminous Material, L/sq.m	0.2 - 0.5	0.5 - 1	0.85 - 1.5
Cover Aggregate, kg/sq.m	none	5 - 10	8 - 14

3. Bituminous Material shall be Asphalt Cement, Penetration Grade **120-150**, and Cut-back Asphalt (Rapid Curing or Medium Curing)
4. Cover Aggregate for Type 2 consist of **sand and fine aggregate** while Type 3 consist of **crushed stone, crushed gravel or crushed slag**
5. **Cover Aggregate. 75 cu.m or 200t or fraction thereof,** 1 grading test. For abrasion test, shall have a mass percent of wear (abrasion loss) **40%max**
6. If crushed slag is used in cover aggregate the density must be **960 kg/cu.m (60 lbs/ cu.ft.)** min.
7. Seal coat shall be applied **10 days min.** on compacted bituminous, except if instructed by the Engineer
8. Bituminous Material shall be applied by pressure distributor at the rate of **0.9 to 1.8 lit/sq.m** for asphalt cement and **1.5 to 3.0 lit/sq.m** for cut-back asphalt
9. Cover Aggregate shall be spread at the rate of **0.004 to 0.007 cu.m/sq.m**
10. For bituminous material, **40t or 200 drums** or fraction thereof, **1 (5 liters) quality test** shoul be conducted

304 Bituminous Surface Treatment

1. Single Surface Treatment (SST) - single application of bituminous material and single spread of aggregate
   Double Surface Treatment (SST) - double application of bituminous material and single spread of aggregate
2. Bulk Specific Gravity of aggregates must be **2.55 to 2.75**, If not met proportionate correction must conduct until it reaches 2.65
5. If crushed slag is used in cover aggregate the density must be **960 kg/cu.m (60 lbs/ cu.ft.)** min.
6. Asphaltic Material shall be applied at **least 24 hours** after surface had been prime coated
7. **Cut-back asphalt or asphalt cement** shall be applied on dry surface, while **Emulsified Asphalt** on moist surface
8. Spray should commence if road temperature is **20 °C min.**
9. Sprayed surface must be covered immediately by aggregate **2 minutes max.**
10. Until the asphaltic has not set yet vehicles must only travel at a speed of **40km/hr.max** and all all vehicles must not be allowed to turn around
11. For Aggregates
    - A For every **75 cu.m or 200t or fraction thereof,** 1 Grading test
    - B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face,** Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification
12. For Bituminous Material
    - A When using cut-back asphalt, asphalt cement or emulsified asphalt - **1.58 to 2.04 L/sq.m**
    - B One quality test for **40t or 200 drums or fraction thereof**

305 Bituminous Penetration Macadam Pavement - consists of placing one or more aggregate and one or more bituminous material followed by a seal coat w/ cover aggregate

1. Bulk Specific Gravity of aggregates must be **2.55 to 2.75**, If not met proportionate correction must conduct until it reaches **2.65**
2. bituminous material shall be made only when aggregate is dry and atmospheric temp. in the shade is **15 °C min**
3. prior to application of bituminous material the aggregate layer will be tested by the Engineer using a **3m straight edge** at selected location, variation shall not exceed **10mm max**
4. For Aggregates
   - A For every **75 cu.m or 200t or fraction thereof,** 1 Grading test
   - B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face.** When crushed gravel is subjected to five cycles of sodium sulfate soundness test, the weight shall be **12%max** (soundness loss), Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification
   - C If crushed slag is used in aggregate the density must be **1120 kg/cu.m (70 lbs/ cu.ft.)** min.
5. For Bituminous Material
   - A Quantity **7.20 to 11.00 L/sq.m**
   - B One **(5 liters)** quality test for **40t or 200 drums or fraction thereof**

306 Bituminous Road Mix Surface Course (Mixed in Place Construction)

1. Procedure. The aggregate should be place first to the surface the spray the bituminous material (either cutback asphalt or emulsified asphalt). Spraying may be done in **150°C to 200°C.** Then initial roll using pneumatic roller with a force of **80 psi.** Final rolling is done by **three wheel or tandem type steel wheel roller (temp of 220 to 225°C),** travelling **5km per hour not less. than 10 tons** to eliminate roller marks and a minimun of **95 mass percent** of the density at

laboratory compacted. **Rolling is done from the side toward the center,** so the asphalt will be confined in the pavement and not spread toward the shoulder. An area of **500 sq.m** is to be prepared as trial section for asphalt pavement. The surface of the asphalt pavement will be allowed a toleranceof **6mm** using **3m straight edge.** When tar is used **66 to 107°C** temperature is maintained during construction.

2 Any salvaged aggregate appearing in the surface of lay down and finishing appearing not passing **37.5mm (1 1/2")** sieve shall be removed.

3 Bituminous material on the basis of dry aggregate, **4.5% to 7%** mass percent when using cut-back asphalt and **6% to 10%** mass percent when using emulsified asphalt.

4 During mixing operation, **0.5% to 1%** mass percent of hydrated lime, dry aggregate basis, shall be added lower percentage limit is applicable to aggregate which are predominantly calcareous.

5 When the compacted thickness of the roadmix surface is to be **more than 50mm (2")**, the mixture shall be spread and compacted **two 2 layers**

6 For Aggregates
- A For every **75 cu.m or 200t or fraction thereof,** 1 Grading test
- B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face.** When crushed gravel is subjected to five cycles of sodium sulfate soundness test, the weight shall be **12% max** (soundness loss), Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

7 For Bituminous Material
- A **4.5% to 7%** mass percent of dry soil aggregate if using cutback asphalt
- B **6% to 10%** mass percent of dry soil aggregate if using emulsified asphalt
- C One **(5 liters)** quality test for **40t or 200 drums or fraction thereof**

307 Bituminous Plant Mix Surface Course General

1 The bituminous mixture shall be composed of **aggregate, mineral filler, hydrated lime, and bituminous material**

2 At **least three weeks** prior to production, Contractor shall submit a job-mix formula for Egineer' approval.

3 Job Mix Formula consists of single values for
- A percentage of aggregate in each sieve
- B percentage of bituminous material to be added
- C temperature of mixture delilivered on the road
- D kind and percentage of additive to be used
- E kind and percentage of mineral filler to be used

4 All mixture furnished for the project shall conform within the range of tolerances
- A passing no. 4 and larger sieve ± 7%
- B passing no. 8 to no.100 sieve ± 4%
- C passing no. 200 sieve ± 2%
- D bituminous material ± 0.4%
- E temperature of mixture ± 10°C

5 For aggregates
- A For every **75 cu.m or 200t or fraction thereof, 1 grading test** and **PI = 4.0% max**
- B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face.** When crushed gravel is subjected to five cycles of sodium sulfate soundness test, the weight shall be **12% max** (soundness loss),Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

6 For Bituminous Material
- A Proportion of bituminous material, on the basis of dry aggregate, shall be from **5% to 8%** mass percent
- B One **(5 liters)** quality test for **40t or 200 drums or fraction thereof**
- C 2 types of **bitumen** that are commonly used are **tar** (viscous liquid obtain from distillation of coal or wood) and **petroleum asphalt** (are products of the distillation of crude oil). (**3 major petroleum asphalt** produced is asphalt cement, emulsified asphalt, and cutback asphalt)
- D commonly used bituminous material is **Asphalt Cement (AC). Asphalt cement** is also called **hot asphalt.** Asphalt cement is **refined asphalt** or **combination of refined asphalt and flux oil**

7 For Hydrated Lime
- A For every **100t or fraction thereof,** conduct 1 grading test and 1 plasticity test
- B During mixing operation, **0.5% to 1%** mass percent of hydrated lime, dry aggregate basis, shall be added lower percentage limit is applicable to aggregate which are predominantly calcareous.

8 During mixture, for every **75 cu.m or 130mt** or fraction thereof
- A The mixture shall have a minimum compressive strength of **1.4 Mpa (200psi)**
- B The mixture shall have a mass percent air voids with the range of **3 to 5**
- C For aggregates having maximum size over **25mm (1")** cylindrical sample will be modified to use **150mm x 150mm (6"x6")**
- D **97% min.** of density laboratory compacted specimen must be obtained
- E The **Index of Retained Strength** of the mixture **is 70% min.**

9 During construction. The correct temperature of the mixture shall be place as measured in the truck prior to dumping is **107°C**. But if Tar is used the temperature is **66°C to 107°C.** To attain required **density,** the **compaction** should be done when the mixture **is still hot and workable.** In order to determine the number of passes that would attain the required density, **trial section** must be conducted. **Temperature** must be control during mixing and compaction, it is a great significance in the strength of resulting pavement. Then **initial roll using pneumatic roller (not less than ten tons)** with a force of **80 psi. Final rolling** is done by **three wheel or tandem type steel wheel roller (temp. must be 220 to225°C), travelling 5km per hour not less. than 10 tons** to eliminate roller marks. **Rolling is done from the side toward the center**, so the asphalt will be confined in the pavement and not spread

toward the shoulder.

10 For acceptance of the finished pavement,sample shall be at **least 150mm x 150mm** (square section when using saw) or **100mm diameter** full depth when using core drill. **At least one, but not more than 3 samples** shall be taken during the day's operation. If no core sample were taken during the day's operation, core sample should be taken for every **100 L.M. per lane**, degree of compaction should be **95% min** lab density

11 No acceptance should be made on finish pavement unless **core test for thickness determination** is conducted, except for **Barangay Roads** which is allowed to waive test.

12 The cored sample should not be accepted if the deficiency in the density is **more than 2%**

13 Tolerance for pavement thickness is **-5mm max**, averaging of cored samples for density and thickness is not permitted. Additional layer shall be permitted to meet thickness with a minimum of **50mm (2")**

14 For surface tolerance, using **3m straight edge** test the variation should **not exceed 6mm**

15 Properties of Bituminous Pavement. 1) **Stability** - resistance to deformation or displacement due to an imposed load. 2) **Durability** - resistance to disintegration or deterioration due to action of water, traffic, and climate change. 3) **Flexibility** - ability to adjust itself to the settlement or to bend slightly without cracking.4)**Fatigue Resistance** - Ability to withstand repeated flexing cause by passage wheel loads, 5)**Skid Resistance** - ability to resist slipping or skidding of vehicles tires, 6) **Workability** - ease w/ which paving mixture may placed and compacted

16 The recommended thickness to be overlay is **75mm to 125mm (3" to 5")**

17 During Delivery of mixed bituminous material, a thermometer should be place at a depth of **6"**

18 In molding specimen the temperature must be **134±10°C**

19 Air voids = (theoretical max density - bulk density of compacted Marshall specimen) / theoretical maximum density the requirement is **3% to 5%** air voids.

20 Voids in mineral aggregates = (100 - bulk density of compacted Marshall specimen) / bulk specific gravity of composite aggregates

21 Voids filled with asphalt = (voids in mineral aggregate - air voids) / voids in mineral aggregate x 100

308 Cold Asphalt Plant Mix

1 Shall be composed of **coarse mineral aggregate, fine mineral aggregate, mineral fillers and chemically bonding bitumen.** These are plant mix either **dense or open graded,** which may be spread at normal **atmospheric temperature**

2 At **least three weeks** prior to production, Contractor shall submit a job-mix formula for Egineer' approval.

3 Job Mix Formula consists of single values for
- A percentage of mineral aggregate in each sieve
- B percentage of chemically bonding bitumen material to be added
- C temperature of mixture delilvered on the road
- D kind and percentage of additive to be used
- E kind and percentage of mineral filler to be used

4 For aggregates
- A For every **75 cu.m or 200t or fraction thereof, 1 grading test** and **PI = 4.0% max**
- B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face.** When crushed gravel is subjected to five cycles of sodium sulfate soundness test, the weight shall be **12% max** (soundness loss), Sample is **50kg** for Routinary Test, Moisture Density Relation and CBR and **20kg** for Classification

5 Bituminous material on the basis of dry aggregate, **4.5% to 7%** mass percent when using cut-back asphalt and **6% to 10%** mass percent when using emulsified asphalt. One **(5 liters)** quality test for **40t or 200 drums or fraction** thereof. (Note: cold mix is either with **cutback asphalt** or **emulsified asphalt**)

6 During mixture, for every 75 cu.m or 130t or fraction thereof
- A The mixture shall have a minimum compressive strength of **1.4 Mpa (200psi)**
- B The mixture shall have a mass percent air voids with the range of **3 to 5**
- C For aggregates having **maximum size over 25mm (1")** cylindrical sample will be modified to use 150mm x 150mm (6"x6")
- D **97% min.** of density laboratory compacted specimen must be obtained

7 For Hydrated Lime
- A For every **100t or fraction thereof,** conduct 1 grading test and 1 plasticity test
- B During mixing operation, **0.5% to 1%** mass percent of hydrated lime, dry aggregate basis, shall be added lower percentage limit is applicable to aggregate which are predominantly calcareous.

8 For acceptance of the finished pavement, sample shall be at **least 150mm x 150mm (square section) using saw or 100mm diameter full depth** using core drill. **At least one, but not more than 3 samples** shall be taken during the day's operation. If no core sample were taken during the day's operation, core sample should be taken for every **100 L.M.** per lane, degree of compaction should be **97% min** lab density

9 Asphalt surface mixture shall not be place if the temperature of base course is below **10°C (50°F)**

309 Bituminous Plant Mix (Stockpile Maintenance Mixture)

1 composed of bituminous stockpile maintenance mixture (such as **aggregate, mineral filler, hydrated lime,** and **bituminous material**)

2 If crushed slag is used in aggregate the density must be **1120 kg/cu.m (70 lbs/ cu.ft.)** min.

3 For aggregates
- A For every **75 cu.m or 200t or fraction thereof, 1 grading test** and **PI = 4.0% max**
- B For every **1500 cu.m or fraction thereof**, should have a mass percent of wear (abrasion loss) **40%max.** When crushed gravel is used, **50% min** of particle retain on 4.75mm (no.4) shall have at **least 1 fractured face.** When crushed gravel is subjected to five cycles of sodium sulfate soundness test, the weight shall be **12% max** (soundness loss). Combined aggragate after going through the drier, shall have a sand equivalent value of **not less than 40%** (Sand Equivalent Test). Sample is **50kg** for Routinary Test, Moisture Density

Relation and CBR and **20kg** for Classification

4 For Bituminous Material
   - A Quantity **4 to 10 mass %** of total mix. Upper limit may be raised when using absorptive aggregate.
   - B One **(5 liters)** quality test for **40t or 200 drums or fraction thereof**

5 During mixture, for every 75 cu.m or 130t or fraction thereof
   - A The mixture shall have a minimum compressive strength of **1.4 Mpa (200psi)**
   - B The mixture shall have a mass percent air voids with the range of **3 to 5**
   - C For aggregates having maximum size over **25mm (1")** cylindrical sample will be modified to use **150mm x 150mm (6"x6")**
   - D **97% min.** of density laboratory compacted specimen must be obtained

6 For Hydrated Lime
   - A For every **100t or fraction thereof,** conduct 1 grading test and 1 plasticity test
   - B During mixing operation, **0.5% to 1%** mass percent of hydrated lime, dry aggregate basis, shall be added lower percentage limit is applicable to aggregate which are predominantly calcareous.

7 For acceptance of the finished pavement, sample shall be at **least 150mm x 150mm** (square section using saw) **or 100mm** diameter full depth when using core drill. **At least one, but not more than 3 samples** shall be taken during the day's operation. If no core sample were taken during the day's operation, core sample should be taken for every **100 L.M. per lane**, degree of compaction should be **95% min** lab density

310 Bituminous Concrete Surface Course

1 Same as In Item 307 (Bituminous Plant Mix Surface Course - general) except testing of from aggregate (fracture face)

2 In definition it is a combination of **aggregates** that are uniformly mixed and **coated with asphalt cement.** This must be **spread and compacted** while in a **heated condition.**

311 Portland Cement Concrete Pavement

1 Cement
   - A Sampling for every **2000 bags** or fraction thereof subjected for 1 **(10kg)** Quality Test
   - B Cement which become partialy set or which contain lumps of caked will be rejected
   - C Shall be conform to Item **700 (Hydraulic Cement)**. Type of cement used in DPWH Infrastructure as indicated in the blue book is **Portland Cement Type 1**.However, **Portland Pozzolan Cement Type IP** meeting the requirements of **AASHTO M240/ASTM C S95** can be allowed.

2 **For fine aggregates.** Beach sand should not be allowed without the approval of the Engineer. It shall not contain more than **3% mass percent** of material passing 0.075mm (no.200) nor more than **1% mass percent** of clay lumps or shale. If subjected to 5 cycle of sodium sulfate soundness test, the weighted loss shall not exceed **10 mass percent.** If subjected to colorimatic test for organic impurities and a **color darker** than the standard is produced, it shall be rejected.However, when tested for the effect of organic impurities of strength of mortar, it may be used if the relative strength at **7 and 28 days** is **95% min.** Sampling of aggregates should be for every **75 cu.m or fraction thereof.**

3 For coarse aggregate. The material should not contain more than **1 mass percent** passing 0.075mm (no.200) sieve, not more than **0.25 mass percent** of clay lumps, nor not more than **3.5 mass percent** of soft fragments.If subjected to 5 cycle of sodium sulfate soundness test, the weighted loss shall not exceed **12 mass percent.** It shall have a mass percent of wear **40% max.** If slag is used, density shall be **1120 kg/cu.m (70 lbs/cu.ft) min.** (same item in 309-Bituminous Plant Mix Stockpille Maintenance Mixture and 305-Bituminous Penetration Macadam Pavement) Sampling of aggregates should be for every **75 cu.m or fraction thereof.**

4 Drinkable water no need for test

5 In reinforcing steel, tie bars should be **deformed bars** and **dowels** (use as load transfer) should be **plain round bars**. Before delivery to the sight of work one half of the length of each dowel shall be painted with **one coat of approved lead, thin film of bitumen or tar paint**. For every **10,000kgs** or fraction thereof for each size, conduct 1 (**1m** sample) Quality Test (tension, bending, and chemical analysis)

6 Concrete
   - A Fly ash can be used as **20% partial** replacement of Portland Cement in concrete mix
   - B It is the intent of this Specification to require at least **364kg (9 bags)** of cement per cu.m to meet min. strength req.
   - C Concrete slump requires **40 to 75mm (1 1/2" to 3")** if not vibrated or **10 to 40mm (1/2" to 1 1/2")** if vibrated Flexural strength not less than **3.8 Mpa (550 psi)** when tested by **third point method** or **4.5 Mpa (650psi)** on **mid-point method** at 14 days. Compressive strength of **24.1 Mpa (3500 psi)** for cores taken at 14 days
   - D Vibrators shall operate at a frequency of **8,300 to 9,600 impulse per minute** and in no case shall the vibrator be operated longer than **15 seconds** in one location. Over vibration will result to **segregation** of aggregate.
   - E Batch concrete weight shall have the tolerance of **1%** of cement and **2%** of aggregates
   - F Concrete temperature during hot weather shall not exceed **90°F (32°C)**
   - G Concrete not in place within **90 min.** from the time of mixing shall not be used.
   - H When concrete shall be placed adjoining previously constructed lane and mechanical equipment will be operated on the existing lane, that previously constructed shall have attained strength for **14 day concrete.** If only finishing equipment is carried on the existing lane, paving in adjoining lane may be permitted after **3 days.**
   - I For test specimen, as work progresses, at **least one set consisting of three concrete beam** shall be taken, **150mm x 150mm x 525mm or 900mm** shall be taken from each **330 sq.m**, **230mm depth or fraction thereof** place nor volume of concrete not more than **75 cu.m.**
   - J Concrete layed shall not be left exposed for more than **1/2 hour** of curing period (Curing period of **72 hrs (3days)**)
   - K Removal of forms is permitted **24hrs min.**after concrete pouring
   - L The strength level of concrete will be satisfactory if the average of the **3 sample equal** or exceed specified strength and no individual strength test result is deficient by more than **15% of specified strength**. If not meet the stated requirement, core test can be conducted w/ **3 sample obtained** and the result of the **average of three** specimen is equal to at **least 85%** of the required strength and no single sample is **less than 75%** of

required strength.

20 If strength specimen does not meet requirement and it is not advisable to obtain cores due to structural consideration. Adjustment of price should be conducted due to deficiency:

Deficiency in strength of Concrete Specimens (%)	**Percent (%) of Contract Price Allowed**
Less than 5	100
5 to less than 10	80
10 to less than 15	70
15 to less than 20	60
20 to less than 25	50
25 or more	0

15 In surface test using **3m straight edge**, areas showing high spot more than **3mm but not exceeding 12mm** shall be grind.Any area or section so removed shall not be less than **1.5m in length**.

18 Seal joint should be place below pavement surface approximately **6mm**

21 Opening to traffic. Pavement will be open unless it met the specified minimum strength requirement or if test is not yet conducted, it can be opened **14 days min.**

22 No acceptance should be made on finish pavement unless **core test for thickness determination** is conducted, exce for Barangay Roads which is allowed to waive test. A core specimen for thikness determination shall have a diameter of at least **100mm (4")**. A core specimen for compressive strength determination the dia. of core specimen must be at **least 2 times** the max. size of coarse aggregates

23 **Tie Bar** is placed perpendicular to **logitudinal joint** and not to be painted.

24 **Transverse Contraction Joint** also called **Weakened plane joint** is constructed usually every **4.5m**, the depth of the **joint should not be less than 50mm and not more than 6mm** width. Sawing of this joint commence as soon as the concrete has hardened sufficiently, usually within **24 hrs.**

25 **Transverse Construction Joint** is also called **cold joint,** constructed when there is an interruption of **more than 30min** in concreting operations. No cold joint shall be constructed within **1.50m** of an expansion joint, contraction joint, or plane of weakness.

26 Corrugation produce in the surface shall be uniform in appearance and not more than **1.5mm** in depth

27 Coring for thickness determination. The completed pavement is accepted on a lot basis. A lot shall be considered as **1000 lm.** For single lane and **500 lm** For two lanes. (Note: if the next length of lane is at **least 1/2** of the nominal length it is considered also another lot. Other areas such as entrance cross over, ramps, etc is considered 1 lot. Each lot will be divided to **5 equal segment** and **one core** will be obtain at each segment. When the measurement of **any core** is less than the specified thickness by more than **25mm** additional core will be taken at no **less than 5m intervals** parallel to the center line in each direction from the affected location. Obtaining a core will be stopped until cored sample is not deficient by **25mm thk.**

28 In evaluating a core sample, it is divided into **9 measurement**, **one at the center and the other 8 divided in equal portion**.When one measurement exceed the specified thickness by **more than 5mm** it will be considered as specified thickness **plus 5mm**. When one measurement is less than the specified thickness by more than **25mm** it shall not be included in the average. Then average the **5 cored** sample.

Deficiency in average thickness per lot (mm)	**Percent (%) of Contract Price Allowed**
0 - 5	100
6 - 10	95
11 - 15	85
16 - 20	70
21 - 25	50
more than 25	remove and replace (NP)

30 Mixing time for concrete at mixing plant shall not be less than **50 sec.** but not greater than **90** seconds

31 In transporting concrete the time elapsed from the time water added to the mix until the concrete deposited in place must **not exceed 45min** if hauled by **non agitating** trucks and **90min** when hauled in **truck mixers of truck agitator**

32 **Steel forms** are prescribed to be used in concrete pavement construction.

Part F BRIDGE CONSTRUCTION

Item No.

400 Piling

1 Piling not part of the structure shall be removed or cut at **least 300mm** below the bottom of the footing.

2 For concrete piles. Concrete shall be **class "C" with a slump of 6"-8" (150mm to 200mm)** self compacting mix.

3 For precast concrete piles. Removal of forms is permitted **24hrs min.**after concrete pouring. Piles shall not be moved until the test indicates that the concrete attained a compressive strength of at least **80%** of required strength and shall not be transported or driven until required strength has attained. If testing is not available, piles shall not be moved until **14 days after casting** and shall not be transported or driven prior to **28 days after casting**. If high early strength is used piles should not be moved, transported or driven prior to **7 days of casting.**

4 Timber Piles. The heads of untreated piles should be treated with **2 coats hot creosote oil or other approved preservatives.** The weight of the **gravity hammer** to be use in piling **is 2,000 kg.**

401 Railing

402 Timber Structures

1 For using preservatives, **creosote oil ot creosote petroleum oil** blend shall be use.When timber is intended for marine use creosote petroleum oil shall not be used.

2 The minimum penetration of the preservatives to the surface of the timber **is 20mm**

3 The Engineer shall be notified at **least 10 days** prior to the treatment process (application of preservatives)

4 Lumber is well seasoned if the moisture content contains **12% to 18%**

DPWH STANDARD SPECIFICATION AND MINIMUM TEST REQUIREMENTS

TABLE OF CONTENT

403 Metal Structures

404 Reinforcing Steel Bars

1 For every **10,000kgs or fraction thereof** for each size, conduct 1 **(1m sample)** Quality Test (tension, bending, and chemical analysis)

2 Minimum distance for Lap Splice for reinforcing bars

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

405 Structural Concrete

1 Classes and Uses of Concrete

Class A all superstructure and heavily reinforced substructures
Class B footings, pedestals, unreinforced or small amount of reinforcement
Class C thin reinforced section, railing, precast R.C piles
Class P Prestressed concrete structure
Seal concrete deposited in water.

2 Sampling of cement **2000 bags or fraction thereof**, conduct 1 **(10kg.)** Quality Test infrastructure as indicated in the blue book is **Portland Cement Type 1** (portland cement is a cement which has cementitious effect).

3 For test specimen, at least one set of three samples, **150mm x 300mm (6" x 12")** shall be taken from each **75 cu.m** or fraction thereof place each day and must not represent not more than **75 cu.m**

4

Class of Concrete	Min. Cement Content (bag or kg)/cu.m)		Min Strength Req.	Range in Slump
Class A	9 bags	360 kg.	20.7Mpa or 3000psi	50-100mm (2" - 4")
Class B	8 bags	320 kg.	16.5Mpa or 2400psi	50-100mm (2" - 4")
Class C	9.5 bags	380 kg.	20.7Mpa or 3000psi	50-100mm (2" - 4")
Class P	11 bags	440 kg.	37.7Mpa or 5000psi	100mm max (4"max)
Seal	9.5 bags	380 kg.	20.7Mpa or 3000psi	100 to 200mm (4" to 8"

based on 40 kg / bag

5 For Aggregates

A Washed aggregates must be drained at least **12 hrs**. prior to batching
B For fine and coarse aggregate sampling shall be **75 cu.m or fraction thereof** for 1 Grading Test

6 Testing of rebars, for every **10,000kgs or fraction thereof** for each size, conduct 1 **(1m)** Quality Test (tension, bending, and chemical analysis)

7 For admixture, it shall be measured with an accuracy of **± 3%**, the use of **calcium chloride** as an admixture is not permitted.

8 The interval of delivery of batched concrete shall not exceed **30 min.** interval during casting. Exceptional cases may consider when using volumetric which requires less than 75 cu.m per day pouring.

9 Mixing time for concrete at mixing plant shall not be less than **50 sec.** but not greater than **90** seconds

10 In transporting concrete the time elapsed from the time water added to the mix until the concrete deposited in place must **not exceed 45min** if hauled by **non agitating** trucks and **90min** when hauled in **truck mixers of truck agitators.** (required revolution for truck mixers is **4 to 6 rpm**)

11 If there is a need to add water to the concrete mix in order to increase workability after the initial time of mixing, it shall be permitted **not exceeding 45min.** (provided not to exceed slump and water cement ratio)

12 **Design of concrete mix** specified in the blue blook is based on **Absolute Volume Method**

13 **Removal of forms**

	min time	min % design strength
centering under girder, beam frames or arches	14 days	0.60%
floor slab	14 days	0.70%
walls	1 day	0.70%
columns	2 days	0.70%
sides of beams and all vertical surfaces	1 day	0.70%

14 Limit for water cement ratio ranges from **0.50 to 0.60**

15 Concrete that is properly vibrated has a higher strength result than that of not thoroughly consolidated by **20% to 25%**

406 Prestressed Structural Concrete

1 For wire strand. 1 Quality Test for every **20t or fraction thereof**

2 Concrete strength of at least 28 Mpa should be attained prior to tensioning of the prestressing reinforcement unless otherwise specified.

407 Concrete Structure

408 Steel Bridge

409 Welded Structure

410 Treated and Untreated Timber

411 Paint

1 Sampling. **One 20-L or one 4-L** can or every for every **100 can or fraction thereof**

2 Paint use in concrete pavement is **thermoplastic** while in asphalt pavement is **reflectorized**

3 The insoluble powdered solid mixture of paint is called **pigments.** Pigments having **high refractive indices** are classified as **prime.** Then **colored pigment** use as **primer for metallic surface** is called **red lead.**

4 The most common popular **dry oil paint is** called **linseed oil paint**
5 A volatile solvent use to reduce consistency of paint is **thinner**

412 Elastomeric Bearing Pad

413 Pre molded joint filler for concrete paving

Part G DRAINAGE AND SLOPE PROTECTION STRUCTURES

Item No.

500 Pipe Culvert and Storm Drain

1 Joint Mortar for concrete pipes should consist of **1 part Portland Cement and 2 part sand**. Mortar shall be used within **30 mins** after its preparation.
2 Sampling of Pipes. **1** pipe for every **50pcs**. (for strength, absorption, dimension test)
3 Alternative test on no. 2. Concrete Sample 1 set consisting of three cylinder sample for **not more than 25pcs** cast and 1 Inspection report on casted pipe for not more than **25 pcs.**
4 Test for cement and aggregates same as Item 405 (Structural Concrete)
5 Storm pipe shall be embedded below the finished grade line **not less than 0.60m**
6 **Minimum** spacing of hoop rebars on RCP is **86mm,** w/ net protective covering **of 25mm (1")**

501 Underdrain

502 Catch Basin, Inlet and Manholes

1 Same as Item 405 (Structural Concrete), **Class A**

503 Steel Grating w/ Frame

504 Reconditioning and Cleaning of Existing Drainage

505 Riprap and Grouted Riprap

1 Classes of Stones used:
Class A ranging from a minimum of 15kg to max 25kg. With at leat 50% weighing more than 20kg.
Class B ranging from a minimum of 30kg to max 70kg. With at leat 50% weighing more than 50kg.
Class C ranging from a minimum of 60kg to max 100kg. With at leat 50% weighing more than 80kg
Class D ranging from a minimum of 100kg to max 200kg. With at leat 50% weighing more than 150kg.
2 Mortar mixed shall be **one part** cement , and **three parts** sand and applied a minimum thickness of **20mm** between stones
3 Spacing of weepholes shall **not be more than 2m** and must be in staggered manner with a diameter of at **least 50mm.**
4 Placement of stone is perpendicular to the slope
5 Quantity. For cement **3 bags/cu.m** of riprap, For fine aggregates: **0.17 cu.m/cu.m** of riprap

506 Stone Masonry

1 Mortar for masonry shall consists of **one part** portland cement and **two part** fine aggregates
2 Mortar that is not used within **90min.** After the water has been added shall be discarded.
3 Placement of stone is parallel to the slope.
4 Quantity. For cement **2 bags/cu.m** of riprap, For fine aggregates: **0.17 cu.m/cu.m** of riprap

507 Rubble Concrete

1 Stones to be used shall be more than **0.015 cu.m** and not less than **75%** of the total volume of rock embankment
2 Concrete shall be Class "B"
3 In no case shall vibrator be operated longer than **10 seconds.**
4 After removal of forms if there is a voids or honeycomb spot shall be filled with **one part** cement and **two parts** sand.
5 Spacing of weepholes shall **not be more than 2m** and must be in staggered manner with a diameter of at **least 50mm.**
6 minimum thickness of rubble concrete is **12" or 300mm.**

508 Hand Laid Rock Embankment

1 Stones to be used shall be more than **0.015 cu.m** and not less than **75%** of the total volume of rock embankment

509 Sheet Piles

510 Concrete Slope Protection

1 Concrete shall be class "B"

511 Gabions and Matresses

1 Filter cloth shall consist of **70%** polypropylene and **30%** polyethylene

Part H MISCELLANEOUS STRUCTURES

Part I MATERIAL DETAIL

Other Minimum Requirements for Submission of Samples

	Materials	Minimum Test Requirement	Minimum Quantity of Sample
1	Asphalt Mix	for every 130t or fraction thereof	20 kg
2	Aggregates	for every 1500cu.m or fraction thereof	

	a. coarse aggregate		70 kg	
	b. fine aggregates		50 kg	
3	CHB	for every 10,000 units or fraction thereof	6 units	3 units for compression 3 units for moisture

Classification of CHB:

A) Load Bearing CHB - thickness ranges **6" to 8"** or more, **capable of carrying** superimposed load aside from its own weight.

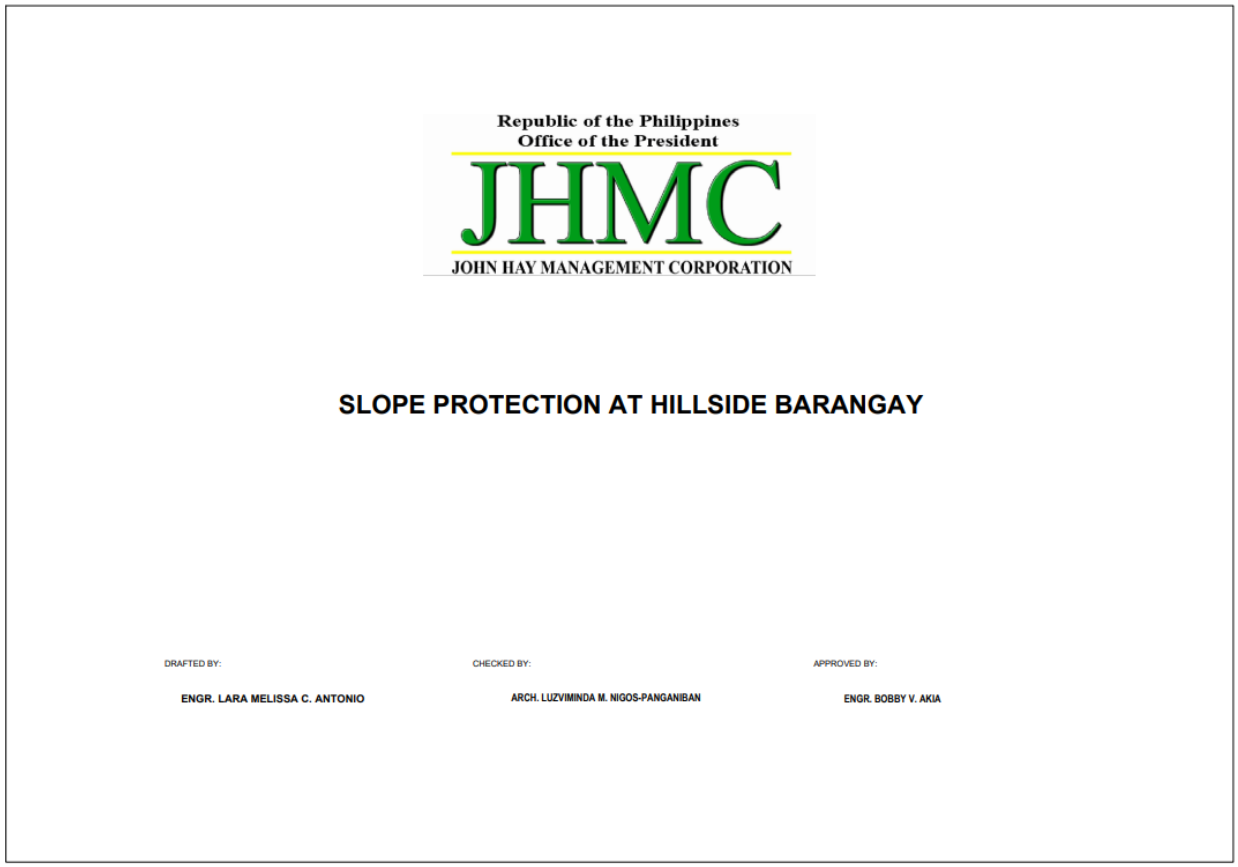
B) Non Load Bearing CHB - thickness ranges **3" to 4"**, which are **not capable of carrying** load and carrying just their own weight.

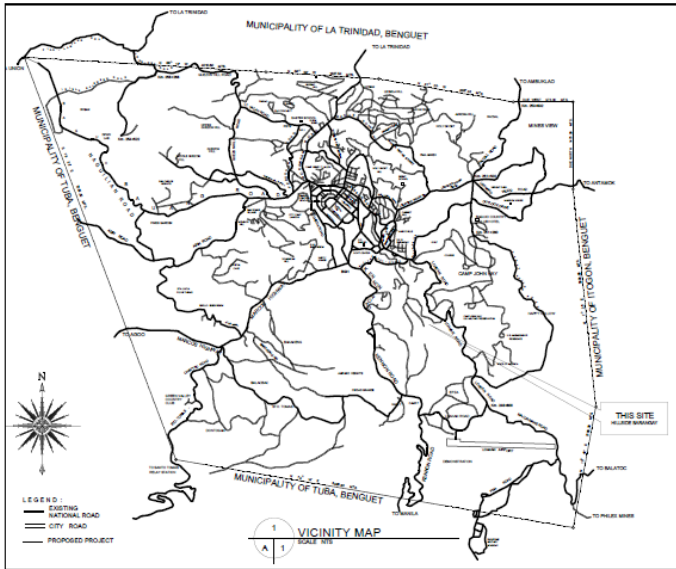
Strength Requirement:	**For Load Bearing**	**For Non Load Bearing**
Individual	500psi min.	500psi min
Average	1000psi min.	600psi min
Absorption	240kg/cum max	240kg/cum max
Moisture Content	45% max	45% max

4	Steel Sheet (galvanized)	for every 1,000 sheets or fraction thereof	1 sheet	

(Note: minimum lapping for GI sheet is **2 1/2 corrugations,** galvanized iron sheet is tested for **1)thickness and dimension** and **2) zinc coating)**

Section VII. Drawings



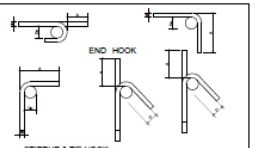


1 VICINITY MAP
A 1 SCALE: NTS

1. CONCRETE
UNLESS OTHERWISE INDICATED ON THE PLANS, THE MINIMUM CYLINDER STRENGTH OF CONCRETE @ 28 DAYS SHALL BE 20.70 MPa.
2. REINFORCING STEEL
REINFORCING BARS FOR ALL STRUCTURES SHALL BE GRADE 60 (Fy=414 MPa) FOR BARS LARGER THAN 16 mm Ø. GRADE 40 (Fy=275.80 MPa) FOR BARS 16mm Ø OR SMALLER. ALL REBARS SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCE THAT MAY IMPAIR/ WEAKEN BOND WITH CONCRETE.
2.1. REINFORCING BAR SPLICING
WHERE SPLICING IS PERMITTED, THE MINIMUM LAP LENGTH OF BARS SHALL BE AS PER AASHTO ARTICLE 8.32. ALL SPLICES SHALL BE STAGGERED AT LEAST 40 BAR Ø. WHERE BUTT WELD IS USED IN LIEU OF LAPPED CONNECTIONS, THIS SHALL DEVELOP AT LEAST 125 % OF THE SPECIFIED YIELD STRENGTH OF THE REINFORCING STEEL BAR. BARS SHALL BE BENT UNLESS PERMITTED BY THE ENGINEER.
2.2. HOOKS AND BENDS
HOOKS AND BENDS SHALL BE AS SHOWN IN THE FOLLOWING TABLE

TABLE FOR VALUES OF A OR G

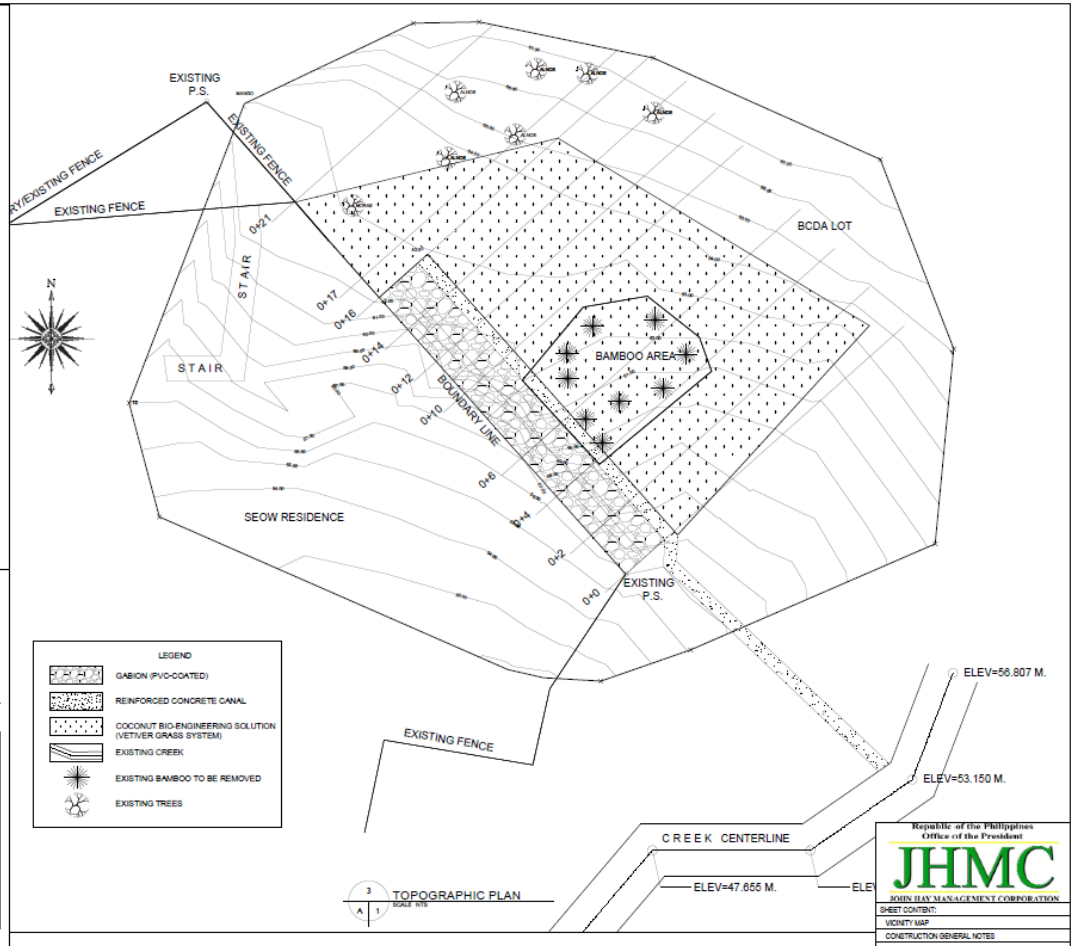
SIZE OF BARS	END HOOKS		STIRRUP & TIE		STIRRUP TIE
	180°	90°	90°	135°	135°
10	125	150	100	100	125
12	150	200	113	113	163
16	175	250	150	138	200
20	200	300	90Ø	-	-



Do = 6 db for db < 30
Do = 8.7 db for db < 30
D = 4 db for db < 20
Do = 6 db for db < 30

3. CONSTRUCTION
DPWH STANDARD SPECIFICATIONS, 2013 EDITION, VOL. II HIGHWAYS, BRIDGES AND AIRPORTS SHALL BE FOLLOWED. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. IN CASE OF CONFLICT ON INTERPRETATIONS OF DRAWINGS. NUMERICAL FIGURES OF DIMENSION SHALL PREVAIL OVER SCALED VALUES.
UNLESS OTHERWISE SHOWN, ALL BAR SPACING REFER TO THE CENTER OF BARS AND THE MINIMUM COVERING FROM SURFACE OF CONCRETE TO THE FACE OF THE NEAREST BAR SHELL BE 75mm.
ALL CONCRETE SHALL BE POURED WHERE THERE IS PERMISSIBLE WEATHER CONDITION AND NO OTHER ENVIRONMENTAL HAZARD WILL AFFECT THE POURING.
ALL ELEVATIONS AND STATIONING SHALL BE VERIFIED BEFORE CONSTRUCTION.
FOUNDATION OF SLOPE AND EMBANKMENT PROTECTION WORKS SHALL HAVE A PERMISSIBLE BEARING CAPACITY OF NOT LESS THAN A MAXIMUM GROUND PRESSURE OF 113 KN/ SQ.M. SOFT SPOTS UNDER THE FOUNDATION SHALL BE REMOVED AND REPLACED WITH SUITABLE BEDDING MATERIALS OR CONCRETE CLASS "B". SOFT SPOTS BETWEEN THE CUT FACE AND SLOPE/ EMBANKMENT PROTECTION WALLS MUST BE FILLED WITH ROCKS OR SUITABLE MATERIALS. SUCH BACKFILL MATERIALS PLACED BEHIND THE WALL SHALL BE FREE DRAINING, NON EXPANSIVE AND WATER SHALL BE DRAINED BY WEEPHOLES PLACED AT SUITABLE INTERVALS AND ELEVATIONS. THE DEPTH OF PENETRATION SHALL BE MEASURED FROM THE LEVEL OF THE ORIGINAL GROUND SURFACE AND SHALL NOT INCLUDE EXCAVATED MATERIALS.
REINFORCING STEEL BARS
A. FABRICATION
REINFORCING BARS SHALL BE ACCURATELY FORMED TO THE SHAPES AND DIMENSIONS INDICATED ON THE PLAN
B. BAR BENDING
UNLESS OTHERWISE PERMITTED, ALL REINFORCING BARS REQUIRING BENDING SHALL BE BENT COLD. WHEN REINFORCING BARS ARE BENT BY HEATING, THE ENTIRE OPERATION SHALL BE APPROVED BY THE ENGINEER.

2 GENERAL CONSTRUCTION NOTES
A 1 SCALE: NTS



3 TOPOGRAPHIC PLAN
A 1 SCALE: NTS

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	REMARKS
B.5	PROJECT BILLBOARD/SIGNBOARD	Each	1.00	
B.7(1)	OCCUPATIONAL SAFETY AND HEALTH PROGRAM	Month	1.00	
B.9	MOBILIZATION/DEMOBILIZATION	l.s.	1.00	
100(2)	CLEARING AND GRUBBING	l.s.	1.00	
102(2)	EXCAVATION (SURPLUS COMMON EXCAVATION)	cu.m.	91.75	COMMON EXCAVATION
104(2)	EMBANKMENT	cu.m.	1.60	
404(1)a	REINFORCING STEEL (GRADE 40)	kg	414.10	GRADE 40
405(1)a3	STRUCTURAL CONCRETE (CLASS A, 20.68MPA, 30 DAYS)	cu.m.	3.90	CLASS A, 20.68MPA, 30
511(1)b3	GABIONS (PVC COATED)	cu.m.	144.00	PVC COATED
622(3)	COCONET BIO-ENGINEERING SOLUTIONS (VETIVER GRASS SYSTEM)	sq.m.	217.04	VETIVER GRASS SYSTEM

4 SUMMARY OF QUANTITIES
A 1 SCALE: NTS

Republic of the Philippines
Office of the President
JHMC
JOHN HAY MANAGEMENT CORPORATION

SHEET CONTENT:
VICINITY MAP
CONSTRUCTION GENERAL NOTES
TOPOGRAPHIC PLAN
SUMMARY OF QUANTITIES

PROJECT TITLE
SLOPE PROTECTION AT HILLSIDE BARANGAY

LOCATION OF PROJECT:
HILLSIDE BARANGAY, BAGUIO CITY

APPROVED BY:
ENGR. BOBBY V. AKIA

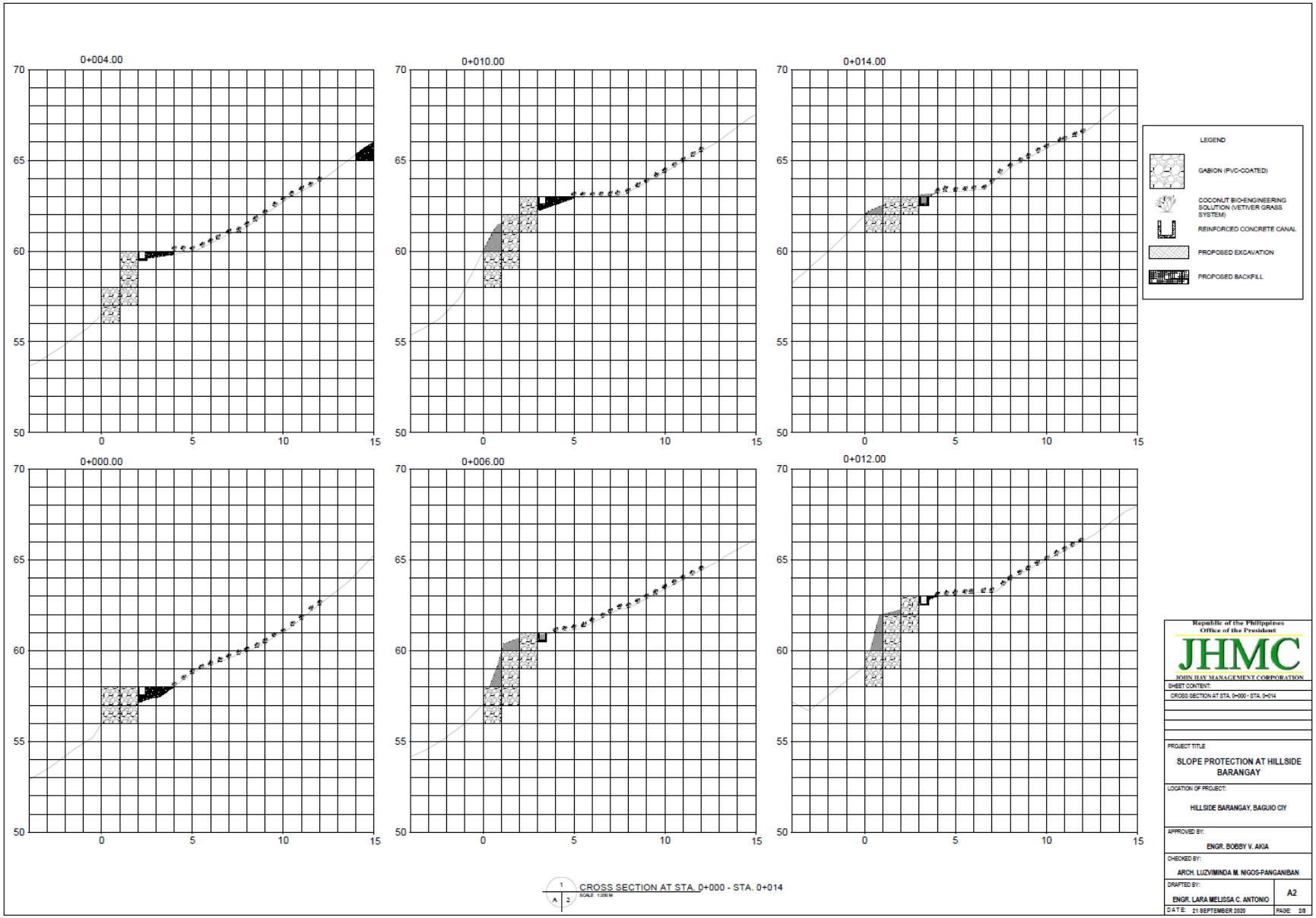
CHECKED BY:
ARCH. LUZVIMINDA M. NIGOS-PANGANIBAN

DRAFTED BY:
ENGR. LARA MELISSA C. ANTONIO

A1

DATE: 21 SEPTEMBER 2020

PAGE: 1/8



Republic of the Philippines
Office of the President

JHMC

JOHN HAY MANAGEMENT CORPORATION

SHEET CONTENT:
CROSS SECTION AT STA. 0+000 - STA. 0+014

PROJECT TITLE
SLOPE PROTECTION AT HILLSIDE BARANGAY

LOCATION OF PROJECT:
HILLSIDE BARANGAY, BAGUIO CITY

APPROVED BY:
ENGR. BOBBY V. AKIA

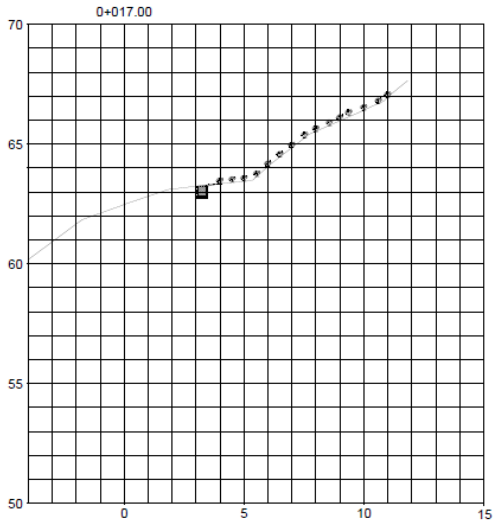
CHECKED BY:
ARCH. LUZVIMINDA M. NIGOS-PANGANIBAN

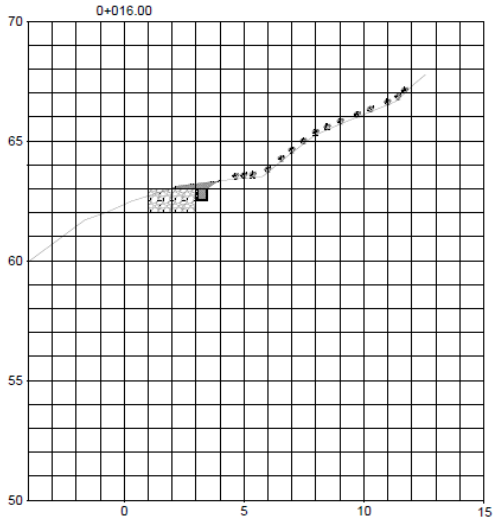
DRAFTED BY:
ENGR. LARA MELISSA C. ANTONIO

A2

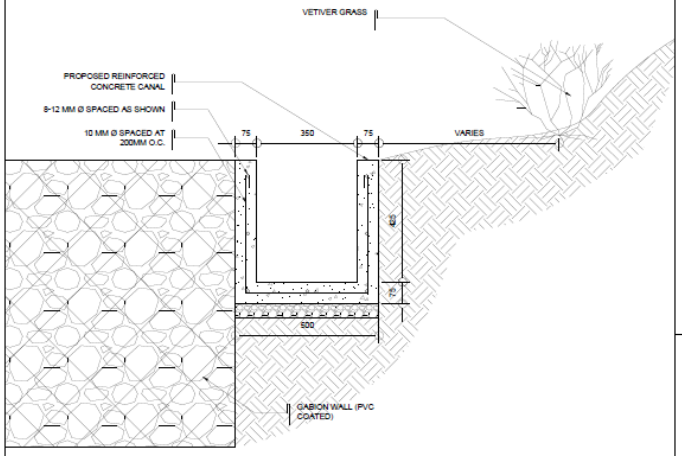
DATE: 21 SEPTEMBER 2020

PAGE: 2/8

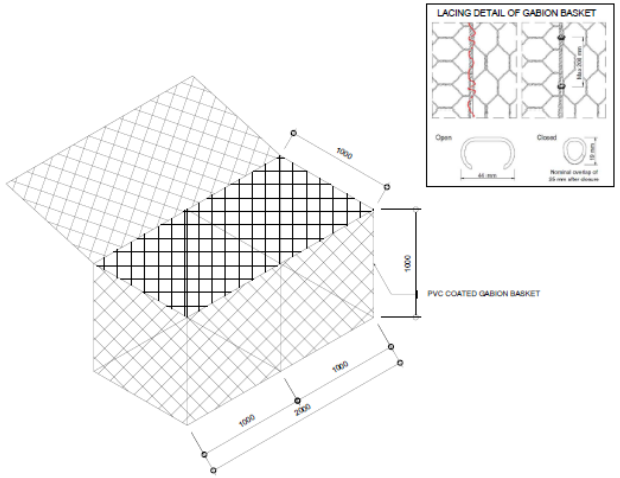




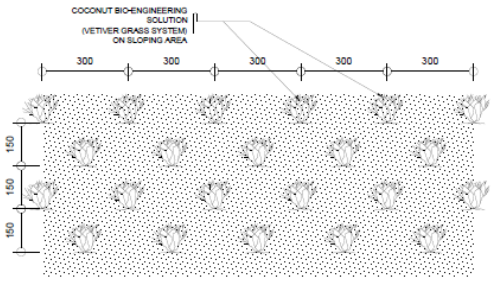
1 A 3 CROSS SECTION AT STA. 0+016 - STA. 0+017
SCALE 1:200 M



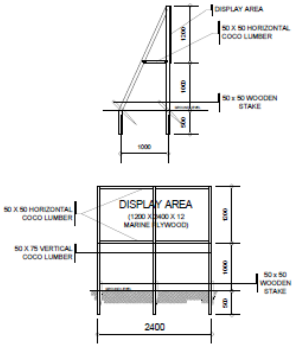
2 A 3 TYPICAL SECTION OF REINF. CONCRETE CANAL
SCALE 1 : 15 METERS



3 A 3 GABION BASKET DETAILS
SCALE 1:40 M



4 A 3 VETIVER GRASS SYSTEM DETAILS
SCALE 1:40 M



5 A 3 BILLBOARD FRAMING DETAILS
SCALE NTS

Republic of the Philippines
Office of the President

JHMC
JOHN HAY MANAGEMENT CORPORATION

SHEET CONTENT:	
CROSS SECTION AT STA. 0+016 - STA. 0+017	
TYPICAL SECTION OF REIN. CONC. CANAL	
GABION BASKET DETAILS	
VETIVER GRASS SYSTEM DETAIL	
BILLBOARD FRAMING DETAILS	
PROJECT TITLE	
SLOPE PROTECTION AT HILLSIDE BARANGAY	
LOCATION OF PROJECT:	
HILLSIDE BARANGAY, BAGUIO CIY	
APPROVED BY:	
ENGR. BOBBY V. AKIA	
CHECKED BY:	
ARCH. LUZVIMINDA M. NIGOS-PANGANIBAN	
DRAFTED BY:	A3
ENGR. LARA MELISSA C. ANTONIO	
DATE: 21 SEPTEMBER 2020	PAGE: 8/8

Section VIII. Bill of Quantities

ITEM NO.	SCOPE OF WORKS TO BE DONE	UNIT	QTY.	UNIT COST	TOTAL
B.5	PROJECT BILLBOARD/SIGNBOARD	Each	1.00		
B.7(1)	OCCUPATIONAL SAFETY AND HEALTH PROGRAM	Month	1.00		
B.9	MOBILIZATION/DEMOBILIZATION	l.s.	1.00		
100(2)	CLEARING AND GRUBBING	l.s.	1.00		
102(2)	EXCAVATION (SURPLUS COMMON EXCAVATION)	cu.m.	91.75		
104(2)	EMBANKMENT	cu.m.	1.60		
404(1)a	REINFORCING STEEL (GRADE 40)	kg	414.10		
405(1)a3	STRUCTURAL CONCRETE (CLASS A, 20.68MPA, 30 DAYS)	cu.m.	3.90		
511(1)b3	GABIONS (PVC COATED)	cu.m.	144.00		
622(3)	COCONET BIO-ENGINEERING SOLUTIONS (VETIVER GRASS SYSTEM)	sq.m.	217.04		
BID AMOUNT					

Name: _____
In the capacity of: _____
Signed: _____
Duly authorized to sign the Bid for and on behalf of: _____
Date: _____

ANNEX "A"

GUIDELINES IN PREPARING THE DETAILED UNIT PRICE ANALYSIS (DUPA)

1. All items of work to be used in preparing the DUPA shall be consistent with the design, plans and specifications prepared by JHMC.
2. For uniformity in the preparation of the Financial Proposal, the DUPA shall be an integral part of the Bidding Documents.
3. All bids shall be composed of the Direct Cost and Indirect Cost.
   - 3.1. DIRECT COST.
     - 3.1.1. MATERIAL COST. Cost of materials to be used in doing the work item called for, which shall include, among others, the following:
       - 3.1.1.1. Cost at source, including processing, crushing, stockpiling, loading, royalties, local taxes, construction and/or maintenance of haul roads, etc.
       - 3.1.1.2. Expenses for hauling to project site.
       - 3.1.1.3. Handling expenses.
       - 3.1.1.4. Storage expenses.
       - 3.1.1.5. Allowance for waste and/or losses.
     - 3.1.2. LABOR COST.
       - 3.1.2.1. Salaries and wages, as authorized by the Department of Labor and Employment.
       - 3.1.2.2. Fringe benefits, such as vacation and sick leaves, benefits under the Workmen's Compensation Act, SSS contributions, allowances, 13th month pay, bonuses, etc.
     - 3.1.3. EQUIPMENT EXPENSES.
       - 3.1.3.1. Rental rates of equipment shall be based on the prevailing "Association of Carriers and Equipment Lessors, (ACEL) Inc." approved for use by the DPWH-CAR. Rental rates of equipment not indicated in the ACEL booklet shall be taken from the rental rates used by the proponent. The make, model and capacity of the equipment should be indicated in the detailed unit cost analysis.
       - 3.1.3.2. Mobilization and demobilization shall be treated as a separate pay item. It shall be computed based on the equipment requirements of the project stipulated in the bidder's proposal.
   - 3.2. INDIRECT COST.
     - 3.2.1. Overhead.
       - 3.2.1.1. Cost to cover power and water consumption and office supplies.
       - 3.2.1.2. Premium on Contractor's All Risk Insurance (CARI).
       - 3.2.2. Contingencies. These includes expenses for coordination meetings, ground breaking, inauguration ceremonies and other unforeseen events.
     - 3.2.3. Miscellaneous Expenses. Expenses for laboratory tests for quality control.
     - 3.2.4. Contractor's Profit.

Notes:

1. All sub-items under the General Requirements shall not be subjected to OCM mark-up.
2. The following items under the General Requirements shall not be subjected to Contractor's profit mark-up:
   a) Mobilization and Demobilization; and
   b) Permits and clearances

ANNEX "B"

Project Name: **Slope Protection at Hillside Barangay**
Location: Hillside Barangay, Baguio City

DETAILED UNIT PRICE ANALYSIS

Item No. 1	General Requirements	Quantity	Unit	Unit Price	Amount
1.1	Mobilization/Demobilization	1	Lot		

	Direct Cost: (a+b+c)
	Indirect Cost:
	Contractor's Profit (Except Items 2.1 and 2.6)
	Withholding Taxes
	Sub-Total 1: (Sum of Direct and Indirect Cost)

Item No. 2	Item Description					
Sub-Item						
2.1	Description	Unit of Measure:				
a.	Labor		No. of Personnel	Daily Rate	No. of Working Days	Amount
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Labor Cost:	#VALUE!
b.	Equipment		No. of Unit/s	Daily Rate	No. of Working Days	Amount
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Equipment Rentals:	#VALUE!
c.	Materials		Quantity	Unit	Unit Price	Amount
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Material Cost:	#VALUE!

	Direct Cost: (a+b+c)
	Indirect Cost:
	Overhead
	Contingencies
	Miscellaneous
	Contractor's Profit
	Withholding Taxes
	Sub-Total 2.1: (Sum of Direct and Indirect Cost)

Sub-Item						
2.2	Description	Unit of Measure:				
a.	Labor		No. of Personnel	Daily Rate	No. of Working Days	Amount
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Labor Cost:	#VALUE!
b.	Equipment		No. of	Daily	No. of	Amount

			Unit/s	Rate	Working Days	
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Equipment Rentals:	#VALUE!
c.	Materials		Quantity	Unit	Unit Price	Amount
	Materials		Quantity	Unit	Unit Price	Amount
	xxxxxxxx		xx	xxxx.xx	xx	#VALUE!
					Total Material Cost:	#VALUE!
		Direct Cost: (a+b+c)				
		Indirect Cost:				
		Overhead				
		Contingencies				
		Miscellaneous				
		Contractor's Profit				
		Withholding Taxes				
		Sub-Total 2.2: (Sum of Direct and Indirect Cost)				
					Item 2. Total Cost:	
					Item 2.Unit Cost:	

ANNEX "C"

Project Name: **Slope Protection at Hillside Barangay**
Location: Hillside Barangay, Baguio City

DUPA Summary

Item No.	Item Description	Unit	Quantity	Direct Cost				Indirect Cost						Item Cost	Unit Cost	Percent
				Labor	Equipment	Materials	Total	Overhead	Contingencies	Miscellaneous	ontractor's Pro	ithholding Tax	Total			
1	#REF!															
2	General Requirements															
3	xxxxx															
4	xxxxx															
5	xxxxx															
6	xxxxx															
7	xxxxx															
8	xxxxx															
9	xxxxx															
10	xxxxx															
11	xxxxx															
12	xxxxx															

	Amount	Percent
Total Direct Cost:		
a. Labor		
b. Equipment		
c. Materials		
Total Indirect Cost:		
a. Overhead		
b. Contingencies		
c. Miscellaneous		
d. .Contractor's Profit		
e. Withholding Taxes		
Total Bid Amount:		

Section IX. 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);

or

☐ (b) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document;

and

☐ (c) Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;

and

☐ (e) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

☐ (f) 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**

☐ (g) 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**

☐ (h) Philippine Contractors Accreditation Board (PCAB) License;

or

Special PCAB License in case of Joint Ventures;

and registration for the type and cost of the contract to be bid; **and**

☐ (i) 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**

(j) 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**

☐ (k) 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

☐ (l) The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and**

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

Class "B" Documents

☐ (n) 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

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

Other documentary requirements under RA No. 9184

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

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

☐ (r) Cash Flow by Quarter.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Government Procurement Policy Board