

PHILIPPINE BIDDING DOCUMENTS

**Procurement of
GOODS**

Government of the Republic of the Philippines

**REPAIR AND MAINTENANCE OF
PAVEMENTS WITHIN NINOY AQUINO
INTERNATIONAL AIRPORT COMPLEX**

**Sixth Edition
July 2020**

Preface

These Philippine Bidding Documents (PBDs) for the procurement of Goods through Competitive Bidding have been prepared by the Government of the Philippines for use by any branch, constitutional commission or office, agency, department, bureau, office, or instrumentality of the Government of the Philippines, National Government Agencies, including Government-Owned and/or Controlled Corporations, Government Financing Institutions, State Universities and Colleges, and Local Government Unit. The procedures and practices presented in this document have been developed through broad experience, and are for mandatory use in projects that are financed in whole or in part by the Government of the Philippines or any foreign government/foreign or international financing institution in accordance with the provisions of the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184.

The Bidding Documents shall clearly and adequately define, among others: (i) the objectives, scope, and expected outputs and/or results of the proposed contract or Framework Agreement, as the case may be; (ii) the eligibility requirements of Bidders; (iii) the expected contract or Framework Agreement duration, the estimated quantity in the case of procurement of goods, delivery schedule and/or time frame; and (iv) the obligations, duties, and/or functions of the winning bidder.

Care should be taken to check the relevance of the provisions of the PBDs against the requirements of the specific Goods to be procured. If duplication of a subject is inevitable in other sections of the document prepared by the Procuring Entity, care must be exercised to avoid contradictions between clauses dealing with the same matter.

Moreover, each section is prepared with notes intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They shall not be included in the final documents. The following general directions should be observed when using the documents:

- a. All the documents listed in the Table of Contents are normally required for the procurement of Goods. However, they should be adapted as necessary to the circumstances of the particular Procurement Project.
- b. Specific details, such as the “*name of the Procuring Entity*” and “*address for bid submission*,” should be furnished in the Instructions to Bidders, Bid Data Sheet, and Special Conditions of Contract. The final documents should contain neither blank spaces nor options.
- c. This Preface and the footnotes or notes in italics included in the Invitation to Bid, Bid Data Sheet, General Conditions of Contract, Special Conditions of Contract, Schedule of Requirements, and Specifications are not part of the text of the final document, although they contain instructions that the Procuring Entity should strictly follow.

- d. The cover should be modified as required to identify the Bidding Documents as to the Procurement Project, Project Identification Number, and Procuring Entity, in addition to the date of issue.
- e. Modifications for specific Procurement Project details should be provided in the Special Conditions of Contract as amendments to the Conditions of Contract. For easy completion, whenever reference has to be made to specific clauses in the Bid Data Sheet or Special Conditions of Contract, these terms shall be printed in bold typeface on Sections I (Instructions to Bidders) and III (General Conditions of Contract), respectively.
- f. For guidelines on the use of Bidding Forms and the procurement of Foreign-Assisted Projects, these will be covered by a separate issuance of the Government Procurement Policy Board.

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Glossary of Acronyms, Terms, and Abbreviations

ABC –Approved Budget for the Contract.

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.

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])

CDA - Cooperative Development Authority.

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.

CIF – Cost Insurance and Freight.

CIP – Carriage and Insurance Paid.

CPI – Consumer Price Index.

DDP – Refers to the quoted price of the Goods, which means “delivered duty paid.”

DTI – Department of Trade and Industry.

EXW – Ex works.

FCA – “Free Carrier” shipping point.

FOB – “Free on Board” shipping point.

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]).

Framework Agreement – Refers to a written agreement between a procuring entity and a supplier or service provider that identifies the terms and conditions, under which specific purchases, otherwise known as “Call-Offs,” are made for the duration of the agreement. It is in the nature of an option contract between the procuring entity and the bidder(s) granting the procuring entity the option to either place an order for any of the goods or services identified in the Framework Agreement List or not buy at all, within a minimum period of one (1) year to a maximum period of three (3) years. (GPPB Resolution No. 27-2019)

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.

GPPB – Government Procurement Policy Board.

INCOTERMS – International Commercial Terms.

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.

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.

Supplier – refers to a citizen, or any corporate body or commercial company duly organized and registered under the laws where it is established, habitually established in business and engaged in the manufacture or sale of the merchandise or performance of the general services covered by his bid. (Item 3.8 of GPPB Resolution No. 13-2019, dated 23 May 2019). Supplier as used in these Bidding Documents may likewise refer to a distributor, manufacturer, contractor, or consultant.

UN – United Nations.

Section I. Invitation to Bid

Notes on the Invitation to Bid

The Invitation to Bid (IB) provides information that enables potential Bidders to decide whether to participate in the procurement at hand. The IB shall be posted in accordance with Section 21.2 of the 2016 revised IRR of RA No. 9184.

Apart from the essential items listed in the Bidding Documents, the IB should also indicate the following:

- a. The date of availability of the Bidding Documents, which shall be from the time the IB is first advertised/posted until the deadline for the submission and receipt of bids;
- b. The place where the Bidding Documents may be acquired or the website where it may be downloaded;
- c. The deadline for the submission and receipt of bids; and
- d. Any important bid evaluation criteria (*e.g.*, the application of a margin of preference in bid evaluation).

The IB should be incorporated in the Bidding Documents. The information contained in the IB must conform to the Bidding Documents and in particular to the relevant information in the Bid Data Sheet.

INVITATION TO BID FOR THE REPAIR AND MAINTENANCE OF PAVEMENTS WITHIN NINOY AQUINO INTERNATIONAL AIRPORT COMPLEX

1. The Manila International Airport Authority (MIAA) through the:

Source of funding and year: CY 2024 COB
Approved Budget to the Contract (ABC): PESOS: THIRTY-TWO MILLION ONE HUNDRED THOUSAND AND 00/100 (Php32,100,000.00) IN PHILIPPINE CURRENCY
Procurement Project/ Identification Number: Responsibility Center Code No. 24-E23P-50213030-39

Bids received in excess of the ABC shall be automatically rejected at bid opening.

Lot-procurement

The MIAA, through the (please refer to the above project particulars) being the ABC to payments under the contract for each lot/item. Bids received in excess of the ABC for each lot shall be automatically rejected at bid opening.

Framework Agreement:

The MIAA using: Single-year
 Multi-year for a duration of: 2 or 3 years.

Framework Agreement, through the (please refer to the above project particulars) being the ABC to payments under the contract for each item. Bids received in excess of the total cost per item shall be automatically rejected.

2. The MIAA now invites bids for the above Procurement Project.

<i>Contract Duration</i>	<i>Six (6) Months</i>
<i>Bidders should have completed</i>	refer ITB to Clause 5.3(a) from the date of submission and receipt of bids, a contract similar to the Project

Bidders should have completed, from the date of submission and receipt of bids, 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).

Framework Agreement

The MIAA now invites bids for the above Procurement Project.

Delivery of the Goods is required within:

expected delivery time frame
 after issuance of a Call-Off or any date determined by the PE

Bidders should have completed, within [(insert relevant period)] from the date of submission and receipt of bids, 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 a non-discretionary “pass/fail” criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

a. [Select this paragraph if conditions (a), (c), and (d) under Section 23.4.1.2 of the 2016 revised IRR of RA No. 9184 DO NOT exist:]

Bidding is restricted to Filipino citizens/sole proprietorships, partnerships, or organizations with at least sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines, and to citizens or organizations of a country the laws or regulations of which grant similar rights or privileges to Filipino citizens, pursuant to RA No. 5183.

b. [Select this paragraph if condition (a), (c), or (d) under Section 23.4.1.2 of the 2016 revised IRR of RA No. 9184 exists:]

Bidding is open to all interested bidders, whether local or foreign, subject to the conditions for eligibility provided in the 2016 revised IRR of RA No. 9184.

4. Prospective Bidders may obtain further information from:

MIAA	Pavements and Grounds Division	AGM For Engineering
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and inspect the Bidding Documents at the address given below during regular office hours.

5. A complete set of Bidding Documents may be acquired by interested Bidders on:

<i>From</i>	<i>To</i>	<i>Time</i>
April 10, 2024	May 01, 2024	8:00 AM-5:00 PM
	May 02, 2024	08:00 AM – 12:00NN

from the given address and website(s) below and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of PHP 25,000.00. The Procuring Entity shall allow the bidder to present its proof of payment for the fees either in person¹.

[NOTE: For lot procurement, the maximum fee for the Bidding Documents for each lot shall be based on its ABC, in accordance with the Guidelines issued by the GPPB; provided that the total fees for the Bidding Documents of all lots shall not exceed the maximum fee prescribed in the Guidelines for the sum of the ABC of all lots.]

6. The **MIAA** will hold a Pre-Bid Conference² on:

<i>Date</i>	<i>Time</i>	<i>Venue</i>
18 April 2024	2:00 PM	4/F, Audio Visual Room, MIAA Administration Building

and/or through video conferencing or webcasting³ which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat:

<i>Mode of Bid submission</i>	<i>Last day of submission</i>	<i>Time</i>
Manual submission	May 02, 2024	12:00 NN.

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 14.

¹ It may be presented in person, by facsimile, or through electronic means;

² May be deleted in case the ABC is less than One Million Pesos (PhP1,000,000) where the Procuring Entity may not hold a Pre-Bid Conference.

³ via Facebook Live at Ninoy Aquino International Airport;

9. Bid opening shall be on:

Date	Time	Venue
May 02, 2024	2:00 PM	4/F, Audio Visual Room, MIAA Administration Building

and/or via social media⁴. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. [n/a] [Insert such other necessary information deemed relevant by the Procuring Entity such as the use of a back-up data or cloud storage for large files uploaded for online bid submissions]

11. The MIAA 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 IRR of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.

12. For further information, please refer to:

MS. ELSIE P. NITOLLANO
BAC Head Secretariat
Bids and Awards Committee
Nos. 88771109 Loc. 3736, 3838 and 3010
e-mail: bac@miaa.gov.ph / miaa.bac.secretariat@gmail.com

13. You may visit the following websites: www.miaa.gov.ph
www.philgeps.gov.ph
www.facebook.com/MIAAGovPH

For downloading of Bidding Documents:

For online bid submission: n/a

Date of Issue

10 APRIL 2024, WEDNESDAY

RAFAEL S. REGULAR
Chairperson, MIAA Bids and Awards Committee

⁴ *ibid*;

Section II. Instructions to Bidders

Notes on the Instructions to Bidders

This Section on the Instruction to Bidders (ITB) provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Procuring Entity. It also provides information on bid submission, eligibility check, opening and evaluation of bids, post-qualification, and on the award of contract.

1. Scope of Bid

The MIAA wishes to receive Bids for the:

<i>Project Name / Title</i>	REPAIR AND MAINTENANCE OF PAVEMENTS WITHIN NINOY AQUINO INTERNATIONAL AIRPORT COMPLEX
<i>Procurement Project/ Identification number</i>	Responsibility Center Code No. 24-E23P-50213030-39

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

The Procurement Project (referred to herein as “Project”) is composed of:

one (1)	Refer to Terms of Reference on the REPAIR AND MAINTENANCE OF PAVEMENTS WITHIN NINOY AQUINO INTERNATIONAL AIRPORT COMPLEX
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2. Funding Information

2.1. The GOP through the source of funding as indicated below in the amount of: PESOS: THIRTY-TWO MILLION ONE HUNDRED THOUSAND AND 00/100 ONLY (PhP32,100,000.00) IN PHILIPPINE CURRENCY;

2.2. The source of funding is: CY COB 2024

n/a Early procurement activity:
a. GOCC and GFIs, the proposed Corporate Operating Budget.

NOT an early procurement activity:
a. GOCC and GFIs, the Corporate Operating Budget.

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 Manuals 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 **IB** 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 verified and accepted the general requirements of this Project, including 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, and Coercive Practices

The Procuring Entity, as well as the Bidders and Suppliers, 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. *[Select one, delete other/s]*

- n/a a. Foreign ownership exceeding those allowed under the rules may participate pursuant to:
- i. When a Treaty or International or Executive Agreement as provided in Section 4 of the RA No. 9184 and its 2016 revised IRR allow foreign bidders to participate;
 - ii. Citizens, corporations, or associations of a country, included in the list issued by the GPPB, the laws or regulations of which grant reciprocal rights or privileges to citizens, corporations, or associations of the Philippines;
 - iii. When the Goods sought to be procured are not available from local suppliers; or
 - iv. When there is a need to prevent situations that defeat competition or restrain trade.
- b. Foreign ownership limited to those allowed under the rules may participate in this Project.

5.3. Pursuant to Section 23.4.1.3 of the 2016 revised IRR of RA No.9184, the Bidder shall have an SLCC that is at least one (1) contract similar to the Project the value of which, adjusted to current prices using the PSA’s CPI, must be at least equivalent to:

[Select one, delete the other/s]

- a. For the procurement of Non-expendable Supplies and Services: The Bidder must have completed a single contract that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC.
- n/a b. For the procurement of Expendable Supplies: The Bidder must have completed a single contract that is similar to this Project, equivalent to at least twenty-five percent (25%) of the ABC.
- n/a c. For procurement where the Procuring Entity has determined, after the conduct of market research, that imposition of either (a) or (b) will likely result to failure of bidding or monopoly that will defeat the purpose of public bidding: the Bidder should comply with the following requirements: *(Select either failure or monopoly of bidding based on market research conducted)*

- i. Completed at least two (2) similar contracts, the aggregate amount of which should be equivalent to at least *fifty percent (50%) in the case of non-expendable supplies and services or twenty-five percent (25%) in the case of expendable supplies*] of the ABC for this Project; and
- ii. The largest of these similar contracts must be equivalent to at least half of the percentage of the ABC as required above.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.1 of the 2016 IRR of RA No. 9184.

6. Origin of 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, subject to Domestic Preference requirements under **ITB** Clause 18.

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 twenty percent (20%) of the Project.

The Procuring Entity has prescribed that:

[Select one, delete other/s]

n/a a. Subcontracting is allowed. The portions of Project and the maximum percentage allowed to be subcontracted are indicated in the **BDS**, which shall not exceed twenty percent (20%) of the contracted Goods.

b. Subcontracting is NOT allowed.

7.2. *[If Procuring Entity has determined that subcontracting is allowed during the bidding, state:]*

n/a The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criteria 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.

7.3. *[If subcontracting is allowed during the contract implementation stage, state:]*

n/a 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.

7.4. Subcontracting of any portion of the Project does not relieve the Supplier 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 Supplier's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address and/or through videoconferencing/webcasting as indicated in paragraph 6 of the **IB**.

9. Clarification and Amendment of Bidding Documents

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

10. Documents comprising the Bid: Eligibility and Technical Components

- 10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section VIII (Checklist of Technical and Financial Documents)**.
- 10.2. The Bidder's SLCC as indicated in **ITB** Clause 5.3 should have been completed within the period as provided in paragraph 2 of the **IB** prior to the deadline for the submission and receipt of bids.
- 10.3. 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. Similar to the required authentication above, 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.

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 VIII (Checklist of Technical and Financial Documents)**.
- 11.2. If the Bidder claims preference as a Domestic Bidder or Domestic Entity, a certification issued by DTI shall be provided by the Bidder in accordance with Section 43.1.3 of the 2016 revised IRR of RA No. 9184.
- 11.3. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.4. 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.

11.5. *[Include if Framework Agreement will be used:]*

n/a

 Financial proposals for single or multi-year Framework Agreement shall be submitted before the deadline of submission of bids as prescribed in the **IB**. For multi-year Framework Agreement, evaluation of the financial proposal during this stage is for purposes of determining eligibility and whether or not such financial proposal is within the ABC.

12. Bid Prices

12.1. Prices indicated on the Price Schedule shall be entered separately in the following manner:

a. For Goods offered from within the Procuring Entity's country:

- i. The price of the Goods quoted EXW (ex-works, ex-factory, ex-warehouse, ex-showroom, or off-the-shelf, as applicable);
- ii. The cost of all customs duties and sales and other taxes already paid or payable;
- iii. The cost of transportation, insurance, and other costs incidental to delivery of the Goods to their final destination; and
- iv. The price of other (incidental) services, if any, listed in the **BDS**.

b. For Goods offered from abroad:

- i. Unless otherwise stated in the **BDS**, the price of the Goods shall be quoted delivered duty paid (DDP) with the place of destination in the Philippines as specified in the **BDS**. In quoting the price, the Bidder shall be free to use transportation through carriers registered in any eligible country. Similarly, the Bidder may obtain insurance services from any eligible source country.
- ii. The price of other (incidental) services, if any, as listed in the **BDS**.

12.2. *[Include if Framework Agreement will be used:]*

n/a

 For Framework Agreement, the following should also apply in addition to Clause 12.1:

- a. For a single year Framework Agreement, the prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation or escalation on any account. Price

_____ schedules required under Clause 12.1 shall be submitted with the bidding documents.

b. For a multi-year Framework Agreement, the prices quoted by the Bidder during submission of eligibility documents shall be the ceiling and the price quoted during mini-competition must not exceed the initial price offer. The price quoted during call for mini-competition shall be fixed during the Bidder's performance of that Call-off and not subject to variation or escalation on any account. Price schedules required under Clause 12.1 shall be submitted with the bidding documents.

For Framework Agreement, the following should also apply in addition to Clause 12.1:

- c. For a single year Framework Agreement, the prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation or escalation on any account. Price schedules required under Clause 12.1 shall be submitted with the bidding documents.
- d. For a multi-year Framework Agreement, the prices quoted by the Bidder during submission of eligibility documents shall be the ceiling and the price quoted during mini-competition must not exceed the initial price offer. The price quoted during call for mini-competition shall be fixed during the Bidder's performance of that Call-off and not subject to variation or escalation on any account. Price schedules required under Clause 12.1 shall be submitted with the bidding documents.

13. Bid and Payment Currencies

13.1. For Goods that the Bidder will supply from outside the Philippines, the 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.

13.2. Payment of the contract price shall be made in:

[Select one, delete the other/s]

a. Philippine Pesos.

b. A foreign-denominated bid as allowed by the Procuring Entity, which shall be tradeable or acceptable by the BSP.

14. Bid Security

- 14.1. The Bidder shall submit a Bid Securing Declaration⁵ 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**.
- 14.2. The Bid and bid security shall be valid for **one hundred twenty (120) calendar days**. Any Bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.
- 14.3. *[Include if Framework Agreement will be used:]*

n/a

 In the case of Framework Agreement, other than the grounds for forfeiture under the 2016 revised IRR, the bid security may also be forfeited if the successful bidder fails to sign the Framework Agreement or fails to furnish the performance security or performance securing declaration. Without prejudice on its forfeiture, bid securities shall be returned only after the posting of performance security or performance securing declaration, as the case may be, by the winning Bidder or compliant Bidders and the signing of the Framework Agreement.

15. 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 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.

16. Deadline for Submission of Bids

16.1. 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**.

16.2. *[Include if Framework Agreement will be used:]*

n/a

 For multi-year Framework Agreement, the submission of bids shall be for the initial evaluation of their technical and financial eligibility. Thereafter, those declared eligible during the said initial eligibility evaluation and entered into a Framework Agreement with the Procuring Entity shall submit anew their best financial offer at the address and on or before the date and time indicated in the Call for each mini-competition.

17. Opening and Preliminary Examination of Bids

⁵ In the case of Framework Agreement, the undertaking shall refer to entering into contract with the Procuring Entity and furnishing of the performance security or the performance securing declaration within ten (10) calendar days from receipt of Notice to Execute Framework Agreement.

- 17.1. 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.

- 17.2. The preliminary examination of bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

18. Domestic Preference

- 18.1. The Procuring Entity will grant a margin of preference for the purpose of comparison of Bids in accordance with Section 43.1.2 of the 2016 revised IRR of RA No. 9184.

- 18.2. *[Include if Framework Agreement will be used:]*

n/a For multi-year Framework Agreement, determination of margin of preference shall be conducted every call for Mini-Competition.

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 the 2016 revised IRR of RA No. 9184.

n/a *Include the following options if Framework Agreement will be used:*

- a. In the case of single-year Framework Agreement, the Lowest Calculated Bid shall be determined outright after the detailed evaluation;
- b. For multi-year Framework Agreement, the determination of the eligibility and the compliance of bidders with the technical and financial aspects of the projects shall be initially made by the BAC, in accordance with Item 7.4.2 of the Guidelines on the Use of Framework Agreement.

- 19.2. If the Project allows partial bids, bidders may submit a proposal on any of the lots or items, and evaluation will be undertaken on a per lot or item basis, as the case maybe. In this case, the Bid Security as required by **ITB** Clause 14 shall be submitted for each lot or item separately.

- 19.3. The descriptions of the lots or items shall be indicated in **Section VII (Technical Specifications)**, although the ABCs of these lots or items are indicated in the **BDS** for purposes of the NFCC computation pursuant to Section 23.4.2.6 of the

2016 revised IRR of RA No. 9184. The NFCC must be sufficient for the total of the ABCs for all the lots or items participated in by the prospective Bidder.

19.4. The Project shall be awarded as follows:

[Select one, delete the other/s]

Option 1 – One Project having several items that shall be awarded as one contract.

n/a Option 2 – One Project having several items grouped into several lots, which shall be awarded as separate contracts per lot.

n/a Option 3 - One Project having several items, which shall be awarded as separate contracts per item.

[Delete Options 2 and 3 if Framework Agreement will be used.]

19.5. Except for bidders submitting a committed Line of Credit from a Universal or Commercial Bank in lieu of its NFCC computation, all Bids must include the NFCC computation pursuant to Section 23.4.1.4 of the 2016 revised IRR of RA No. 9184, which must be sufficient for the total of the ABCs for all the lots or items participated in by the prospective Bidder. For bidders submitting the committed Line of Credit, it must be at least equal to ten percent (10%) of the ABCs for all the lots or items participated in by the prospective Bidder.

20. Post-Qualification

20.1. *[Include if Framework Agreement will be used:]*

n/a For multi-year Framework Agreement, all bidders initially determined to be eligible and financially compliant shall be subject to initial post-qualification. The BAC shall then recommend the execution of a Framework Agreement among all eligible, technically and financially compliant bidders and the Procuring Entity and shall be issued by HoPE a Notice to Execute Framework Agreement. The determination of the Lowest Calculated Bid (LCB) shall not be performed by the BAC until a Mini-Competition is conducted among the bidders who executed a Framework Agreement. When a Call for Mini-Competition is made, the BAC shall allow the bidders to submit their best financial proposals on such pre-scheduled date, time and place to determine the bidder with the LCB.

20.2. 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, *[n/a]* *(Include if Framework Agreement will be used:)* or in the case of multi-year Framework Agreement, that it is one of the eligible bidders who have submitted bids that are found to be technically and financially compliant, 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**. *[n/a]* *(Include if Framework Agreement will be used:)* For every mini-competition in Framework Agreement, the LCB shall likewise submit the required documents for final Post Qualification. }

21. Signing of the Contract

21.1. 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**.

n/a

Include the following clauses if Framework Agreement will be used:

21.2. At the same time as the Procuring Entity notifies the successful Bidder that its bid has been accepted, the Procuring Entity shall send the Framework Agreement Form to the Bidder, which contract has been provided in the Bidding Documents, incorporating therein all agreements between the parties.

21.3. Within ten (10) calendar days from receipt of the Notice to Execute Framework Agreement with the Procuring Entity, the successful Bidder or its duly authorized representative shall formally enter into a Framework Agreement with the procuring entity for an amount of One Peso to be paid to the procuring entity as a consideration for the option granted by the procuring entity to procure the items in the Framework Agreement List when the need arises.

21.4. The Procuring Entity shall enter into a Framework Agreement with the successful Bidder within the same ten (10) calendar day period provided that all the documentary requirements are complied with.

21.5. The following documents shall form part of the Framework Agreement:

- a. Framework Agreement Form;
- b. Bidding Documents;
- c. Call-offs;
- d. Winning bidder's bid, including the Technical and Financial Proposals, and all other documents/statements submitted (*e.g.*, bidder's response to request for clarifications on the bid), including corrections to the bid, if any, resulting from the Procuring Entity's bid evaluation;
- e. Performance Security or Performance Securing Declaration, as the case may be;
- f. Notice to Execute Framework Agreement; and
- g. Other contract documents that may be required by existing laws and/or specified in the **BDS**.

Section III. Bid Data Sheet

Notes on the Bid Data Sheet

The Bid Data Sheet (BDS) consists of provisions that supplement, amend, or specify in detail, information, or requirements included in the ITB found in Section II, which are specific to each procurement.

This Section is intended to assist the Procuring Entity in providing the specific information in relation to corresponding clauses in the ITB and has to be prepared for each specific procurement.

The Procuring Entity should specify in the BDS information and requirements specific to the circumstances of the Procuring Entity, the processing of the procurement, and the bid evaluation criteria that will apply to the Bids. In preparing the BDS, the following aspects should be checked:

- a. Information that specifies and complements provisions of the ITB must be incorporated.
- b. Amendments and/or supplements, if any, to provisions of the ITB as necessitated by the circumstances of the specific procurement, must also be incorporated.

Bid Data Sheet

ITB Clause						
5.3	For this purpose, contracts similar to the Project shall be: <ul style="list-style-type: none"> a. Asphalt Paving for Airport Horizontal Works b. Completed within the period as provided in paragraph 2 of the IB prior to the deadline for the submission and receipt of bids. 					
7.1	[<u>n/a</u>] <i>[Specify the portions of Goods to be subcontracted, which shall not be a significant or material component of the Project as determined by the Procuring Entity.]</i>					
12	The price of the Goods shall be quoted DDP <i>[state place of destination]</i> or the applicable International Commercial Terms (INCOTERMS) for this Project.					
14.1	The bid security shall be in the form of a Bid Securing Declaration, or any of the following forms and amounts: <ul style="list-style-type: none"> a. The amount of not less than PhP642,000.00 <i>[amount equivalent to two percent (2%) of ABC]</i>, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; or b. The amount of not less than PhP1,605,000.00 <i>[amount equivalent to five percent (5%) of ABC]</i> if bid security is in Surety Bond. 					
19.3	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Item</th> <th style="text-align: center;">Unit/Quantity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Refer to Terms of Reference (TOR)</td> </tr> </tbody> </table>	Item	Unit/Quantity	1	Refer to Terms of Reference (TOR)	<p><i>[In case the Project will be awarded by lot, list the grouping of lots by specifying the group title, items, and the quantity for every identified lot, and the corresponding ABC for each lot.]</i></p> <p><i>[<u>n/a</u>] [In case the project will be awarded by item, list each item indicating its quantity and ABC.]</i></p>
Item	Unit/Quantity					
1	Refer to Terms of Reference (TOR)					
20.2	List here any licenses and permits relevant to the Project and the corresponding law requiring it. Refer to TOR					
21.2	[<u>n/a</u>] <i>[List here any additional contract documents relevant to the Project that may be required by existing laws and/or the Procuring Entity.]</i>					

Section IV. General Conditions of Contract

Notes on the General Conditions of Contract

The General Conditions of Contract (GCC) in this Section, read in conjunction with the Special Conditions of Contract in Section V and other documents listed therein, should be a complete document expressing all the rights and obligations of the parties.

Matters governing performance of the Supplier, payments under the contract, or matters affecting the risks, rights, and obligations of the parties under the contract are included in the GCC and Special Conditions of Contract.

Any complementary information, which may be needed, shall be introduced only through the Special 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.

Additional requirements for the completion of this Contract shall be provided in the **Special Conditions of Contract (SCC)**.

2. Advance Payment and Terms of Payment

2.1. Advance payment of the contract amount is provided under Annex “D” of the revised 2016 IRR of RA No. 9184.

2.2. The Procuring Entity is allowed to determine the terms of payment on the partial or staggered delivery of the Goods procured, provided such partial payment shall correspond to the value of the goods delivered and accepted in accordance with prevailing accounting and auditing rules and regulations. The terms of payment are indicated in the **SCC**.

Include the following clauses if Framework Agreement will be used:

2.3. For a single-year Framework Agreement, prices charged by the Supplier for Goods delivered and/or services performed under a Call-Off shall not vary from the prices quoted by the Supplier in its bid.

2.4. For multi-year Framework Agreement, prices charged by the Supplier for Goods delivered and/or services performed under a Call-Off shall not vary from the prices quoted by the Supplier during conduct of Mini-Competition.

3. Performance Security

Within ten (10) calendar days from receipt of the Notice of Award by the Bidder 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 of RA No. 9184.

{[Include if Framework Agreement will be used:] In the case of Framework Agreement, the Bidder may opt to furnish the performance security or a Performance Securing Declaration as defined under the Guidelines on the Use of Framework Agreement.}

4. Inspection and Tests

The Procuring Entity or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Project [n/a] *{[Include if Framework Agreement will be used:]*or Framework Agreement} specifications at no extra cost to the Procuring Entity in accordance with the Generic Procurement Manual. In addition to tests in the **SCC, Section VII (Technical Specifications)** shall specify what inspections and/or tests the Procuring Entity requires, and where they are to be conducted. The Procuring Entity shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.

All reasonable facilities and assistance for the inspection and testing of Goods, including access to drawings and production data, shall be provided by the Supplier to the authorized inspectors at no charge to the Procuring Entity.

5. Warranty

5.1 In order to assure that manufacturing defects shall be corrected by the Supplier, a warranty shall be required from the Supplier as provided under Section 62.1 of the 2016 revised IRR of RA No. 9184.

5.2 The Procuring Entity shall promptly notify the Supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the Supplier shall, repair or replace the defective Goods or parts thereof without cost to the Procuring Entity, pursuant to the Generic Procurement Manual.

6. Liability of the Supplier

The Supplier's liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

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

Section V. Special Conditions of Contract

Notes on the Special Conditions of Contract

Similar to the BDS, the clauses in this Section are intended to assist the Procuring Entity in providing contract-specific information in relation to corresponding clauses in the GCC found in Section IV.

The Special Conditions of Contract (SCC) complement the GCC, specifying contractual requirements linked to the special circumstances of the Procuring Entity, the Procuring Entity's country, the sector, and the Goods purchased. In preparing this Section, the following aspects should be checked:

- a. Information that complements provisions of the GCC must be incorporated.
- b. Amendments and/or supplements to provisions of the GCC as necessitated by the circumstances of the specific purchase, must also be incorporated.

However, no special condition which defeats or negates the general intent and purpose of the provisions of the GCC should be incorporated herein.

Special Conditions of Contract

GCC Clause	
1	<p><i>[List here any additional requirements for the completion of this Contract. The following requirements and the corresponding provisions may be deleted, amended, or retained depending on its applicability to this Contract:]</i></p> <p>Delivery and Documents –</p> <p>For purposes of the Contract, “EXW,” “FOB,” “FCA,” “CIF,” “CIP,” “DDP” and other trade terms used to describe the obligations of the parties shall have the meanings assigned to them by the current edition of INCOTERMS published by the International Chamber of Commerce, Paris. The Delivery terms of this Contract shall be as follows:</p> <p><i>[For Goods supplied from abroad, state:]</i> “The delivery terms applicable to the Contract are DDP delivered <i>[indicate place of destination]</i>. In accordance with INCOTERMS.”</p> <p><i>[For Goods supplied from within the Philippines, state:]</i> “The delivery terms applicable to this Contract are delivered <i>[indicate place of destination]</i>. Risk and title will pass from the Supplier to the Procuring Entity upon receipt and final acceptance of the Goods at their final destination.”</p> <p>Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in Section VI (Schedule of Requirements).</p> <p>For purposes of this Clause the Procuring Entity’s Representative at the Project Site is ENGR. ANTONIO P. MENDOZA AGM For Engineering MIAA, Engineering</p> <p>Incidental Services –</p> <p>The Supplier is required to provide all of the following services, including additional services, if any, specified in Section VI. Schedule of Requirements:</p> <p><i>[n/a] Select appropriate requirements and delete the rest.</i></p> <ol style="list-style-type: none"> a. performance or supervision of on-site assembly and/or start-up of the supplied Goods; b. furnishing of tools required for assembly and/or maintenance of the supplied Goods; c. furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; d. performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and

	<p>e. training of the Procuring Entity’s personnel, at the Supplier’s plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.</p> <p>f. <i>[Specify additional incidental service requirements, as needed.]</i></p> <p>The Contract price for the Goods shall include the prices charged by the Supplier for incidental services and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.</p> <p>Spare Parts –</p> <p>The Supplier is required to provide all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier:</p> <p><u>[n/a]</u> <i>Select appropriate requirements and delete the rest.</i></p> <ol style="list-style-type: none"> 1. Such spare parts as the Procuring Entity may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under this Contract; and 2. In the event of termination of production of the spare parts: <ol style="list-style-type: none"> i. advance notification to the Procuring Entity of the pending termination, in sufficient time to permit the Procuring Entity to procure needed requirements; and ii. following such termination, furnishing at no cost to the Procuring Entity, the blueprints, drawings, and specifications of the spare parts, if requested. <p>The spare parts and other components required are listed in Section VI (Schedule of Requirements) and the costs thereof are included in the contract price.</p> <p>The Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spare parts or components for the Goods for a period of <i>[indicate here the time period specified. If not used indicate a time period of three times the warranty period]</i>.</p> <p>Spare parts or components shall be supplied as promptly as possible, but in any case, within <i>[insert appropriate time period]</i> months of placing the order.</p>

	<p>Packaging –</p> <p>The Supplier shall provide such packaging of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in this Contract. The packaging shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packaging case size and weights shall take into consideration, where appropriate, the remoteness of the Goods’ final destination and the absence of heavy handling facilities at all points in transit.</p> <p>The packaging, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified below, and in any subsequent instructions ordered by the Procuring Entity.</p> <p>The outer packaging must be clearly marked on at least four (4) sides as follows:</p> <p>Name of the Procuring Entity Name of the Supplier Contract Description Final Destination Gross weight Any special lifting instructions Any special handling instructions Any relevant HAZCHEM classifications</p>
	<p>A packaging list identifying the contents and quantities of the package is to be placed on an accessible point of the outer packaging if practical. If not practical the packaging list is to be placed inside the outer packaging but outside the secondary packaging.</p> <p>Transportation –</p> <p>Where the Supplier is required under Contract to deliver the Goods CIF, CIP, or DDP, transport of the Goods to the port of destination or such other named place of destination in the Philippines, as shall be specified in this Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.</p> <p>Where the Supplier is required under this Contract to transport the Goods to a specified place of destination within the Philippines, defined as the Project Site, transport to such place of destination in the Philippines, including insurance and storage, as shall be specified in this Contract, shall be arranged by the Supplier, and related costs shall be included in the contract price.</p>

	<p>Where the Supplier is required under Contract to deliver the Goods CIF, CIP or DDP, Goods are to be transported on carriers of Philippine registry. In the event that no carrier of Philippine registry is available, Goods may be shipped by a carrier which is not of Philippine registry provided that the Supplier obtains and presents to the Procuring Entity certification to this effect from the nearest Philippine consulate to the port of dispatch. In the event that carriers of Philippine registry are available but their schedule delays the Supplier in its performance of this Contract the period from when the Goods were first ready for shipment and the actual date of shipment the period of delay will be considered force majeure.</p> <p>The Procuring Entity accepts no liability for the damage of Goods during transit other than those prescribed by INCOTERMS for DDP deliveries. In the case of Goods supplied from within the Philippines or supplied by domestic Suppliers risk and title will not be deemed to have passed to the Procuring Entity until their receipt and final acceptance at the final destination.</p> <p>Intellectual Property Rights –</p> <p>The Supplier shall indemnify the Procuring Entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof.</p>
2.2	<p><input checked="" type="checkbox"/> [If partial payment is allowed, state] “The terms of payment shall be as follows: <u>refer to Terms of Reference (TOR).</u>”</p>
4	<p><input checked="" type="checkbox"/> The inspections and tests that will be conducted are: <u>refer to Terms of Reference (TOR).</u></p>

Section VI. Schedule of Requirements

The delivery schedule expressed as weeks/months stipulates hereafter a delivery date which is the date of delivery to the project site.

Item Number	Description	Quantity	Total	Delivered, Weeks/Months

[Use this form for Framework Agreement:]

Framework Agreement List

Limited to repeatedly required goods and services that are identified to be necessary and desirable, but, by its nature, use or characteristic, the quantity and/ or exact time of need cannot be accurately pre-determined and are not advisable to be carried in stock.

Prepared by the End-User, attached to the APP and submitted to the BAC for the approval of the HOPE.

<i>FRAMEWORK AGREEMENT LIST (AGENCY)</i>			
<i>Item / Service Type and nature of each item/service</i>	<i>Cost per item or service</i>	<i>Maximum Quantity</i>	<i>Total Cost per Item</i>
<i>TOTAL (Approved Budget for the Contract)</i>			
<i>Expected delivery timeframe after receipt of a Call-Off.</i>	<i>Within [no. of days] calendar days upon issuance of Call-off.</i>		
<i>Remarks</i>	<i>Indicate here any other appropriate information as may be necessary.</i>		
<i>SIGNATURE OVER PRINTED NAME</i>	<i>POSITION</i>	<i>DEPARTMENT/DIVISION</i>	

Section VII. Technical Specifications

Notes for Preparing the Technical Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Procuring Entity without qualifying their Bids. In the context of Competitive Bidding, the specifications (*e.g.* production/delivery schedule, manpower requirements, and after-sales service/parts, descriptions of the lots or items) must be prepared to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of transparency, equity, efficiency, fairness, and economy in procurement be realized, responsiveness of bids be ensured, and the subsequent task of bid evaluation and post-qualification facilitated. The specifications should require that all items, materials and accessories to be included or incorporated in the goods be new, unused, and of the most recent or current models, and that they include or incorporate all recent improvements in design and materials unless otherwise provided in the Contract.

Samples of specifications from previous similar procurements are useful in this respect. The use of metric units is encouraged. Depending on the complexity of the goods and the repetitiveness of the type of procurement, it may be advantageous to standardize the General Technical Specifications and incorporate them in a separate subsection. The General Technical Specifications should cover all classes of workmanship, materials, and equipment commonly involved in manufacturing similar goods. Deletions or addenda should then adapt the General Technical Specifications to the particular procurement.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for equipment, materials, and workmanship, recognized Philippine and international standards should be used as much as possible. Where other particular standards are used, whether national standards or other standards, the specifications should state that equipment, materials, and workmanship that meet other authoritative standards, and which ensure at least a substantially equal quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the Special Conditions of Contract or the Technical Specifications.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Technical Specifications to specific standards and codes to be met by the goods and materials to be furnished or tested, the provisions of the latest edition or revision of the relevant standards and codes shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relate to a particular country or region, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable.

Reference to brand name and catalogue number should be avoided as far as possible; where unavoidable they should always be followed by the words “*or at least equivalent.*” References to brand names cannot be used when the funding source is the GOP.

Where appropriate, drawings, including site plans as required, may be furnished by the Procuring Entity with the Bidding Documents. Similarly, the Supplier may be requested to provide drawings or samples either with its Bid or for prior review by the Procuring Entity during contract execution.

Bidders are also required, as part of the technical specifications, to complete their statement of compliance demonstrating how the items comply with the specification.

Technical Specifications

Item	Specification	Statement of Compliance
		<p><i>[Bidders must state here either “Comply” or “Not Comply” against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of “Comply” or “Not Comply” must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer’s un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidder’s statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the applicable laws and issuances.]</i></p>
1 Lot	Refer to Terms of Reference (TOR)	

[Use this form for Framework Agreement:]

Technical Specifications

<i>TECHNICAL SPECIFICATIONS</i>			
<i>Item / Service</i>	<i>Maximum Quantity</i>	<i>Technical Specifications / Scope of Work</i>	<i>Statement of Compliance</i>
			<p><i>[Bidders must state here either “Comply” or “Not Comply” against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of “Comply” or “Not Comply” must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer’s un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidder’s statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution.]</i></p>

Statement of all Government & Private Contract ongoing which are similar or not similar in nature and complexity as the Project subject of the Bidding

Business Name: _____

Business Address: _____

Name of Contract	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Bidder's Role		a. Amount at Award	a. Date Awarded
			Description	%	b. Amount at Completion	b. Contract Effectivity
Government						
Private						

Submitted by: _____
(Print Name and Signature)

Designation: _____

Date: _____

Statement of Single Largest Contract completed within **2019-Present which are similar in nature and complexity as the Project subject of the Bidding**

Business Name: _____

Business Address: _____

Name of Contract	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Bidder's Role		a. Amount at Award b. Amount at Completion	a. Date Awarded b. Date Completed
			Description	%		
Government						
Private						

Note: **This statement shall be supported by the following:**

- 1. Official Receipt from the owner/client or**
- 2. Certification of End-user's Acceptance or**
- 3. Sales Invoice**

Submitted by: _____
(Print Name and Signature)

Designation: _____

Date: _____

Bid Form for the Procurement of Goods
[shall be submitted with the Bid]

BID FORM

Date : _____
 Project Identification No. : _____

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

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to *[supply/deliver/perform]* *[description of the Goods]* in conformity with the said PBDs for the sum of _____ *[total Bid amount in words and figures]* or the total calculated bid price, as evaluated and corrected for computational errors, and other bid modifications in accordance with the Price Schedules attached herewith and made part of this Bid. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties]*, which are itemized herein or in the Price Schedules,

If our Bid is accepted, we undertake:

- a. to deliver the goods in accordance with the delivery schedule specified in the Schedule of Requirements of the Philippine Bidding Documents (PBDs);
- b. to provide a performance security in the form, amounts, and within the times prescribed in the PBDs;
- c. to abide by the Bid Validity Period specified in the PBDs and it shall remain binding upon us at any time before the expiration of that period.

[Insert this paragraph if Foreign-Assisted Project with the Development Partner:

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and address of agent	Amount and Purpose of Commission or gratuity
_____	_____
_____	_____
_____	_____

(if none, state “None”)]

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your Notice of Award, shall be binding upon us.

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

We certify/confirm that we comply with the eligibility requirements pursuant to the PBDs.

The undersigned is authorized to submit the bid on behalf of *[name of the bidder]* as evidenced by the attached *[state the written authority]*.

We acknowledge that failure to sign each and every page of this Bid Form, including the attached Schedule of Prices, shall be a ground for the rejection of our bid.

Name: _____

Legal capacity: _____

Signature: _____

Duly authorized to sign the Bid for and behalf of: _____

Date: _____

Bid Securing Declaration Form

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

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

BID SECURING DECLARATION **Project Identification No.: *[Insert number]***

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

I/We, the undersigned, declare that:

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

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

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]

[Insert signatory's legal capacity]

Affiant

[Jurat]

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

Omnibus Sworn Statement (Revised)

[shall be submitted with the Bid]

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

AFFIDAVIT

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

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

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

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

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

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

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

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

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

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

6. *[Select one, delete the rest:]*

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

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

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

7. *[Name of Bidder]* complies with existing labor laws and standards; and
8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:
 - a. Carefully examining all of the Bidding Documents;
 - b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
 - c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
 - d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.
9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.
10. **In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.**

IN WITNESS WHEREOF, I have hereunto set my hand this ___ day of ___, 20___ at _____, Philippines.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]

[Insert signatory's legal capacity]

Affiant

[Jurat]

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

PRICE SCHEDULE FORM

PROJECT: REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

BILL OF QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST
I	CUTTING OF ASPHALT PAVEMENT	1.00	l.m.	
II	EXCAVATION AND DISPOSAL	1.00	cu.m.	
III	SUB-GRADE PREPARATION	1.00	sq.m.	
IV	EMBANKMENT	1.00	cu.m.	
V	MILLING WORKS	1.00	cu.m.	
VI	AGGREGATE SUB-BASE COURSE	1.00	cu.m.	
VII	AGGREGATE BASE COURSE	1.00	cu.m.	
VIII	CEMENT TREATED BASE	1.00	cu.m.	
IX	BITUMINOUS PRIME COAT	1.00	m.t.	
X	BITUMINOUS TACK COAT	1.00	m.t.	
XI	PORTLAND CEMENT CONCRETE PAVEMENT	1.00	cu.m.	
XII	A. ASPHALT CONCRETE MIX	1.00	m.t.	
	B. ASPHALT CONCRETE MIX WITH ANTI-RUTTING ADDITIVES (ARA)	1.00	m.t.	

Submitted By:

Name and Signature of Authorized Representative

Name of Company

Date

General Notes:

1. All items not included in the Price Schedule Form but necessary for the completion of the project shall be supplied by the Contractor at no Cost to the MIAA.
2. Use Excel In the computation of bid prices, the centavo component must be rounded off to the nearest 2 decimal points.
3. Items and Specifications should strictly conform to the Terms of Reference.

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM			ASSUMED QUANTITY	
I	ASPHALT PAV'T. SAW CUTTING (t=100mm)				l.m.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)	
TOTAL FOR MATERIALS					
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)	
TOTAL FOR EQUIPMENT					
LABOR	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST	
TOTAL FOR LABOR					
A. DIRECT COST					
B. VAT 12%					
TOTAL COST					
UNIT COST					

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

UNIT PRICE ANALYSIS				
(in Pesos)				
NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX				
ITEM #	NAME OF ITEM			ASSUMED QUANTITY
II	EXCAVATION AND DISPOSAL			cu.m.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
BACKHOE				
DUMP TRUCK				
SERVICE VEHICLE				
TOWERLIGHT/GENSET				
MINOR TOOLS				
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
FOREMAN				
SAFETY OFFICER				
LABORER				
TOTAL FOR LABOR				
	A. DIRECT COST			
	B. VAT 12%			
	TOTAL COST			
	UNIT COST			

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM			ASSUMED QUANTITY	
IV	EMBANKMENT				CU.M.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)	
	EMBANKMENT MATERIALS				
	(LOOSE VOLUME)				
TOTAL FOR MATERIALS					11,667.83
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)	
	ROAD ROLLER				
	ROAD GRADER				
	WATER TRUCK				
	TAMPING RAMMER				
	TOWERLIGHT/GENSET				
	SERVICE VEHICLE				
	TRAILER TRUCK				
	MINOR TOOLS				
TOTAL FOR EQUIPMENT					
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST	
	FOREMAN				
	SAFETY OFFICER				
	LABORER				
TOTAL FOR LABOR					
	A. DIRECT COST				
	B. VAT 12%				
	TOTAL COST				
	UNIT COST				

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM			ASSUMED QUANTITY	
V	MILLING WORKS			4.00	CU.M.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)	
TOTAL FOR MATERIALS					
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)	
TOTAL FOR EQUIPMENT					
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST	
TOTAL FOR LABOR					
				A. DIRECT COST	
				B. VAT 12%	
				TOTAL COST	
				UNIT COST	

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM	ASSUMED QUANTITY		
VI	AGGREGATE SUB-BASE COURSE	CU.M.		
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	AGGREGATE SUB-BASE COURSE	CU.M		
	LOOSE VOLUME			
TOTAL FOR MATERIALS				13,504.00
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	PNEUMATIC TIRE ROLLER			
	ROAD GRADER			
	WATER TRUCK			
	TAMPING RAMMER			
	SERVICE VEHICLE			
	TOWERLIGHT/GENSET			
	TRAILER TRUCK			
	MINOR TOOLS			
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN			
	SAFETY OFFICER			
	LABORER			
TOTAL FOR LABOR				
	A. DIRECT COST			
	B. VAT 12%			
	TOTAL COST			
	UNIT COST			

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM	ASSUMED QUANTITY		
VII	AGGREGATE BASE COURSE			C.U.M.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	AGGREGATE BASE COURSE		CU.M	
	LOOSE VOLUME			
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	PNEUMATIC TIRE ROLLER			
	ROAD GRADER			
	WATER TRUCK			
	TAMPING RAMMER			
	SERVICE VEHICLE			
	TOWERLIGHT/GENSET			
	TRAILER TRUCK			
	MINOR TOOLS			
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN			
	SAFETY OFFICER			
	LABORER			
TOTAL FOR LABOR				
	A. DIRECT COST			
	B. VAT 12%			
	TOTAL COST			
	UNIT COST			

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

	ITEM #	NAME OF ITEM		ASSUMED QUANTITY	
	VIII	CEMENT TREATED BASE			CU.M.
	MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	CEMENT TREATED BASE		CU.M		
TOTAL FOR MATERIALS					
	EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	BASE PAVER				
	ROAD ROLLER (TANDEM)				
	ROAD ROLLER (PNEUMATIC)				
	PLATE COMPACTOR				
	TOWERLIGHT/GENSET				
	WATER TRUCK				
	BACK HOE				
	SERVICE VEHICLE				
	TRAILER TRUCK				
	MINOR TOOLS				
TOTAL FOR EQUIPMENT					
	LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN				
	SAFETY OFFICER				
	LABORER				
	MASON				
TOTAL FOR LABOR					
		A. DIRECT COST			
		B. VAT 12%			
		TOTAL COST			
		UNIT COST			

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM	ASSUMED QUANTITY		
IX	BITUMINOUS PRIME COAT			M.T
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	BITUMINOUS PRIME COAT, MC-70	M.T		
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	ASPHALT DISTRIBUTOR			
	SERVICE VEHICLE			
	MINOR TOOLS			
TOTAL FOR EQUIPMENT				-
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN			
	SAFETY OFFICER			
	LABORER			
TOTAL FOR LABOR				
		A. DIRECT COST		
		B. VAT 12%		
		TOTAL COST		
		UNIT COST		

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM		ASSUMED QUANTITY	
X	BITUMINOUS TACK COAT			DRUM
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	BITUMINOUS TACK COAT, SS-1	DRUMS		
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	ASPHALT DISTRIBUTOR			
	SERVICE VEHICLE			
	MINOR TOOLS			
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN			
	SAFETY OFFICER			
	LABORER			
TOTAL FOR LABOR				
		A. DIRECT COST		
		B. VAT 12%		
		TOTAL COST		
		UNIT COST		

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM		ASSUMED QUANTITY	
XI	PORTLAND CEMENT CONCRETE PAVEMENT			CU.M
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
READYMIX CONCRETE 725F		CU.M		
G-1 @28 DAYS				
DOWEL BARS		PCS		
CURING COMPOUND		DRUM		
ASPHALT SEALANT		LITERS		
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
CONCRETE SCREEDER				
CONCRETE VIBRATOR				
BAR CUTTER				
TOWER LIGHT/GENSET				
CONCRETE CUTTER				
WATER TRUCK				
PROFANE BURNER				
SERVICE VEHICLE				
TRAILER TRUCK				
MINOR TOOLS				
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
FOREMAN				
SAFETY OFFICER				
MASON				
LABORER				
TOTAL FOR LABOR				
	A. DIRECT COST			
	B. VAT 12%			
	TOTAL COST			
	UNIT COST			

UNIT PRICE ANALYSIS

(in Pesos)

NAME OF PROJECT : REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX

ITEM #	NAME OF ITEM	ASSUMED QUANTITY		
XII	B. ASPHALT CONCRETE MIX W/ ARA			M.T.
MATERIALS	QUANTITY	UNIT	UNIT PRICE (in peso)	FINANCIAL COST (in peso)
	ASPHALT MIX WITH ANTI-RUTTING	M.T		
	ADDITIVE (ARA)			
TOTAL FOR MATERIALS				
EQUIPMENT	NO. OF UNITS	NO. OF HOURS	HOURLY RATE	FINANCIAL COST (in peso)
	ROAD ROLLER (TANDEM)			
	ROAD ROLLER (PNEUMATIC)			
	ASPHALT PAVER			
	WATER TRUCK			
	PLATE COMPACTOR			
	TOWERLIGHT/GENSET			
	SERVICE VEHICLE			
	PROFANE BURNER			
	TRAILER TRUCK			
	AIR COMPRESSOR			
	MINOT TOOLS			
TOTAL FOR EQUIPMENT				
LABOR	NO. OF UNITS	NO. OF HOURS	DAILY RATE	FINANCIAL COST
	FOREMAN			
	SAFETY OFFICER			
	ASPHALT RAKER			
	LABORER			
TOTAL FOR LABOR				
A. DIRECT COST				
B. VAT 12%				
TOTAL COST				
UNIT COST				

TERMS OF REFERENCE

MANILA INTERNATIONAL AIRPORT AUTHORITY

Ninoy Aquino International Airport
(NAIA)

TERMS OF REFERENCE

**REPAIR AND MAINTENANCE OF PAVEMENTS
WITHIN NINYOY AQUINO INTERNATIONAL AIRPORT COMPLEX**

I. INTRODUCTION

The Manila International Airport Authority (MIAA) requires the services of a contractor/supplier to undertake the Repair and Maintenance of Pavements within NAIA Complex for six (6) months.

The MIAA, therefore, intends to engage a qualified contractor/supplier (PCAB Registered), which has the expertise, equipment and manpower and has undertaken similar works particularly in pavement repair.

II. QUALIFICATION OF CONTRACTORS/SUPPLIERS

Qualification of contractors/suppliers shall be subject to the following requirements:

1. Must have a PCAB License category:
 - a. Principal Classification and Category: General Engineering B
 - b. Registration Particulars: Medium A (Road, Highways, Pavement, Railways, Airport Horizontal Structure and Bridges)
2. The contractors/suppliers must have a single similar project at least 50% of the ABC for asphalt paving for airport horizontal works.
3. Only contractors/suppliers of asphalt and concrete products with batching plant within 20 km radius from the intersection of Runway 06/24 and Runway 13/31 since the Supply Support Agreement (SSA) is intended primarily for emergency works and the distance is vital as follows:
 - a. Shorter travel time (with traffic time considered) from 30 to 45 minutes for immediate response.
 - b. The distance is ideal for calculated loss on temperature and ensure that asphalt mix delivered on site will be at least 150°C for workability (laying and compaction)
 - c. These conditions need to be complied with, to have satisfactory repair works result especially if the repair will require more than the minimum of 1 metric ton delivery of asphalt mix and more than one (1) trip is needed.
4. Technical personnel with experience in horizontal work especially in asphalt and concrete repair with a minimum qualification as follows:
 - a. Engineer- must be a licensed Civil Engineer with at least two (2) years of relevant experience.
 - b. Safety Officer- must have a COSH Certificate issued by DOLE accredited COSH training provider.
 - c. Foreman- must have at least two (2) years of experience in asphalt and concrete horizontal repair works.
5. Complete list of application equipment as listed in Figure 1.
6. Knowledge and experience in infrastructure development and safety standards.
7. Must have equipment which will be deployed in MIAA on a 24/7 basis, should be owned or leased by the supplier and must be in A1 condition. A1 condition refers to the following physical and functionality aspects:

Figure 1.

**LIST OF EQUIPMENTS AND SECONDARY TOOLS FOR
REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX**

(ON SITE) 24/7

	DESCRIPTION	QUANTITY	CAPACITY
1	Backhole / Excavator	1.0 unit	0.70 to 1.62 cu.m. cap.
2	Road Roller (Combination)	1.0 unit	7.0 to 20 tons
3	Dump Truck	1.0 unit	15 to 20 Tons
4	Milling Machine	1.0 unit	1.0 to 1.30m Width
5	Service Vehicle	1.0 unit	2,000 kgs min.
6	Water Truck	1.0 unit	10,000 lit. min.
7	Air compressor with Jack Hammer	1.0 unit	125-365 CFM- min.
8	Flood light	1.0 unit	6, 000 watts
9	Plate Compactor	1.0 unit	3.3 H.P / 5800 UPH
10	Tamping Rammer	1.0 unit	3.0 H.P. / 16.5 KN-impact force
11	Concrete Cutter	1.0 unit	7.5 H.P. / 12" blade radius. Min.
12	Vacuum Sweeper	1.0 unit	6 cu.m. min. hopper cap., 90 inc. min. pick-up head
13	Profane Gas Burner	1.0 unit	15 kgs - LPG
14	Warning Sign	1.0 unit	
	X-Marker	4 unit	
	Rubber Cone	20 pcs.	
15	Survey Instruments (Total Station / Level)	1.0 unit	

(ON CALL WITHIN 3 HOURS UPON REQUEST)

1	Asphalt Paver	1.0 unit	2.5 to 8.5 m. width
2	Asphalt Distributor	1.0 unit	5,400 lit. cap.
3	Payloader	1.0 unit	2.5 to 3.5 cu.m. cap.
4	Pneumatic Roller	1.0 unit	15 tons min
5	Tandem Roller	1.0 unit	10 to 20 tons
6	Cargo Truck	1.0 unit	10 tons min.
7	Trailer Truck	1.0 unit	40 tons min.
8	Skid Loader with Broom	1.0 unit	0.42-0.50 cu.m. cap.
9	Transit Mixer	1.0 unit	6.0 to 8.0 cu.m. cap.
10	Screed Finisher	1.0 unit	7.5 m. width
11	Concrete Vibrator	1.0 unit	40-50 mm. ϕ

NOTE: Equipment that are required to be deployed on 24/7 operations should be owned/leased by the contractor supplier.

- a. All wiring and lighting are intact, working without fraying or damage.
- b. Buttons, switches, and controls are fully functional and responsive.
- c. Good engine and transmission condition, without oil, gas, and hydraulic leaks.
- d. Tires are not worn out.

III. OBJECTIVE OF THE SERVICES

The general objective of the services is to implement the immediate repair of potholes and soft spots including other related work regardless of its materials, quantities at any given time as instructed by MIAA. The asphalt, concrete and other materials to be supplied shall be in accordance with the required specifications.

IV. SCOPE OF SERVICES

The contractor/supplier shall furnish all necessary manpower, equipment, tools materials, supervision and other items necessary to perform the following:

- Cutting of the affected area
- Removal of deteriorated asphalt/concrete including soft sub-base materials, if necessary
- Milling of uneven surface, if necessary
- Replacement of embankment, base and sub-base materials if required
- Surface preparation and application of Cement Treated Base (CTB), if required
- Application of Bituminous Tack Coat and Prime Coat should be Furnished, Delivered and Sprayed (FDS), if required
- Supply and application of Bituminous Concrete Course should be Furnished, Delivered, Laid, Rolled and Compacted (FDLRC), if required
- Supply and laying of Portland Cement Concrete Pavement (PCCP) , if required
- Supply and laying of Asphalt Mix with or without Anti-Rutting Additives (ARA) depending on the area covered by repair, if required.

The contractor/supplier shall supply and deliver the material regardless of required volume in order to complete the work on time. All completed repairs shall be subject to inspection and acceptance by MIAA.

V. SCHEDULE OF REQUIREMENTS:

The following are the minimum requirements:

- 1) Minimum delivery - 1.0 MT (asphalt)
- 2) Minimum delivery - 6.0 cu. m. (concrete)
- 3) Technical schedule of delivery
 - The delivery of work shall be on a per NOTAM basis or per instruction of the Engineer on a 24/7 basis.

- Equipment & Manpower, both stand by on field office, equipment with corresponding operator.

Manpower

- 1 – Engineer
- 1 – Foreman
- 11 – Laborers

Equipment

- 15 – units of Equipment (listed in Tab E) with operators

VI. SPECIFICATION

See attached Materials Specifications (Tab D).

VII. GUIDELINES

The contractor/supplier shall establish a complete quality control program to adhere with the following requirements, while carrying out its functions and responsibilities during the implementation of the contractor/supplier services.

A. Quality Assurance

The contractor/supplier shall establish a system of control program to assure that the requirements of the contract are provided as specified. One copy of the supplier's quality control program shall be submitted to the Authority prior to the start of the contracted services. An updated copy must be provided as changes occur. The program shall include at least the following:

- a. An inspection system, covering all the services to be performed under the contract. This must specify areas to be inspected on either a scheduled or unscheduled basis of such personnel who will perform the inspection.
- b. A method for identifying deficiencies in the quality of services rendered before the level of performance becomes unacceptable.
- c. MIAA's representative shall monitor the supplier's performance under the contract.

B. Safety and Security Measures

The contractor/supplier shall adhere to all standard measures and requirements stipulated by the MIAA and shall, under no circumstances, violate standard rules and regulations.

- a. The contractor/supplier and its employees shall comply, at all times, with all security and safety requirements imposed by the airport management while within the airport premises.
- b. The contractor/supplier is instructed that aircraft operations and movements, for the safety thereof, shall at all times take precedence over any services operation.
- c. The contractor/supplier shall have full coordination to the offices concerned before initiating any activity within the airfield area. An authorized radio operator is present at all times to conduct radio communications with the Control Tower.

- d. While work is being performed in the restricted project area, all personnel and operated equipment shall at all times be transportable and escorted for the whole duration of activity.
- e. All contractor's/supplier's personnel involved and physically present at the project site, especially the runways and taxiways must at all times wear reflectorized cover all and helmets among others in international bright orange or its equivalent color.
- f. Get access pass and all staff to pass airport security requirements.

C. Facilities and Service Utilities

MIAA shall provide space, without cost to the contractor/supplier for its field office, storage and quarter facilities excluding service utilities.

- a. The contractor/supplier shall not make any alteration to the space provided except with the permission of the MIAA.
- b. Follow rules and regulations on proper use of MIAA property/space.

VIII. WORK SCHEDULE

The contractor/supplier shall properly perform the work in accordance with the principles of Airport standard and practice and shall comply with the following tasks in the contract services:

- a. The contractor/supplier shall undertake the work at any given time as specified by MIAA.
- b. The work at runway, taxiways and ramps are conducted mostly during nighttime, after the last departure and/or arrival flights with appropriate NOTAM or advice from the MIAA.
- c. Or any other tasks within the Scope of Works as may be instructed by MIAA.

IX. MANPOWER SCHEDULE

The contractor/supplier shall at all times provide supervisory and working personnel, sufficient and efficient in number to properly accomplish all necessary work. The contractor/supplier shall designate a competent representative who shall be available at any time to oversee the working operation being carried out and to receive instructions from authorized MIAA officials. The contractor's/supplier's authorized representative shall be responsible for the overall management and coordination of work to be performed as per contract provisions and shall act as the focal point with the authority. The contractor's/supplier's authorized representative shall have full authority to act thereat on behalf of the contractor's/supplier's name while on the premises. Furthermore, the contractor/supplier shall have full coordination with the MIAA prior to implementation of the work in the Terms of Reference.

1. Identification

The contractor's/supplier's personnel shall be distinctly recognized while within the airport premises. This shall be accomplished through the use of uniforms with company name, logo and proper identifications. All costs for uniforms, badges and other accessories shall be borne by the supplier.

2. Workload

The contractor/supplier shall provide sufficient personnel to complete the work on time as required by the MIAA.

3. Benefits

The contractor/supplier must comply with the laws on wages, incentives and other benefits.

X. EQUIPMENT SCHEDULE

The contractor/supplier shall also provide sufficient number of equipment to accomplish all necessary works. The equipment must be at all times ready, operational and in satisfactory condition to perform the tasks and must be able to be deployed or mobilized in case of emergency requests. All equipment to be provided by the contractor/supplier shall be used exclusively for the contracted services.

In case of equipment breakdown, the contractor/supplier shall provide a back-up equipment necessary to comply with its commitment.

XI. DURATION OF CONTRACT

The contract shall be from April 2024 to September 2024, commencing on the date of acceptance of the Notice to Proceed (NTP) by the awarded supplier or on the date specified in the same notice.

XII. PERSONNEL SERVICES

The contractor/supplier warrants and undertakes to render free and harmless from any demand, suit or course of action, whether judicial or extra judicial, the MIAA, its officers and representatives, from any claim for Social Security System benefits, unpaid wages, vacation leave with pay, sick leave with pay, overtime wages, workmen's compensation claims for injuries and/or death as a result of whatever fortuitous event while in the employment of the contractor/supplier which may be filed by employees of the contractor/supplier while in the discharge of their normal duties outlined herein, meal

allowance, medication and hospitalization of the employees. It is understood that all such claim/s shall be for the exclusive account of the contractor/supplier.

XIII. PAYMENT SCHEDULE

Payment shall be based on the actual materials and quantities indicated in the Work Order/Engineer's Instruction and based on the contract unit cost per item. The quantity of described items present shall be paid based on the contract unit price for the pay item. The unit price shall be inclusive of all labor, tools and equipment including mobilization of equipment and materials and all other incidental costs necessary to complete the work on a per item basis. The prices quoted shall remain fixed for the duration of the contract.

Payment shall be in accordance with the following manner:

1. Monthly Payment (per monthly accomplishment)
2. Retention Fee – An amount equivalent to one percent (1%) of completed works per monthly accomplishment are to be retained and to be released after one (1) year to cover contractor's/supplier's defects warranty period. The contractor/supplier shall submit a request for release of retention the following month after the warranty period.

XIV. WARRANTY

Materials and Workmanship:

The contractor/supplier shall warrant the materials and workmanship from any defects for a period not less than one (1) year.

Performance Bond:

The contractor/supplier is required to post an acceptable Performance Security under the schedule prescribed in Section 39.2 of IRR No. 9184 to be submitted to the Legal Office.

The performance security shall be in an amount equal to a percentage of the total contract price in accordance with the following schedule:

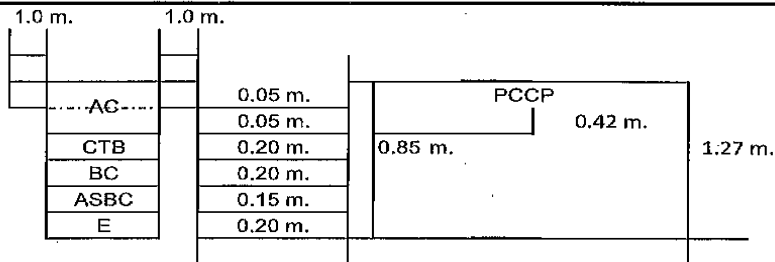
Form of Performance Security	Amount of Performance Security (Equal to Percentage of the Total Contract Price)
a) Cash or cashier's/manager's check issued by a Universal or Commercial Bank	Goods and Consulting Services – Five percent (5%)
b) Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: Provided, however, that it shall be confirmed or authenticated by A Universal or Commercial Bank, if issued by a foreign bank.	Infrastructure Projects – Ten percent (10%)
c) Surety bond callable upon demand issued	Thirty percent (30%)

Figure 2.

REPAIR AND MAINTENANCE OF PAVEMENTS WITHIN NAIA COMPLEX

EVALUATION CRITERIA

ITEM NO.	DESCRIPTION	UNIT	UNIT COST (A)	QUANTITY COMPUTATION (B)	SCORE (A x B)
I.	Cutting of Asphalt Pavements	LM		LM = 1.0 m x 4.0 = 4.0 lm	
II.	Excavation and Disposal	CU.M.		V = 1.0 m ² x 1.27 m = 1.27 m ³	
III.	Sub-Grade Preparation	SQ.M.		A = 1.0 m ² x 1.0 m = 1.0 m ²	
IV.	Embankment	CU.M.		V = 1.0 m ² x 0.20 m = 0.20 m ³	
V.	Milling Works	CU.M.		V = 1.0 m x 4 m x 0.05 m = 0.20 m ³	
VI.	Aggregate Sub-Base Course	CU.M.		V = 1.0 m ² x 0.15 m = 0.15 m ³	
VII.	Aggregate Base Course	CU.M.		V = 1.0 m ² x 0.20 m = 0.20 m ³	
VIII.	Cement Treated Base	CU.M.		V = 1.0 m ² x 0.20 m = 0.20 m ³	
IX.	Bituminous Prime Coat	M.T.		QTY = $\frac{1.0 \text{ m} \times 1.0 \text{ m} \times 1 \text{ (lit./m}^2\text{)}}{1,002.20 \text{ lit./M.T.}}$ = 0.000099 M.T.	
X.	Bituminous Tack Coat	DRUM		QTY = $\frac{1.0 \text{ m}^2 \times 0.75 \text{ (Lit./m}^2\text{)} \times 5.0 \text{ (drums/M.T.)}}{1,002.20 \text{ lit./M.T.}}$ = 0.000035 drums	
XI.	Portland Cement Concrete Pavement (PCCP)	CU.M.		QTY = 7.5 m x 7.5 m x 0.42 = 23.625 m ³	
XII.	a. Asphalt Concrete Mix	M.T.		QTY = 1.0 m ² x 0.05 m x 2.5 (M.T./m ³ .) QTY = 4 m ² x 0.05 m x 2.5 (M.T./m ³ .) = 0.625 M.T.	
	b. Asphalt Concrete Mix with Anti-Rutting Additive (ARA)	M.T.		QTY = 1.0 m ² x 0.05 m x 2.5 (M.T./m ³ .) QTY = 4 m ² x 0.05 m x 2.5 (M.T./m ³ .) = 0.625 M.T.	
TOTAL AGGREGATES SCORE:					



- Note: 1. Unit cost per item shall not be above the ABC unit cost. Unit costing in excess of the ABC unit cost shall be disqualified outright.
2. The contemplated service shall be on a lump sum basis but computed on a per pay item basis. The least aggregate score with all unit costs below the ABC shall therefore be considered the lowest bid price.

by a surety or insurance company duly certified by the Insurance Commission as authorized to issue such security.	
d) Any combination of the foregoing	Proportionate to share of form with respect to total amount of security.

XV. CRITERIA

Contractors/Suppliers must comply with the Evaluation Criteria intended to this Project. The least aggregate score with all unit costs below the ABC shall therefore be considered the lowest bid price as stated in Figure 2.

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27 MAR 2024

Approved:



ERIC JOSE CASTRO INES
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Manila International Airport Authority

APR 03 2024

Figure 1.

**LIST OF EQUIPMENTS AND SECONDARY TOOLS FOR
REPAIR AND MAINTENANCE OF PAVEMENT WITHIN NAIA COMPLEX**

(ON SITE) 24/7

	DESCRIPTION	QUANTITY	CAPACITY
1	Backhole / Excavator	1.0 unit	0.70 to 1.62 cu.m. cap.
2	Road Roller (Combination)	1.0 unit	7.0 to 20 tons
3	Dump Truck	1.0 unit	15 to 20 Tons
4	Milling Machine	1.0 unit	1.0 to 1.30m Width
5	Service Vehicle	1.0 unit	2,000 kgs min.
6	Water Truck	1.0 unit	10,000 lit. min.
7	Air compressor with Jack Hammer	1.0 unit	125-365 CFM- min.
8	Flood light	1.0 unit	6, 000 watts
9	Plate Compactor	1.0 unit	3.3 H.P / 5800 UPH
10	Tamping Rammer	1.0 unit	3.0 H.P. / 16.5 KN-impact force
11	Concrete Cutter	1.0 unit	7.5 H.P. / 12" blade radius. Min.
12	Vacuum Sweeper	1.0 unit	6 cu.m. min. hopper cap., 90 inc. min. pick-up head
13	Profane Gas Burner	1.0 unit	15 kgs - LPG
14	Warning Sign	1.0 unit	
	X-Marker	4 unit	
	Rubber Cone	20 pcs.	
15	Survey Instruments (Total Station / Level)	1.0 unit	

(ON CALL WITHIN 3 HOURS UPON REQUEST)

1	Asphalt Paver	1.0 unit	2.5 to 8.5 m. width
2	Asphalt Distributor	1.0 unit	5,400 lit. cap.
3	Payloader	1.0 unit	2.5 to 3.5 cu.m. cap.
4	Pneumatic Roller	1.0 unit	15 tons min
5	Tandem Roller	1.0 unit	10 to 20 tons

6	Cargo Truck	1.0 unit	10 tons min.
7	Trailer Truck	1.0 unit	40 tons min.
8	Skid Loader with Broom	1.0 unit	0.42-0.50 cu.m. cap.
9	Transit Mixer	1.0 unit	6.0 to 8.0 cu.m. cap.
10	Screed Finisher	1.0 unit	7.5 m. width
11	Concrete Vibrator	1.0 unit	40-50 mm. \emptyset

NOTE: Equipment that are required to be deployed on 24/7 operations should be owned/leased by the contractor supplier.

MATERIAL SPECIFICATIONS

**REPAIR AND MAINTENANCE OF PAVEMENTS
WITHIN NINOY AQUINO INTERNATIONAL
AIRPORT COMPLEX**

SAW CUTTING, DEMOLITION AND REMOVAL OF EXISTING ASPHALT PAVEMENT

SCOPE OF WORKS

This Section covers the saw cutting, demolition, removal and disposal of existing asphalt and under layer to designated disposal area to be proposed by the Contractor and approval by the Engineer.

GENERAL REQUIREMENTS

Prior to the execution of the work, the Contractor shall mark on the existing pavement the area to be cut and demolished as designated on the drawings for the Engineer's approval. All waste materials resulting from the demolition work shall be dumped in the disposal areas designated by the Contractor or as directed by the Engineer. The manner of disposing of materials and location for such purpose shall not create unsightly or objectionable view.

Any damage to adjoining works or existing structures caused by the Contractor shall be restored and/or replaced at his own expenses in a manner and time accepted by the Authority.

CONSTRUCTION METHOD

Equipment

Concrete Saws - The Contractor shall provide sawing equipment adequate in number and power to complete the saw-cutting to the required dimensions. The Contractor shall provide stand-by sawing equipment in good condition and supply of saw blades at the work site at all times during operations. The Contractor shall provide adequate lighting facilities during night operation. All of these set of equipment shall be on the jobsite prior to start of operation and continuously up to the completion of the work.

Saw Blades - The Contractor shall provide blades with sufficient size and diameter (1 m. dia.) to completely cut the required depth of saw cutting as indicated on the drawing.

Mechanical Sweeper - The Contractor shall provide mechanical sweeper to remove all loose materials, dirt and other objectionable materials that maybe generated during this operation.

Method of Demolition

The Contractor shall submit work methodology that includes equipment to be used for asphalt demolition, timetable to finish the required area to be removed, and the safety and protection plan, to the Engineer for approval prior to commencing the work.

Alternative route for safe and continuous aircraft operations shall be prepared and discussed with concerned agencies early so as not to delay the works prior to the effectivity of the corresponding Notice to Airmen (NOTAM)

Disposal of Materials

Waste materials shall be disposed in a manner that will prevent spillage on the pavement or adjacent areas. Any spillage or debris on the pavement along its route shall be removed and cleaned immediately in manner approved by the Engineer.

Protection

Where the safety of all vehicles and aircraft in the demotion area are endangered, traffic barricades or flagmans shall be provided in a manner approved by the Engineers.

MEASUREMENT AND RATES

Measurement

The unit of measurement for saw cutting shall be computed by the "linear meter" from the dimension indicated on the drawings. The unit of measurement for the demolition shall be in cubic meter (m³).

The quantity of the items to be demolished shall be recorded by actual survey and computed by average End-Area Method multiplied by distance between cross-sections.

Rates

The rates shall be full compensation for all plant, materials, labor, equipment, transport, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Specification.

The rates shall further include for:

- multiple handling
- loading and hauling to designated disposal area
- breaking and removal of existing pavement structure
- spreading and leveling to appropriate height level as required

EXCAVATION

SCOPE OF WORKS

The Work under this Section to be carried out by the Contractor consists of execution and completion of Excavation to all required areas of the site.

Excavation shall include support to sides or additional excavation to form sloped sides, working space, disposal of all water (including surface water and groundwater). Segregation of materials suitable for backfilling or embankment all necessary handling, stockpiling, disposal, shaping and trimming completed excavation surface in accordance with the locations, lines, levels, grades and dimension shown on the Drawing and as specified herein.

Excavation includes general oversite excavation to reduce levels, where applicable.

Excavation shall also include excavation in and the necessary diversion or containment of canals or watercourses, with all necessary pumping, draining, sheeting, bracing and the construction, maintenance and subsequent removal of cribs and cofferdams.

Prior to commencement of Excavation, the Contractor shall obtain the Engineer's written instructions regarding work area and depth limits, and approval for the equipment and materials to be used and the method of work execution.

The work method must include proposal for protecting the excavated areas from slippage and the surface run-off of water and other materials to adjacent areas or watercourses. For excavation in a proposed Borrow Pit area, if any, the Contractor's proposed methodology must be at least to the same level as indicated on the Drawings or better, all at the expense of the Contractor.

All materials arising from Excavation shall remain the property of the Employer and the Engineer will direct the Contractor where the materials are to be transported and deposited. Materials generally shall be set aside for re-use, or transported and deposited by the Contractor to locations on the Site.

Where instructed in writing by the Engineer that materials are not required to be retained by the Employer, materials shall be removed by the Contractor from the Site to a disposal area to be selected by the Contractor (and approved by the Engineer) at the expenses of the Contractor.

CONSTRUCTION METHOD

Excavation Generally

The working methods and equipment used for Excavation shall take into account the nature of soils to be encountered, and the presence of the ground water table.

The Contractor is to provide all necessary means for dewatering excavations and maintaining them free of all water, including groundwater or storm water.

Excavation shall be performed carefully to avoid overbreak or unnecessary disturbance of adjacent surfaces. Any overbreak or disturbance caused by excavation operations shall be backfilled and restored by the Contractor at his expense and as directed by the Engineer.

When unsuitable material is excavated below embankments or below normal sub-grade level the void so formed shall be backfilled with suitable materials, compacted in 20 cm layers to 95% of its maximum dry density to the approval of the Engineer.

Slopes in excavations shall be formed and maintained to prevent the formation of standing water. All excavations shall be finished to reasonably smooth and uniform surfaces.

Water from excavations shall not be permitted to flow directly into the existing or new watercourses, ponds or into the new drainage system or other construction work areas.

Where pumping is necessary, the materials in and around the excavations shall not be disturbed by pumping and all slumps shall be formed clear of excavations for permanent work.

Water pumping at all low points shall be provided continuously until the permanent drainage systems are finished and connected to the existing drainage network.

Temporary drains shall be built as excavation progresses.

Effective temporary decantation basins shall be installed before the water is drained into recently completed or existing drainage systems. Murky or polluted storm water shall not be permitted to drain directly into adjacent protected areas.

The drainage network for the water coming from the work areas, whether on or outside the Site, shall be permanently protected against pollution, maintained and kept clean until the end of work.

The Contractor shall divert as required all ditches, field drains, foul drains sewer, water and electrical mains, ducts, etc, wherever encountered during the progress of the work. Where such diversions are temporary the Contractor shall subsequently reinstate them to the Engineer's approval.

Existing ditches shall not be filled until diversion ditches have been excavated, or without the Engineer's permission.

The Contractor shall organize each section of the earthworks rationally so as to eliminate prolonged exposure of subgrades and bottoms or excavations during bad weather.

All excavated grades shall be kept well drained at all items with no storm water standing on the surface and protected as necessary to avoid deterioration.

Any cave-in caused by slides or other forces shall be restored by the Contractor at his own expense.

Re-use of Excavated Material

Suitable material arising from the excavations shall be used as backfill to structures or to the embankment works.

In general all other materials arising from the excavations shall be used outside embankment works unless otherwise instructed by the Engineer.

Suitable materials is defined as excavation material. (That complies with Section 5.)

The contractor's working methods shall ensure that the highest proportion of suitable material is clearly excavated without contamination and suitable materials shall be clearly segregated.

Materials that becomes unsuitable as the result of incorrect handling or construction methods or contaminations by the Contractor shall be conditioned and used or disposed of, and replaced at the expense of the Contractor all in accordance with the instruction of the Engineer.

Disposal of Unsuitable or Surplus Excavation Materials

All excavated materials, either within or beneath the design excavation limits that in the opinion of the Engineer, will be detrimental to the permanent works shall be designated "unsuitable materials".

Unsuitable materials shall include soils which:

- a) have a low natural density less than 800 kg/m^3 , or
- b) are highly expansive, or
- c) have hazardous chemical or physical properties.

Unsuitable materials shall be disposed or according to the instructions of the Engineer.

All disposed sites provided and used by the Contractor's shall comply with the relevant Philippine laws and regulations concerning the Protection of the Environment.

Unsuitable material shall only be removed from the Site following the written instruction of the Engineer.

No other excavated materials shall be removed from the Site.

QUALITY CONTROL AND CONSTRUCTION TOLERANCES

The dimensional tolerance for finished lines, grades and formations after excavation shall be $\pm 50 \text{ mm}$ of dimensions shown on the Drawings.

MEASUREMENT AND RATES

Measurement

Excavation Generally

Work under this Section shall be measured according to the item classification and units contained in the Bill of Quantities (BOQ) Unless classification otherwise, Excavation shall be measured in cubic meter (m³).

The volume of Excavation shall be computed from the direct plan area necessary to accommodate the permanent works, multiplied by the average depth from the designated ground surface level after clearing and grubbing or topsoil removal as the case may be, to the designated sub-grade level indicated on the Drawing or as instructed by the Engineer.

The volume of any unsuitable materials instructed by the Engineer to be excavated beyond the limits defined above shall be calculated by the site measurement or survey at these locations, included in the total volume and paid for as Excavation.

Any additional fill materials required to backfill the additional excavation from above shall be included in the total volume of and paid for under Section 5.

No allowance shall be made in the quantities for bulking or shrinkage.

No allowance shall be made in the quantities for any additional volume of Excavations or Disposal that may be required to accommodate working space to any excavations, space for earthwork supports or sloping sides of excavations, even if same is indicated on the Drawing.

Rates

The rates and lump sums shall be full compensation for all plant, materials, transport, labor, equipment, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Section of the Specifications and/or shown on the Drawings.

Rates for Excavations Generally shall include for:

- a) Reinstating any existing adjacent surface pavement or sodding disturbed by the excavation.
- b) Removal of all water including surface and groundwater by whatever means necessary.
- c) Forming any trial holes to locate existing pipes or cables.
- d) Excavating by hand or machine.
- e) Excavating in any materials likely to be encountered including all clays, sands, silts, rocks, boulders, paved areas, old foundations.
- f) All necessary earthworks supports and protection to uphold and maintain sides of excavation, adjacent paving or other structures.
- g) Temporary protection measures to ensure no slippage occurs in excavated areas nor surface run off of material to adjacent areas or watercourses.
- h) All required additional volume of excavation to accommodate working space including additional backfilling, disposal, earthwork supports and all others additional costs associated therewith.

- i) Selecting, setting aside and preserving any materials suitable for backfilling or embankment.
- j) Transporting excavated materials to and about the Site.
- k) Multiple handling including depositing in temporary spoil heaps.
- l) Removal and disposal of unsuitable material off the sites as instructed by the Engineer.

SUBGRADE PREPARATION

SCOPE OF WORKS

The Work under this Section to be carried out by the Contractor consists of the execution and completion of Subgrade Preparation to all required area of the Site.

Upon completion of the work on the subgrade and before the work on the subbase course is started, the finished surface of the subgrade shall be checked and accepted by the Engineer. The Contractor shall correct all defects observed by the Engineer to the required condition at the Contractor's own expense.

CONSTRUCTION METHOD

General

Only materials specifically approved by the Engineer shall be permitted to be used in the subgrade or below.

The subgrade construction shall be started, only after the completion of all underground works to be installed below the pavement, with due regard to the compaction previously performed at the values specified for embankment so as to make the finish or subgrade as shown on the Drawings.

All holes and depressions made as required for the quality control procedures shall be backfilled and compacted by the Contractor to the prescribed density, at his own expense.

Subgrade in Fill

The material for subgrade in fill shall be that as specified in Section 5 Table 5.1

The subgrade in fill shall be constructed to the grade and elevation as designated on the Drawings, with the percentage of compaction not less than 95% of the maximum dry density as determined by AASHTO T 180. The finished thickness of each layer shall be 200 mm at the maximum.

Subgrade in Cut

Where the subgrade in cut is required to be excavated and replaced as specified on the Drawings or as may be directed by the Engineer the material to be used be that as specified in Section 5 Table 5.1, or when so instructed by the Engineer, the same material derived from excavating the subgrade in cut.

The cost of any work involved with excavation for the subgrade in cut shall not be included with this pay item but shall be deemed to be included in the rates and prices for Section 4.

When no replacement is required of the subgrade in cut, the Contractor shall scarify the surface of the Subgrade in cut to a depth of 200 mm and compact the surface until the moisture content is adjusted to the optimum moisture content of the solid and to not less than 95% of the maximum dry density as determined by AASHTO T 180.

Finished Protection and Repairs to Subgrade

The surface of the subgrade shall be finished to the shape, grade, cross sections and the prescribed percent compaction as designated on the Drawings approved by the Engineer.

The final finished surface shall be proofed-rolled by the method approved by the Engineer. Any defective part discovered as a result shall be reworked as directed by the Engineer at the expense of the Contractor.

The surface of the subgrade shall be protected and maintained to provide adequate drainage at all times. During handling or manipulating of the materials, tools and equipment, the Contractor shall take appropriate protective measures against any possible damage to the surface of the subgrade.

Damaged surfaces of the sub grade, caused by construction operations, storm water or the like shall either be removed or scarified to a reasonable depth, and compacted to the prescribed density with moisture content adjusted to the optimum moisture content of soil such operations shall be as instructed by the engineer and shall be at the expense of the contractor.

Quality control

Materials

The quality shall satisfy the standard values shown in Table 6.1

Workmanship

The workmanship shall be controlled in the manner shown in table 6.2

MEASUREMENT AND RATES

Measurement

Subgrade shall be measured and the unit of measurement shall be the square meter (m²)

The quality shall be as the area flat on plan of the top surface calculated from the dimensions indicated on the Drawings.

Rates

The rates shall be full compensation for all plant, materials, labor, equipment, transport, temporary works, establishment charges, overhead, profit and taxes required to complete the work described in this Section of the Specification and/or shown on the drawings.

Table 6.2

**QUALITY CONTROL STANDARDS
WORKMANSHIP**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Subgrade Preparation	Finished elevation	As approved by the Engineer	Once for every 400m ² at points designated by the Engineer	- 5 mm	
	Area	As approved by the Engineer	All areas as shown in the Drawing	+50mm per linear measurement	

EMBANKMENT

SCOPE OF WORKS

The Work under this Section to be carried out by the Contractor consists of embankment construction utilizing materials excavated and transported from outside source together with materials arising from the general excavation within the area. The embankment shall be that portion of the embankment below the subgrade with boundaries as follows:

- a. The upper limit shall be the bottom of subgrade line extended out 0.50 m of each side of the subgrade limit; and
- b. The side limits shall extend down & outward from the upper limit line at a slope of 1 in 1.

Embankment construction shall include for any necessary preparation of original ground below formation level, selecting and obtaining materials, hauling and handling, depositing, spreading, shaping and compacting in accordance with the requirements of location, elevation and grade designated on the Drawings and as specified herein.

Prior to commencement of the Embankment work, the Contractor shall obtain the Engineer's approval for the equipment and materials to be used and the method of work execution.

MATERIALS

Materials for embankment shall be a well graded material with a smooth and continuous grading curve, free of deleterious materials, organic matter and excessive water and comply with the requirements of Table 5.1. This material shall be obtained from the materials arising from the general excavation within the site and the balance outside source to be proposed by the Contractor.

All embankment materials shall be tested and results submitted to the Engineer for approval.

Table 5.1 Characteristics and Testing Embankment Materials

Test Item	Test Method	Frequency	Standard Value
Maximum particle Size	AASHTO T 27	As directed by the Engineer	Not greater than 75 mm
Plasticity Index	AASHTO T 90	For each source or change of materials	Not more than 10
Density-Moisture Relationship	AASHTO T 180	For each source or change of materials	
CBR	AASHTO T 193	As directed by the Engineer or for each source or change of materials	More than 10% when compacted to 95% of MDD
Field Moisture Cement	ASTM D 2216	Once a day or for each completed layer of embankment	Within the range - 3% to 1% of OMC
Field Density	AASHTO T 191	Once fro every 1000 ^m 2 for each layer of 20cm max.	Not less than 95% of maximum Dry Density

CONSTRUCTION METHOD

Embankment materials shall be spread in horizontal layers not exceeding 200mm compacted thicknesses.

Compaction requirements for embankments expressed as percentage of Maximum Dry Density shall be 95%.

Embankment Construction shall not start until all clearing and grubbing and topsoil removal (as applicable) has been completed in accordance with the Drawings, over the entire area of embankment proposed by the Contractor, to be constructed in a particular operations.

Where the embankment is to be constructed on natural slope steeper than 4 to 1, horizontal benches shall be constructed on the natural ground to prevent landslips and keep the embankment firmly founded upon the ground surface.

In the embankment work, operations shall be started at the lowest elevation and depression so as to avoid the retention of storm water in the work area.

Each of the successive layers of the embankment shall be placed and compacted with the proper moisture content of soil to reach the elevation designated on the Drawings.

Embankment materials, generally, shall be placed and spread immediately on the prepared surface upon arrival at the work location. Stockpiling of embankment materials will not be permitted, especially during the wet season. Embankment material shall be conditioned as necessary to achieve the required moisture content before compaction operations commence.

For dry materials the nature of the conditioning shall be to add sufficient water and mix it uniformly into the fill material by disking, ploughing or scarifying or other methods approved by the Engineer.

For materials with moisture content in excess of that required, the materials shall be worked by adequately aerating the materials, by scarifying or forming windrows or other approved methods, until the correct moisture content is achieved.

Once embankment fill materials is at the correct moisture content the surface shall be graded level before compaction operations commence.

Hauling and leveling equipment shall be routed and distributed over fill areas in such a manner as to reduce rutting and uneven compaction. Compaction equipment shall be capable of achieving the required compaction without having any detrimental effects on the fill materials. The equipment shall be carefully controlled to ensure that all areas are uniformly compacted for their full width and depth.

Successive layers of materials will not be placed until the underlying layers have been tested for compliance with the specified quality requirements.

Embankment construction at structures shall be so controlled as to prevent displacement or overturning of structures or excessive pressure being exerted on them.

As the embankment height is increased the outer edges of fill layers should be located, wherever possible, to coincide with any benching required in the slope. The Contractor will be required to cut, form and shape all benching shown on the Drawings or as required by the Engineer to ensure stability of the slopes.

During construction, and until the pavement and permanent drainage works have been completed, the embankment surfaces shall be suitably protected, cambered and graded to drain surface water, through suitable side ditches or gutters to avoid erosion.

Damaged surfaces of the embankment caused by the construction operation, storm water or the like shall either be removed or be scarified to a reasonable depth and the surfaces shall be reworked to correct the moisture content and compacted again, to the prescribed density. Such operations shall be as instructed by the Engineer and shall be at the expense of the Contractor.

Stones or fragmentary rock larger than 100mm in their greatest dimensions shall not be allowed in the top 150 mm of the embankment.

Embankment materials containing rock or boulders of size more than 150mm shall be used only below embankment construction.

The surface of the embankment slope shall be trimmed, finished, compacted and protected so as to keep the slope firmly settled. Should oil loss or movement take place on the slope because of landslips or other causes, the Contractor shall repair and restore the portion at his own expense to the satisfaction of the Engineer.

Care shall be taken at all times throughout the execution to protect the embankment against damage or deterioration and all applicable protective measures and materials shall be provided at the expense of the Contractor.

COMPACTION TRIALS

Before the contractor commences the placing, spreading and compacting of embankment materials, trial sections shall be prepared, using the relevant materials and Contractor's proposed equipment and work methods, to demonstrate, to the satisfactions of the Engineer, that the Specifications will be complied with in all respects.

Trial sections shall be of a suitable size, but not less than 500 m².

Trial sections of embankment will be subject to testing by the Contractor, as directed by the Engineer, for moisture content, density, construction tolerance, visual inspection and any other tests specified herein.

If the Contractor's proposed equipment and work methods do not produce finished materials that complies with the Specifications then suitable amendments shall be made and new trial sections prepared.

If, during the Contract, the materials or methods of working are changed, for whatever reason, the Contractor shall prepare and test further trial sections to show that any amendments comply with the Specifications.

CONTROL OF TRAFFIC ON COMPLETED SURFACES

Only traffic necessary for placing, spreading, compaction, testing and supervision of the embankment materials shall be permitted in the working area.

At all times the Contractor shall be responsible for controlling traffic to avoid or eliminates damage to or deterioration of the embankment materials and surfaces. The Contractor shall be responsible for the making well, rectifying or replacing any materials that is considered to be unsuitable for use in the Works due to vehicular damage.

CONSTRUCTION TOLERANCES

The finished levels and grades of embankment shall not be more than 20mm below or more than 10mm above for finished level and not be more than 50mm below and above for intermediate layer.

Finished embankment slope surfaces shall not vary from the profile shown on the Drawing by more than 100mm.

QUALITY CONTROL AND TESTING

Regular testing methods and their frequency during construction for the embankment material shall be as detailed in Table 5.1

Alignment, levels and grades shall be checked regularly by surveying.

All holes made in completed work by cores or other testes shall be filled with the specified materials by the Contractor and compacted to the density and surface requirements of the Specification.

MEASUREMENT AND RATES

Measurement

Work under the Section shall be lump sum (Sum) or measured according to the item classifications and units contained in the Bills of Quantities (BOQ). Unless classified otherwise, Embankment shall be measured in cubic meters (m³) classified as follows:

Embankment; imported materials from outside source.
Embankment; material excavated from site

The quantity of Embankment shall be computed from the length and cross-sectional areas indicted on the Drawings. The Embankment cross section areas shall be bounded by:

The ground formation level surveyed after any topsoil removal and any excavation as applicable, and

The finished embankment profile dimensions and levels shown on the Drawings.

No allowance shall be made for shrinkage or bulking of materials.

Rates

The rates and lump sums shall be full compensation for all plant, materials transport, labor, equipment, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Section of the Specifications and/or shown on the Drawings.

Rates for Embankment shall further include for:

Multiple handling

Placing and consolidating in layers including all required tests

Forming benching

Grading and trimming to finished profiles and protecting.

GRANULAR SUB-BASE COURSE

SCOPE OF WORK

The work under this section to be carried out by the Contractor consists of the execution and completion of Granular Subbase course to all required areas.

The work shall include the processing, hauling, spreading and compacting of the granular material on a prepared subgrade to meet the requirements per location, thickness and grade indicated on the Drawings; and as specified herein.

The Contractor shall, before the work on the granular subbase course is started, secure the approval of the Engineer on the equipment and materials to be used and the methods of the work execution.

MATERIAL

- 1) The material for the granular subbase shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed natural gravel and filler of natural or crushed sand and other finely divided mineral matter. The composite material shall be free from any dirt, organic matter, vegetable matter, lumps or balls of clay or objectionable material, and shall be of such nature that it can be compacted readily to form a firm and stable subbase. The source is to be approved by the Engineer.
- 2) The gradation of the materials shall be not more than 75 mm in the maximum particle size. The granular subbase material shall conform to the following grading requirements:

Grading Requirements for Granular Sub-base

Sieve Designation (Alternative US Standard)	Percentage by Weight Passing
3	100
2	90-100
1	55-85
No. 4	35-70
No. 8	20-50
No. 200	0-10

- 3.) The grading is based on aggregates of uniform specific gravity, and the percent passing the various sieves are subject to correction by the Engineer when aggregates of varying specific gravities are used. The plasticity index of the portion of material passing the No. 40 mesh sieve shall be not more than 6, while the soaked CBR value of the material shall not be less than 25% as determined by AASHTO T 193. The CBR value shall be obtained at the maximum dry density as determined by AASHTO T 180 Method D. The sand equivalent as determined by AASHTO T 176 shall have a 25% minimum and Los Angeles Abrasion (AASHTON T 96) of 50% maximum. The sieve analysis of aggregate shall be executed in accordance with AASHTO T-11 and T-27.

CONSTRUCTION METHOD

Preparation of Surface

The existing surface shall be graded and finished as provided under Subgrade Preparation, before placing the subbase material. The subgrade shall, as hereinafter described, be brought to the lines, grades, and typical section shown on the drawings. All soft and yielding material or other portions of the subgrade, which will not compact readily, when rolled or tamped, shall be removed, and all loose material found shall be removed or broken off to a depth of not less than 150mm below the surface of subgrade. All holes or depressions made by the removal of material, as described above, shall be filled with approved material, and the whole subgrade brought to line and grade and compacted to the density specified on the Drawings or as directed by the Engineer.

Placing

1. The subbase material shall be placed in a uniform mixture on a prepared subgrade in a quantity which will provide the required compacted thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.
2. The placing of material shall begin at the point designated by the Engineer. Placing shall be from vehicles especially equipped to distribute the material in a continuous uniform layer or wind row. The layer or wind row shall be of such size that when spread and compacted the finished layer will be in reasonably close conformity to the nominal thickness as shown on the Drawings.
3. When hauling is done over previously placed material, hauling equipment shall be dispersed uniformly over the entire surface of the previously constructed layer; to minimize rutting or uneven compaction.

Spreading

1. The aggregate subbase material shall be spread on subgrade which has been approved by the Engineer. Subbase material which has been placed on a subgrade not approved by the Engineer shall be removed at the Contractor's expense.
2. The subbase material shall be spread in layers not exceeding 150mm in compacted depth. Where the required thickness 150mm or less, the material may be spread in one layer. Where the required thickness is more than 150mm, the aggregate subbase shall be spread 2 or more layers of approximately equal thickness, but not be exceed 150mm of compacted depth of any layer, nor shall any layer be less than 75mm thick.
3. Spreading shall be done by means of approved mechanical spreaders, distributing the material to the required line and grade. The material shall be handled so as to avoid segregation.
4. Segregated materials shall be mixed until uniform. Suitable precautions shall be taken to prevent rutting of the subgrade during the spreading of the subbase material. No hauling or placement of material will be permitted when, in the judgment of the Engineer, the weather or road conditions are such that the hauling operations will cause loose or rutting of the subgrade or cause contamination of the subbase material.

Compaction

1. The moisture content of the subbase material shall be adjusted, if necessary, prior to compaction, by watering with approved sprinklers mounted on trucks, or by drying out, as required in order to obtain the specified density on compaction. The subbase material shall be compacted to ninety five percent (95%) of the Maximum Dry Density as determined according to AASHTO T 180 Method D.
2. Immediately following final spreading and smoothing, each layer shall be compacted to the full width by means of approved compaction equipment progressing gradually from the outside towards the center with each succeeding pass uniformly overlapping the previous pas. Rolling shall continue until the entire thickness of each layer is thoroughly and uniformly compacted to the specified density. Rolling shall be as accompanied by sufficient blading, in a manner approved by the Engineer, to ensure a smooth surface free from ruts or ridges and having the proper section and crown. Any irregularities or depression that develop shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform.
3. Along curbs, gutters, headers and walls, and at all places not accessible to the roller, the subbase material shall be compacted thoroughly with approved tampers or compactors.
4. The finished surface shall be proof-rolled by the method approved by the Engineer. Any defective area discovered as a result be reworked as directed by the Engineer at the expense of the Contractor.

Compaction Trial Sections

1. If directed by the Engineer, before subbase construction is started, the Contractor shall spread and compact trial sections in an area selected by Engineer.
2. One trial section of about 500 m² shall be made for every type of material and/or construction equipment/procedure proposed for use. The purpose of the trial sections is to check the suitability of the materials and the efficiency of the equipment and construction method which is proposed to be used by the Contractor.
3. The materials used in the trials shall be that approved for use as subbase in order to establish the loose depth measurements necessary to result in the specified compacted layer depths, the field moisture content and the relationship between the number of compaction and the resulting density of the material.
4. After final compaction of each trial section, the Contractor shall carry out field density tests and other tests required as directed by the Engineer. The Contractor may proceed with subbase work only after the methods and procedures established in the compaction trial have been approved by the Engineer.

Finishing

- 1) Immediately prior to the placing of the first layer of base on the subbase, the final layer of subbase shall be at the specified density and the required line and grade. The surface of the finished subbase shall be tested with a 3 meter straight edge by the Engineer at selected locations. The variation of the surface from the testing edge of the straight edge

between any 2 contracts with the surface shall at no point exceed 20mm when placed on parallel or perpendicular to the centerline.

- 2) The allowable tolerance or permitted variation from design of compacted subbase shall be as specified hereunder:

Thickness of layer	± 20 mm
Level of Surface	+ 10 mm
	- 20 mm
Crossfall or camber	± 0.3%
Longitude grade over 25 m length	± 0.1%

Quality Control

1.) Material

The quality shall satisfy the standard values in Table 7.2

2.) Workmanship

The work done shall be controlled in the manner shown Table 7.3

Measurement

- 1.) The unit of measurement of the Granular Subbase Course shall be the cubic meter (m³)
- 2.) The quantity shall be computed from the theoretical values indicated on the Drawings, flat on plan. Thickness shall be that on the Drawings.

Rates

1.) The rates shall be full compensation for plant, materials, transport, labor, equipment, temporary works, establishment charges, overheads, profit, and taxes required to complete the work described in this Section of the Specifications and/or shown on the Drawings.

2.) The rates shall further include for:

- a) Delivery to site
- b) Taking from stockpiles
- c) Loading and hauling
- d) Producing, crushing and screening
- e) Multiple handling
- f) Depositing, spreading, and compacting
- g) Maintenance and repair work
- h) Side and end waste
- i) Testing

Table 7.2 – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Granular Sub-base Course	Gradation	AASHTO T-11, 27	Once for every 500 m ² at point designated by the Engineer	Max. particles size shall be 75 mm. 20 to 50% at the rate of passing the No. 8 sieve. Not less than 10% at the rate of the No. 200 sieve	
	Moisture content	ASTM D2216	Once for every 500 m ²		
	Plasticity index	AASHTO T- 89, 90	- ditto -	6% or less	
	Moisture-density Relation	AASHTO T-180	- ditto -		
	Modified CBR	As approved by the Engineer	- ditto -	25% or more	
	Density of Soil in Place by the Sand Cone Method	AASHTO T-191	Once for every 2,000 m ² or fractions thereof at points designated by the Engineer	95% min.	
	Proof rolling	By method approved by the Engineer	2 times on the finished surface entirely	By visual check by the Engineer	Remedial action: Defective area, if any, is rolled again, or replaced and compacted
	Sand Equivalent	AASHTO T 176	As directed by the Engineer	25% min.	
	Los Angeles Abrasion	AASHTO T 96	500 m ²	50% max.	

Table 7.3 – **QUALITY CONTROL STANDARDS – WORKMANSHIP**

Granular Sub-base Course	Thickness	ASTM D 3665	Cross-section surveys Needed	-5 mm	
	Proof rolling	By method approved by the Engineer	2 times on the finished surface entirely	By visual check by the Engineer	

MILLING OF EXISTING ASPHALT PAVEMENT

DESCRIPTION

Remove existing asphalt concrete pavement by milling to improve the rideability and cross slope of the finished pavement, to lower the finished grade prior to resurfacing, or to completely remove existing pavement.

EQUIPMENT

Provide a milling machine capable of maintaining a depth of cut and cross slope that will achieve the results specified in the Contract Documents. Use a machine with a minimum overall length (out to out measurement excluding the conveyor) of 18 feet and a minimum cutting width of 4 feet.

Equip the milling machine with a built-in automatic grade control system that can control the transverse slope and the longitudinal profile to produce the specified results.

To start the project, the Engineer will approve any commercially manufactured milling machine that meets the above requirements. If it becomes evident after starting milling that the milling machine cannot consistently produce the specified results, the Engineer will reject the milling machine for further use.

The Contractor may use a smaller milling machine when milling to lower the grade adjacent to existing curb or other areas where it is impractical to use the above described equipment.

Equip the milling machine with means to effectively limit the amount of dust escaping during the removal operation.

For complete pavement removal, the Engineer may approve the use of alternate removal and crushing equipment in lieu of the equipment specified above.

CONSTRUCTION

4-3-1 General

When milling to improve rideability or cross slope, remove the existing pavement to the average depth specified in the Plans, in a manner that will restore the pavement surface to a uniform cross-section and longitudinal profile. The Engineer may require the use of a stringline to ensure maintaining the proper alignment.

Establish the longitudinal profile of the milled surface in accordance with the milling plans. Ensure that the final cross slope of the milled surface parallels the surface cross slope shown in the Plans or as directed by the Engineer. Establish the cross slope of the milled surface by a second sensing device near the outside edge of the cut or by an automatic cross slope control mechanism. The Plans may waive the requirement of automatic grade or cross slope controls where the situation warrants such action.

Operate the milling machine to minimize the amount of dust being emitted. The Engineer may require prewetting of the pavement.

Provide positive drainage of the milled surface and the adjacent pavement. Perform this operation on the same day as milling. Repave all milled surfaces no later than the day after the surface was milled unless otherwise stated in the Plans.

If traffic is to be maintained on the milled surface prior to the placement of the new asphalt concrete, provide suitable transitions between areas of varying thickness to create a smooth longitudinal riding surface. Produce a pattern of furrows or linear mark that will provide an acceptable riding surface. The Engineer will control the traveling speed of the milling machine to produce a texture that will provide an acceptable riding surface.

Prior to opening an area which has been milled to traffic, sweep the pavement with a power broom or other approved equipment to remove, to the greatest extent practicable, fine material which will create dust under traffic. Sweep in a manner that will minimize the potential for creation of a traffic hazard and to minimize air pollution.

Sweep the milled surface with a power broom prior to placing asphalt concrete. In urban and other sensitive areas, use a street sweeper or other equipment capable of removing excess milled materials and controlling dust. Obtain the Engineer's approval of such equipment, contingent upon its demonstrated ability to do the work. Perform the sweeping operation immediately after the milling operations or as directed by the Engineer.

4-3-2 Quality Control Requirements

Furnish an electronic level with a length of 1 meter and an accuracy of plus or minus 0.1 degree approved by the Engineer for the control of cross slope. Make this electronic level available at the jobsite at all times during milling operations.

Multiple cuts may be made to achieve the required pavement configuration or depth of cut. Measure the cross slope of the milled surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. Record all the measurements to the nearest 0.1% on an approved form and submit to the Engineer for documentation.

1. Tangent Sections: Measure the cross slope per lane at a minimum frequency of one measurement every 30 meter. Calculate the absolute deviation of cross slope at each measurement and then average the absolute deviation of ten consecutive cross slope measurements. The absolute deviation is the positive value of a deviation. When the average absolute deviation cross slope is consistently within the acceptance tolerance as shown in Table 4-1 and upon approval by the Engineer, the frequency of the cross slope measurements can be reduced to one measurement every 60 meter during milling operations.
2. Super elevated Sections: Measure the cross slope every 30 meter per lane within the length of full super elevation. Calculate the absolute deviation of each measurement and then average the absolute deviation of ten consecutive cross slope measurements. For every transition section, measure the cross slope at control points identified in the Plans or, if not shown in the Plans, at a control point at a location of 0.0% cross slope. For curves where the length of the fully super elevated section is less than 75 meter measure the cross slope at the beginning point, midpoint and ending point of the fully super elevated section, calculate the absolute deviation and average. When the number of measurements is less than ten and the length of full super elevation is greater than 75 meter average the absolute deviation of all measurements.

If the average absolute deviation of the cross slope measurements falls outside the acceptance tolerance in Table 4-1, stop the milling operations and make adjustments until the problem is resolved to the satisfaction of the Engineer. If an individual cross slope deviation falls outside the acceptance tolerance as shown in Table 4-1, make corrections only in the deficient area to the satisfaction of the Engineer at no cost to the Department. For pavement with multiple cuts, the deficient areas not caused by the final cut may be left in place upon approval of the Engineer. All milling correction shall be completed before placement of the asphalt course unless stated otherwise in the Plans or as determined by the Engineer.

The limits of deficient areas requiring correction may be verified and adjusted with more accurate measurement methods, including survey instruments, upon approval by the Engineer at no cost to the Department. Should the Contractor wish to have any corrections waived, submit a request to the Engineer for approval. The Engineer may waive the corrections at no reduction in payment if an engineering determination indicated that the deficiencies are sufficiently separated so as not to significantly affect the final cross slope or project grade.

For intersections, tapers, crossovers, transitions at the beginning and end of the project, bridge approaches and similar areas, adjust the cross slope to match the actual site conditions, or as directed by the Engineer.

Table 4-1 Cross Slope Milling Acceptance Tolerance

Roadway Feature	Individual Absolute Deviation	Average Absolute Deviation
Tangent section (including turn lanes)	0.4%	0.2%
Super elevated curve	0.4%	0.2%
Shoulder	0.5%	0.5%

In the event that the distance between tow edges of deficient areas is less than 100 feet, the correction work shall include the area between the deficient sections.

4-3-3 Verification

The Engineer will verify the Contractor’s cross slope measurements by randomly taking a minimum of ten cross slope measurements per lane per mile in tangent sections, control points in transition sections, and a minimum of three cross slope measurements on fully super elevated sections. The Engineer will measure the cross slope of the milled surface by placing the level at the center location of a lane and perpendicular to the roadway centerline. If the average absolute deviation or an individual cross slope deviation falls outside the acceptance tolerance as shown in Table 4-1, immediately make a comparison check at the QC test locations to verify the QC measurements in the questionable section. Correct any cross slope not meeting the individual deviation acceptance tolerance at no cost to the Project. The Engineer reserves the right to check the cross slope of the milled surface at any time by taking cross slope measurements at any location.

MILLED SURFACE

Provide a milled surface with a reasonably uniform texture, within 1/4 inch from a straightedge applied to the pavement perpendicular to the centerline. Ensure that the

variation of the longitudinal joint between multiple cut areas does not exceed 7 mm. The Engineer may accept areas varying from a true surface in excess of the above stated tolerance without correction if the Engineer determines that they were caused by a pre-existing condition which could not have reasonably been corrected by the milling operations. Correct any unsuitable texture or profile, as determined by the Engineer, at no additional expense to the Project.

The Engineer may require remilling of any area where a surface lamination causes a non-uniform texture to occur.

METHOD A MEASUREMENT

The quantity to be paid for will be the plan quantity area, in square meter, over which milling is completed and accepted.

BASIS OF PAYMENT

Price and payment will be full compensation for all work specified in this Section, including hauling off and stockpiling or otherwise disposing of the milled material.

GRADED CRUSHED AGGREGATE BASE COURSE

SCOPE OF WORK

The work under Section to be carried out by the Contractor consists of the execution and completion of the construction of the Graded Crushed Aggregate Base Course to all required areas.

The work shall include the production, transport, spreading and compaction of the crushed aggregate material to meet the requirements per location, thickness and grade indicated on the Drawings and as specified herein.

The Contractor shall, before the work on the graded crushed aggregate base course is started, secure the approval of the Engineer on the materials to be used and the methods of the work execution.

MATERIAL

1. Aggregate for graded crushed base course shall consist of hard, durable particles or fragments of crushed slag or crushed or natural rock and filler of natural or crushed sand or other finely divided mineral matter. The composite material shall be free from any dirt, organic matter, vegetable matter, lumps or balls of clay or objectionable material, and shall be of such nature that it can be compacted readily to form a firm and stable base.
2. The gradation of the aggregate shall be based on the range specified in Table 8.1
3. The sieve analysis of aggregate shall be executed in accordance with AASHTO T-11 and T-27.

Table 8.1 – Gradation of Aggregate

Sieve Designation (Square Opening)	Percentage by Weight Passing Sieves	Notes
2	100	
1 ^{1/2}	95 – 100	
1	70 - 95	
3/4	55 -- 85	
3/8	--	
No. 4	30 – 60	
No. 16	--	
No. 30	12 - 30	
No. 50	--	
No. 100	--	
No. 200	0 - 8	

4. The aggregate remaining on No. 8 mesh sieve shall meet the following requirements

- The amount of loss is not more than 20% in the soundness test by AASHTO T-104.
 - The reduced amount of abrasion is not more than 40% in the abrasion test by AASHTO T-96.
 - The aggregate having length and width ratio of more than 5 to 1 should not be more than 10% in quantity.
5. The amount of the aggregation passing the No. 200 mesh sieve shall not exceed 60% of the aggregate passing the No. 30 mesh sieve. The portion of the No. 40 mesh sieve shall have a liquid limit of not more than 25% and the plasticity index should not be more than 6% tested in accordance with AASHTO T-89 and T-90.
 6. The material passing the 19mm sieve shall have a minimum soaked CBR value of 80% tested according to AASHTO T 193. The CBR value shall be obtained at the Maximum Dry Density determined according to AASHTO T 180 Method D.
 7. If filler, in addition to that naturally present, is necessary for meeting the grading requirements or for satisfactory bonding, it shall be uniformly blended with the crushed base course material at the site or in a pug mill unless otherwise specified or approved. Filler shall be obtained from sources approved by the Engineer, free from hard lumps and not contain more than 15 percent of material retained on the 4.75 mm (No. 4) Sieve.

8.3 CONSTRUCTION METHOD

Preparation of Surface

1. The underlying course shall be checked and accepted by the Engineer before the work on the Graded Crushed Aggregate Base Course is started. Any rut or surface abnormalities due to storm water, hauling, or any other cause, shall be corrected and rolled to the prescribed percent compaction, at the expense of the Contractor, before placing the base material.
2. The underlying course shall be protected and proper drainage shall always be maintained.

Placing

1. The material for Graded Crushed Aggregate Base Course shall be combined into a uniform mixture and water added either in a central mixing plant or by watering and mixing in wind rows in a manner approved by the Engineer, before final placement of the material. When binder is to be added, it may be combined with the aggregate base course by thoroughly mixing separate wind rows of binder and aggregate base course or it may be combined in the central mixing plant. Adding binder by spreading it over the aggregate wind row will not be permitted.
2. The placing of material shall begin at the point designated by the Engineer and in such quantity, which will provide the required compacted thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

Spreading

1. Unless otherwise specified, the Graded Crushed Aggregate Base Course shall be delivered to the site in a uniform mixture and shall be placed on the prepared subbase course or prepared subgrade as the case may be, in a uniform layer or layers not exceeding 150mm in compacted depth, including any binder that is to be blended. Spreading shall be done by means of any approved mechanical spreaders, distributing the material to the required width and loose thickness. When the required base course thickness is greater than 150mm, the material shall be spread in layers of equal thickness.
2. The material shall be so handled, as to avoid segregation. All segregated material shall be removed and replaced with well-graded material. No "skin" patching shall be permitted.

Compaction and Finishing

1. If directed by the Engineer, prior to starting the graded crushed aggregate base course preparation, the Contractor shall construct trial lengths in accordance with Section 7.
2. After placement of Graded Crushed Aggregate Base Course, Compaction of the material shall commence immediately. The material shall be compacted to a density of not less than 98% of Maximum Dry Density as determined according to AASHTO T-180 Method D. The field determination of density shall be made in accordance with AASHTO T 191.
3. Rolling shall be continued until the entire thickness of each layer is thoroughly and uniformly compacted to the density specified. The final rolling of the compacted base course shall be done with a self propelled roller. Rolling shall be accompanied by sufficient blading in a manner approved by the Engineer, to ensure a smooth surface, free from ruts or ridges and having the proper section and crown. When additional water is required it shall be added in the amount and manner approved by the Engineer. Each layer of the base course must be completely compacted by the contractor and approved by the Engineer prior to the delivery of materials for a succeeding layer.
4. The surface of the finished base course shall be tested with a 3 meter straight edge by the Engineer at selected locations. The variation of the surface from the testing edge of the straight edge between any 2 contacts with the surface shall at no point exceed 6mm when placed on a parallel or perpendicular to the centerline of compacted area. All lumps and depressions and thickness deficiencies exceeding the specified tolerances shall be reworked at the expense of the Contractor.
5. The finished surface shall be proof-rolled by the method approved by the Engineer. Any defective area discovered as a result shall be reworked as directed by the Engineer at the expense of the Contractor.
6. Following the construction of Graded Crushed Aggregate Base Course, the compacted base course shall be maintained by the Contractor at his expense. The Contractor shall blade, broom and otherwise maintains the base, keeping it free loose particles, and other defects until such time as the bituminous prime or other surface is applied.

Quality Control

- (1) Material
The quality shall satisfy the standard values shown on Table 8.2
- (2) Workmanship
The work done shall be controlled in the manner shown on Table 8.3

MEASUREMENT AND RATES

Measurement

- (1) The unit of measurement of the Graded Crushed Aggregate Base Course shall be the cubic meter (m³)
- (2) The quantity shall be computed from the theoretical values indicated on the Drawings, flat on plan. Thickness shall be that shown on the Drawings.

Rates

- (1) The rates shall be full compensation for all plant, materials, transport, labor, equipment, temporary works, establish charges, overheads, profits and taxes required to complete the work described in this Section of the Specifications and/or shown on the Drawings.
- (2) The rates shall further include for:
 - a) Delivery to site
 - b) Taking from stockpiles
 - c) Loading and hauling
 - d) Producing, crushing and screening
 - e) Multiple handling
 - f) Depositing, spreading and compacting
 - g) Maintenance / repair work
 - h) Side and end waste
 - i) Testing

Table 8.2 - **QUALITY CONTROL STANDARDS - MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Graded Crushed Aggregate Base Course	Gradation Percentage by the weight passing Shieve 0.6mm and 0.074mm.	AASHTO T-11 and T-27	Once for every 500 m ³ at point designated by the Engineer	Within the gradation range of Table 8.1 The Amount of the material passing the No. 200 sieve shall not exceed 60% of the material passing the No. 30 sieve	
	Soundness	AASHTO T-104	- ditto -	Not more than 20%	
	Los Angeles Abrasion Test	AASHTO T- 96	- ditto -	Not more than 40%	
	Flatness	By the Engineer's Instruction	- ditto -	Not more than 10%	
	Moisture content	ASTM D-2216	- ditto -		
	Plasticity index	AASHTO T-89 and T- 80	- ditto	Not more than 6%	
	Liquid Limit	AASHTTO T- 89	- ditto	Not more than 25%	

Table 8.3 – **QUALITY CONTROL STANDARDS – WORKMANSHIP**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Graded Crushed Aggregate Base Course	Thickness	ASTM D 3665	Cross-section survey	+ Not specified - 5 mm	
	Width	As approved by the Engineer	At point designated by the Engineer	+ Not specified - 20 mm	

CEMENT TREATED COARSE

SCOPE OF WORK

This section comprises the Portland cement treated plant-mixed mass concrete, constructed on prepared base course in accordance with the specifications herein and in conformity with the lines, level, grades, thickness and typical cross-sections indicated on the Drawings.

DELIVERT, STORAGE AND HANDLING

Cement

Only new cement material shall be accepted and stored immediately upon receipt. Store bagged or bulk-cement in a dry weather tight, controlled-ventilation structure. Stack bags close together to reduce circulation of air but not stacked against outside walls. Transfer bulk cement to waterproof bins.

Aggregates

Aggregates shall be stored in a proper manner to minimize segregation and prevent contamination. Store different sizes in separate piles. Stockpile the coarse aggregate in thin, horizontal layers not exceeding 150 mm in depth, avoiding the formation of cone stockpiling. Should coarse aggregates become segregated, remix stockpile to conform to the specified grading requirements.

BATCHING PLANT AND EQUIPMENT

Plant 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 conditioned sufficiently ahead of the start of construction operations and has to be examined thoroughly for its compliance with the original manufacturer's specifications.

a. General

The batching plant shall include bins, weighing hoppers and scales for the fine aggregate and for each size of coarse aggregate. If cement is used in bulk, a bin, a hopper and separate scales for cement shall be included. The weighing hopper shall be properly sealed and vented to preclude dust in operation. The batch plant shall be equipped with a suitable non-resettled batch counter, which will correctly indicate the number of batches proportioned.

b. Bins and Hoppers

Bins with adequate separate compartments for fine aggregate and for each size of coarse shall be provided in the batching plant.

c. Scales

Scales for weighing aggregates and cement shall be of either the beam type or the springless-dial type. They shall be accurate within one-half percent (0.25%) throughout the range of use. Counterweights shall be designated to be locked in any position and to prevent unauthorized change.

Scales shall be inspected and sealed as often as the Engineer may deem necessary to assure their continued accuracy.

d. Automatic Weighing Devices

The proposed batching plants shall be equipped with automatic weighing devices of an approved type to proportion aggregates and bulk cement to ensure good quality and consistency of its output.

MATERIALS

Aggregates

Aggregate shall consist of natural sand, crushed stone or other inert materials with similar characteristics, or combinations thereof, having hard, strong and durable particles approved by the Engineer.

a. Shall not contain more than three (3) mass percent of material passing the 0.075 mm (no. 200 sieve) by washing nor more than one (1) mass percent each of clay lumps or shale. The use of beach sand will not be allowed without the approval of the Engineer.

b. If the fine aggregate is subjected to five (5) cycles of the sodium sulfate soundness test, the weighted loss shall not exceed 10 mass percent.

Portland Cement

Only Table 1 Portland Cement conforming to AASHTO M85 shall be used unless otherwise provided for different brands or the same brands from different mills shall not be mixed nor shall they be used alternately unless the mix is approved by the Engineer.

a.) Cement which for any reason has become partially set or which contains lumps of caked cement will be rejected.

Cement salvaged from discard or used bags shall not be used.

b) Samples of cement shall be obtained in accordance with AASHTO T127.

Water

Water used in mixing, curing or other designated applications shall be reasonably clean and free of soil, salt, acid, alkali, grass or other substances injurious to the finished product. Water will be tested in accordance to Engineer's requirement. Water which is drinkable may be used without test. Where the source of water is shallow, the intake shall be so enclosed as to exclude silt, mud, grass or other foreign materials.

Proportioning of Mixture

The amount of cement to be added to the aggregate shall be from 3 to 4 mass percent of the dry mixture. The exact percentage to be added shall be fixed by the Engineer on the basis of Laboratory Test and trial mixes of the materials furnished by the Contractor.

The mixture shall have the following grading characteristics:

Sieve		Mass percent passing cement / Aggregate Mix	
Designation		Minimum	Maximum
Standard	Alternative		
¾	20.00 mm	85	100
3/8"	10.00 mm	55	80
¼"	6.30 mm	42	66
#4	4.75 mm	32	56
#10	2.00 mm	23	43
#40	0.05 mm	11	26
#80	0.20 mm	7	17
#200	0.08 mm	4	10

Strength Requirements

The cement content for construction shall be that at which the mix develops a 7-day compressive strength of at least 750 psi. The testing procedure shall be as follows: mold and cure specimens in accordance with ASTM D 560; soak specimens in water for 4 hours; cap and break specimens in compression in accordance with ASTM D 1633.

Mix Design

The mix design shall be submitted to the Engineer for approval and shall be accompanied by test data. A change in the source of materials during the progress of work may necessitate a new design mix.

The mix design shall determine with accuracy the aggregate grading the cement content and the required water content.

CONSTRUCTION METHOD

Central Plant Method

The aggregate shall be proportioned and mixed with cement and water in a central mixing plant. The plant shall be equipped with feeding and metering devices, which will introduce the cement, aggregate and water into the mixer in the quantities specified. Mixing shall continue until a uniform mixture has been obtained.

Spreading, Compacting and Finishing

The material shall be spread by mechanical paver spreader of approval type. In spreading, care shall be taken to avoid cutting into the underlying course.

Initial and final rolling shall be performed with pneumatic-tired roller. Rolling shall be discontinued whenever it begins to produce undue displacement of the mixture.

When the compacted thickness of the mass concrete is to be more than 200 mm, the mixture shall be spread and compacted in two (2) approximately equal layers, the first layer to be scarified and re-rolled before the second layer is spread.

Compaction shall continue until a field density of not less than 98% of the compacted maximum dry density determined in accordance with AASHTO T 180 Method D has been attained. Field Density test shall be in accordance with AASHTO T 191.

Weather Limitations

Laying and spreading of mixture shall not be permitted during windy, rainy or impending bad weather. In the event of sudden rain occurs, work shall be promptly stopped, and the entire section shall be reconstruction in accordance with the specifications.

Protection, Curing and Maintenance

The completed mass concrete shall be cured with Prime Coat applied as soon as possible after the completion of final rolling. The surface shall be kept moist until the seal is applied.

The application of Prime Coat shall be made by means of the pressurized distributor at the designated temperature, and at a rate of 0.65 liter/m² to 1.0 liter/m². The exact rate will be determined by the Engineer. Curing seal will be applied in enough quantity to provide a continuous film over the base. The film shall be maintained and kept away from construction traffic for at least 5 days.

The contractor shall be required to maintain at his own expense the entire work within the limits of his contract in good condition satisfactory to the Engineer from the time he first started work until all work shall have been completed. Maintenance shall include immediate repair of any defects that may occur before and after the mass concrete has been compacted and finished, provision of temporary drainage or pumping equipment to ensure that the material will not be subjected to water saturation which work shall be done by the Contractor at his own expense and repeated as may be necessary to keep the base structurally sound.

Trial Sections

Before construction is started, the Contractor shall spread, and compact trial sections as directed by the Engineer. The purpose of the trial sections is to check the suitability of the materials and the efficiency of the equipment for construction method which is proposed to be used by the Contractor. Therefore, the Contractor must use the same material and equipment with procedures that he proposes to use for the fieldwork. One trial section of about 500 m² shall be made for same type of material and/or construction equipment/procedure proposed for use.

After final compaction of each trial section the Contractor shall carry out such field density test and other tests required as directed by the Engineer.

If a trial section shows that the proposed material, equipment or procedure in the Engineer's opinion are not suitable, a new trial section shall be constructed, and the previous trial section can be removed at the Contractor's expense as the Engineer deems necessary.

If the basic conditions regarding the type of material or procedure substantially change during the execution of the work, new trial sections shall be constructed.

Tolerances

The Mass Concrete shall be laid to the designed level and transverse slopes shown on the plans. The allowable tolerances shall be in accordance with the following:

Permitted variation from design		
THICKNESS OF LAYER	-	-5 mm
Permitted variation from design		
LEVEL OF SURFACE	-	-5 mm
Permitted SURFACE IRREGULARITY		
Measured by 3 m straight – edge	-	3 mm
CROSSFALL or CAMBER		
Permitted variation from design	-	± 0.2%
LONGITUDINAL GRADE over 25 m length		
Permitted variation	-	± 0.1%

Traffic.

The Contractor shall not be permitted to drive heavy equipment over completed portions prior to the end of five (5) days curing period except the pneumatic tired equipment as allowed by the Engineer that maybe required for constructing adjoining sections.

MEASUREMENT AND RATES

Measurement

The unit of measurement of the mass concrete course shall be in cubic meter (m³).

The quantity shall be computed from the theoretical values indicated on Drawings.

Rates

The rates shall be full compensation of all plant, materials, labor, equipment, transport, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Specification.

Rates shall further include for:

- depositing, spreading, compaction and testing in field and Laboratory for quality monitoring
- side and end waste
- protection and maintenance
- blading

PRIME COAT

SCOPE OF WORK

The work under this Section to be carried out by the Contractor consists of the execution and completion of provision of Prime Coat to all required areas.

Prime coat shall be applied on the prepared aggregate base course with material in the accordance with the requirements indicated on the Drawings and as specified herein.

Prior to commencement of the prime coat work, the Contractor shall obtain the Engineers approval for the material and equipment to be used and the methods of application.

MATERIAL

- 1) The bituminous material shall be either cut-back asphalt or emulsified asphalt and shall conform to the requirements of Table 1.

Table 1 – Bituminous Materials

Type and Grade	Specification	Application Temperatures (°C)
Emulsified Asphalt SS-1, SS-1h MS-2, HFMS-1 CSS-1, CSS-1h CMS-2	ASTM D 977 ASTM D 977 ASTM D 2397 ASTM D 2397	20 to 70 20 to 70 20 to 70 20 to 70
Cut-back Asphalt MC-30 MC-70 MC-250	ASTM D 2028 ASTM D 2028 ASTM D 2028	30 or more 30 or more 30 or more

- 2) The maximum temperature of cut-back asphalt shall be that at which fogging occurs.

CONSTRUCTION METHOD

- 1) Application Rate of Cut-back Asphalt

The application of the bituminous material by means of distributor shall be 0.70 liter/m² to 1.2 liter/m².

- 2) Weather Limitations

The prime coat shall be applied when the atmospheric temperature is above 10°C and when the weather is not foggy or rainy. The temperature requirements may be waived only when so approved by the Engineers.

3) Contractors Equipment

- a) The Contractors equipment for the application shall include a self-powered pressure bituminous material distributor and the equipment for heating the bituminous material.
- b) The distributor shall have the capability which allows the bituminous material at even heat to be applied uniformly on the surface at readily controlled rate from 0.70 liter/m² to 1.2 liter/m². The distributor equipment shall include a thermometer for reading temperature of tank contents.

4) Application of Bituminous Material

- a) Immediately before applying the prime coat, the full width of the surface to be applied shall be swept with a power broom to remove all loose dirt and other objectionable material. The application of the bituminous material shall be made by means of the pressure distributor at the temperature designated and in the amount of 0.70 liter/m² to 1.2 liter/m².
- b) Where required by the Engineer immediately prior to the application of the prime coat, the surface shall be lightly sprayed with water (but not saturated) and/or air blast and if necessary scraped.
- c) After application of the bituminous material is done on the surface of the sub base course or the base course, the surface shall be allowed to dry not less than 48 hours without being disturbed or for such additional time as may be necessary to permit the drying out of the prime coat until it will not be picked by traffic or equipment. The period shall be determined by the Engineer. Care shall be taken that the application of bituminous material is not in excess of the specific amount, any excess shall be with sand or removed as directed by the Engineer. All areas inaccessible to the distributor shall be sprayed manually using the device for hand spraying. The surface of structures adjacent to the areas being treated shall be protected in such a manner as to prevent their being spattered or marred.
- d) The Contractor shall maintain and protect the surface where the bituminous material has been applied from any damage until the hot asphalt cement mixture is placed. Where the prime coat failed to properly set and penetrate the surface, the application of the bituminous material shall be made again.

Quality Control

a) Material

The quality shall satisfy the standard values shown in Table 2.

b) Workmanship

The workmanship shall be controlled in the manner shown in Table 3.

MEASUREMENT AND RATES

1) Measurement

a) The unit of measurement for the prime coat shall be the square meter (m²).

b) The quantity shall be computed as the area flat on plan from dimensions indicated on the Drawings.

2) Rates

The rates shall be full compensation for plant, materials, transport, labor, equipment, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Section of the Specification and/or shown on the Drawings.

Table 2 – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Prime Coat	Bituminous Material	As approved by the Engineer	At every receiving	To meet the requirements of Table 12.1	<p>Manufacturer's test data maybe substituted as directed by the Engineer.</p> <p>Not permitted to use the material 3 months after delivery.</p>

Table 3 – **QUALITY CONTROL STANDARDS – WORKMANSHIP**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Prime Coat	Application of the bituminous material	As approved by the Engineer	As designated by the Engineer	0.7 liter/m ² – 1.2 liters/m ²	

TACK COAT

SCOPE OF WORK

The Work under this Section to be carried out by the Contractor, consists of the execution and completion of provision of Tack Coat to all required areas.

Tack coat shall be applied on the asphalt treated base course and in-between layers of the asphalt concrete surface courses with the requirements indicated on the Drawings and as specified herein.

Prior to commencement of the tack coat work, the Contractor shall obtain the Engineer's approval for the material and equipment to be used and the method of application.

MATERIAL

The bituminous material shall be either cut-back asphalt or emulsified asphalt, or tar and shall conform to the requirements of Table 1.

Table 1 Bituminous Materials

Type and Grade	Specification	Application Temperatures (°C)
Emulsified Asphalt SS-1, SS-1h, CSS-1, CSS-1h	ASTM D 977 ASTM D 2397	25 to 55 25 to 55
Cut-Back Asphalt MC-70	ASTM D 2028	50 to 70
Tar RTCB 5, RTCB 6	AASHTO M 52	15 to 50

CONSTRUCTION

1. Application Rate of Bituminous Material

The application of the bituminous material by means of distributor shall be from 0.3 - 0.7 liters/m².

2. Weather Limitations

The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is above 10°C. The atmospheric temperature requirements may be waived, only when so approved by the Engineer.

3. Contractor's Equipment

The Contractor's equipment to be used for the application shall include a self-powered pressure bituminous material distributor and the equipment for heating bituminous material.

The distributor shall have the capability which allows the bituminous material at even heat to be applied uniformly on the surface at readily controlled rate from 0.3 - 0.7 liters/m². The distributor equipment shall include a thermometer for reading temperature of tank contents.

Application of Bituminous Material

- (1) Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or air blast to remove all loose dirt and other objectionable material.
- (2) Emulsified asphalt shall be diluted by the addition of water when directed by the Engineer and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlaying mixture is placed on the treated surface.
- (3) The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.3 - 0.7 liters/m² depending on the condition of the existing surface. The type of bituminous material and application rate shall be approved by the Engineer prior to application.
- (4) Following the application, the surface shall be allowed to set without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. The period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage this interval.

Quality Control

Material

The quality shall satisfy the standards values shown in Table 13.2.

Workmanship

The workmanship shall be controlled in the manner shown in Table 13.3.

MEASUREMENT AND RATES

1. Measurement

- (1) The unit of measurement for the tack coat shall be square meter (m²).
- (2) The quantity shall be computed as the area flat on plan from the Dimensions indicated on the Drawings.

2. Rates

The rates shall be full compensation for all plant, materials, transport, labor, equipment, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Section of Specification and/or shown on the Drawings.

Table 13.2 – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Tack Coat	Bituminous Material	As approved by the Engineer	At every receiving	To meet the requirements of Table 13.1	<p>Manufacturer's test data maybe substituted as directed by the Engineer.</p> <p>Not permitted to use the material 3 months after delivery.</p>

Table 13.3 – **QUALITY CONTROL STANDARDS – WORKMANSHIP**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Tack Coat	Application of the bituminous material	As approved by the Engineer	As designated by the Engineer	0.3 - 0.7 liters/m ²	

**ASPHALT CONCRETE MIXED
(WITH ANTI-RUTTING ADDITIVE)**

I. SCOPE OF WORK

The Work under this Section to be carried out by the Contractor, consists of the execution and completion of Asphalt Concrete Surface with Binder Course, constructed and laid hot on the prepared base to all required areas.

Asphalt Concrete Surface with Binder Course shall include providing dense, durable asphalt concrete mixed in a mixing plant and hauling, spreading and compacting the materials to meet the requirements of location, thickness, line and grade designated on the Drawings and as specified herein.

The Contractor shall, before the work on the asphalt concrete and mixed work commences, obtain the Engineer's approval for the equipment and materials to be used and the methods of work execution.

II. MATERIAL

1. Bituminous Material

The bituminous material to be used for Section 11, Asphalt Concrete Surface Type 2 and Binder Course Type 1 shall meet the requirements of the penetration grade of 60 to 70 under ASTM D 946.

2. Aggregate

- 1) The aggregate shall consist of hard, durable and clean crushed stone. The material shall be free of any dirt, organic matter, chemical contaminants or other deleterious substance, resulting from the crushing of natural rocks. If necessary, and subject to the Engineer's approval, part of the fine aggregate shall consist of washed, sharp river sand.
- 2) The aggregate shall meet the following requirements:
 - a) The amount of loss is not more than 12% and 10% respectively for coarse and fine aggregates in the soundness test by AASHTO T 104;
 - b) The reduced amount by abrasion is not than 30% in the abrasion test by AASHTO T 96; and
 - c) The aggregate having length and width ratio of more than 5 to 1, should not be more than 10% (flatness).
 - d) Material finer than 200 sieves (river sand) should not be more than 1.0% and 0.25% for fine and coarse aggregate, respectively (AASHTO T-11 and T-27).
 - e) Material finer than 200 sieves (manufactured sand) should not be more than 3% (AASHTO T-11 and T-27).

- f) Lightweight pieces in aggregate should not be more than 0.5% (AASHTO T-113).
- 3) The combined gradation of the aggregate shall be based on the range specified in Table 1. The sieve analysis of aggregate shall be executed in accordance with AASHTO T-11 and T-27.

Table 1 – Gradation of Aggregate

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieves (%)	
	Type 1 (Asphalt Binder Concrete)	Type 2 (Asphalt Surface Coarse)
1 (25 mm)	100	
¾ (19 mm)	95-100	100
½ (12 mm)	70-90	95-100
3/8 (9.5 mm)	68-82	--
No. 4 (4.75 mm)	35-55	55-70
No. 8 (2.36 mm)	20-35	35-50
No. 16 (1.18 mm)	--	--
No. 30 (0.60 mm)	11-23	18-30
No. 50 (0.30 mm)	5-16	10-21
No. 100 (0.15 mm)	4-12	6-16
No. 200 (0.075 mm)	2-7	4-8

- 4) However, if 2 or more kinds of aggregate with different specific gravities, varying not less than 0.2 are mixed, the gradation of aggregate shall be adjusted with the Engineer's approval.

3. Filler

If filler, in addition to the fine particles naturally present in the aggregate, is necessary, it shall consist of stone dust, Portland cement, or other matter as approved by the Engineer. The mineral shall meet the requirements of AASHTO M 17.

III. STORAGE OF MATERIAL

1. Bituminous Material

- 1) The bituminous material delivered in drums shall be stored in the order of deliveries as received from the refinery which produced it and it shall be used on a first-in / first-out basis.
- 2) The asphalt cement delivered by tanker shall, when required to be stored temporarily, be heated as necessary and maintained at the optimum temperature.

2. Aggregate

- 1) The aggregate shall be stocked by size and type with separate stockpiles for similar sizes, if the material nature is substantially different from others.
- 2) In storing the aggregate, care shall be taken to minimize premature mixing and prevent contamination by any deleterious matter as well as ensuring that the storage yard is effectively drained.

3. Filler

The filler shall be stored in damp-proof place and used on a first-in/first out basis. The stone dust packed in bags shall be stored in the warehouse with the floor elevated 300mm or more above the ground.

IV. CONSTRUCTION METHOD

1. Quality and Proportioning of Hot Asphalt Cement Mixture

a) Quality

The hot asphalt cement mixture shall meet the standard values shown in the table 2.

Table 2 - Martial Test Standard Values

Work	Standard Values		Remarks
	Type 1 (Asphalt Binder Concrete)	Type 2 (Asphalt Surface Coarse)	
Number of Blows	75	75	
Marshall Stability (kg) min.	975	975	
Residual Stability 48 hrs (%) min	75	75	
Flow value (1/100 cm)	20-40	20-40	
Percentage of Voids (%)	3-7	3-7	
Saturation Degree (%)	65-85	65-85	
Pavement Density (%) min	98	98	

NOTE: The hot the asphalt cement mixture shall have the residual stability of not less than 75% of the value obtained by the following formula:

$$\text{Residual Stability} = \frac{\text{Stability after a soak in Water (60°C) for 48 hours}}{\text{Stability}} \times 100\%$$

The hot asphalt mixture shall show no segregation when tested in accordance with the method by AASHTO T 182.

b) Proportioning in Laboratory

In determining the amount of the asphalt cement to be mixed into the hot asphalt cement mixture, the Contractor shall execute the Marshall Stability test in accordance with the requirements of table 2 and submit the results to the Engineer for approval.

c) Proportioning in Place

Before constructing the pavement, the hot asphalt cement mixture with the proportion of the material contents determine in the laboratory shall be produced in the mixing plant to be used for the job mixing and tested in accordance with Marshall Stability Test for determining the material proportioning in place. The material proportioning in place shall be subject to the Engineer's approval.

d) Determination of Standard Density

- (i) The standard density of hot asphalt cement mixture shall be the mean value of densities of the specimens prepared in a set of 3 pieces each by the material proportioning in place of the morning and afternoon operations respectively for a minimum of 10 days after the construction work is started. The standard density shall be subject to the Engineers approval.
- (ii) The standard density shall be determined by the following formula:

$$\text{Standard density (g/cm}^3\text{)} = \frac{A}{\frac{A}{r_w} - (B - C)}$$

Where:

- A: Mass in grams of sample in air.
- B: Mass in grams of surface-dry specimen in air
- C: Mass in grams of sample in water
- r_w : Density of water (1.0 g/cm³)

2. Weather and Seasonal Limitations

The asphalt cement treated base coarse shall be constructed only when the weather is not foggy or rainy.

3. Asphalt Plant

a) Plant Capacity

The asphalt plant shall be computerized and conditioned to be capable of producing the prescribed kind quality of asphalt mixture. The minimum capacity of the plant shall be 100 ton per hour. One unit of asphalt plant shall be provided for the prescribed kind of asphalt mixture.

b) Equipment for Plant

The type, capacity and location of the asphalt plant shall be subject to the approval of the Engineer. The asphalt plant shall have the functions described below:

(i) Cold feeder

The cold feeder shall be capable of providing accurate mechanical means uniformity feeding the aggregate into the drier and maintaining uniform levels of both the gradation and temperature.

(ii) Storage tank and heating system for asphalt cement

The tanks for the storage of hot asphalt cement. Excluding the aggregates, shall be of sufficient capacity to hold the quantity required for a day's construction work. The heating system shall be of indirect heating to permit a whole tank content to be uniformly to the prescribed temperature. The storage tank for asphalt or the feeder pipelines shall be provided with a recording thermometer at suitable place to make the measurement of asphalt temperature readily available.

(iii) Drier

The drier shall have sufficient capacity to thoroughly dry and heat the aggregate to the prescribed temperature and maintain the proper and satisfactory operation of the plant. The drier shall be provided with a recording thermometer at a suitable place near the outlet to allow the measurement of aggregate temperature to be readily available.

(iv) Vibrating Screen

The screening system shall have normal capacity of screening all aggregate to the sizes and proportion as specified.

(v) Hot bin

The hot bin shall be divided into 3 or more compartment and have sufficient capacity for storing 5 batches or more of various sizes of aggregate. Each compartment shall be provided with overflow pipe to prevent backup of aggregate into other compartment or bins. Also, each compartment shall be provided with its own individual sample collection system.

(vi) Dust Collector

The asphalt plant shall be equipped with dust collector.

(vii) Weighing box or hopper for aggregate, filler and asphalt

The weighing box or hopper for the aggregate filler, and asphalt shall have sufficient capacity to weigh a full batch of material at a time and shall be equipped with a tight outlet gate so that no material is allowed to leak into the mixture while a batch is being weighed.

The asphalt weighing box or hopper shall have capacity of 12% or more of the mixer and shall be provided with suitable heat insulation all around the outer face.

(viii) Scales for aggregate, filler and asphalt

The scales for aggregate, filler and asphalt shall have sufficient capacity to weigh a full batch of material at a time with reading of gradation at intervals of not more than a two hundredth (1/200) of the required maximum load.

4. Mixing and Transportation

a) Mixing

- (i) The size of the cold feeder gate openings, volumetric amount for each hot bin and quantity of asphalt cement mixture per batch shall be determined by means of test mixing so as to meet the proportioning in place.
- (ii) The aggregate shall be heated to complete dryness and screened for the storage in the respective bins. The amounts of aggregate and dry filler shall be accurately measured to meet the proportioning requirements in place.
- (iii) All aggregate and filler shall be put into the mixer and dry-mixed for 5 seconds or longer.
- (iv) The asphalt shall then be added and mixed well for at least 30 seconds until a uniform asphalt cement mixture can be attained.
- (v) The temperature of mixing shall be chosen from the temperature range when the kinematic viscosity of asphalt is 150 to 300 centi-stoke (75 to 150 seconds, saybolt). The temperature is hereinafter referred to as designated temperature.
- (vi) The designated temperature shall not exceed 170°C. The temperature of heated asphalt shall be the same as the designated temperature.

b) Transportation

The hot asphalt cement mixture shall be transported by the truck with clean and flat metallic loading bed. The loading bed of the truck shall be provided with thin oil or solution coating on the inner face to avoid cohesion of asphalt cement mixture. The asphalt cement mixture, once loaded, shall be covered with waterproof covering sheet, to preserve required laying temperature.

5. Preparation of Asphalt Surface Course

- 1) Immediately before placing the hot cement mixture, the Asphalt Treated Base course surface shall be cleaned of loose stones, director other deleterious materials. Any unusual condition found on the Asphalt Treated Base Course surface shall be promptly brought to the attention of the Engineer for the Contractor's corrective action.
- 2) When the underlying course is wet due to rain or other causes, the asphalt cement mixture shall not be placed until it is dry and the Engineer has approved the work execution.

6. Spreading and Compacting

- 1) The hot asphalt cement mixture shall be spread by means of a paving machine. Bituminous pavers shall be self-contained, power-propelled units with an activated screed or strike-off assembly, heated if necessary, and shall be capable of spreading and finishing courses of bituminous plant mix material which will meet the specified thickness, smoothness and grade. Pavers used for shoulders and similar construction shall be capable of spreading and finishing courses of bituminous plant mix material in widths shown on the Drawings.
- 2) However, where the manual spreading is unavoidable, the mixture shall be spread carefully and thoroughly so that no segregation of the asphalt cement mixture occurs.
- 3) The spreading operation shall be immediately suspended when it starts raining during the operation.
- 4) The width, thickness and speed of the paving by the asphalt finisher shall be subject to the Engineer's approval. The asphalt shall be operated in such manner to spread the hot asphalt cement mixture to the full width along the forms set properly meeting the designated lines and in a uniform layer. When the spreading is completed, it shall have the required width, thickness, proper cross fall and surface smoothness.
- 5) The portions immediately adjacent to concrete curbing's, manholes or other structures shall be spread with a uniform coating of the bituminous material as accepted by the Engineer. After spreading, the hot asphalt cement mixture shall be thoroughly and uniformly compacted with the power roller to not less than 98% of the standard density.
- 6) The temperature of the hot asphalt cement mixture spread and laid shall not be lower that 120°C as standard range, with tandem roller or triple axis roller to finish to a flat and smooth surface, eliminating the roller marks left from secondary rolling or small corrugations on the surface.
- 7) In the area not accessible to the roller, the hot asphalt cement mixture shall be thoroughly compacted with hand tamper or other suitable tools approved by the Engineer.

- 8) The finish thickness of 1 layer shall be 100 mm at the maximum.

7. Joints

- 1) The hot asphalt cement mixture at the construction joints shall be thoroughly cut or milled to a minimum 30 mm and compacted to get sufficient adhesion and even connection to adjoining pavement between new and old portions and finished to secure a smooth and flat surface. The edges of previously paved areas at construction joints to subsequent areas will be cut back by a minimum of 50 mm or to a depth of sound material and to the satisfaction of the Engineer.
- 2) The lines of joint both for transverse and longitudinal shall be staggered at least 300 mm apart from the lines of joint of the underlying course in order to avoid the matching of both joints.

8. Maintenance and Repair

- 1) When a part of the finished surface course is to be made available for Contractor's equipment or temporary works (including the transportation of materials) due to the requirements of the work, its use shall be subject to the Engineer's approval. As soon as its use is over, said surface shall be restored to its original condition. During the period of use, the surface course shall be provided with proper maintenance and repair for the protection of the surface as directed by the Engineer.
- 2) The part shall be checked and accepted by the Engineer, upon completion of the restoration.
- 3) All holes excavated in the work required for the execution of the quality control procedures shall be backfilled to the prescribed density with the same hot asphalt mixture.

9. Quality Control

- 1) Materials
The quality shall satisfy the standard values shown in Table 3.1 (A) through Table 3.2 (C).
- 2) Workmanship
The workmanship shall be controlled in the manner shown in Table 3.3

10. Test Section

- 1) Prior to full production, the Contractor shall prepare sufficient quantity of asphalt concrete mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 15 m long and 5 to 6 m wide placed in two sections and shall be of the same depth specified for the construction of the course which it represents. The underlying grade or pavement structure upon which the test section is to be

constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be of the same type and weight to be used on the remainder of the course represented by the test section.

- 2) If the test section should prove to be unsatisfactory, the necessary adjustments to the mix design, plant operation, and/or rolling procedures shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. When test sections do not conform to specification requirements, the pavement shall be removed and replaced at the Contractor's expense. A marginal quality test section that has been placed in an area of little or no traffic may be left in place. If a second test section also does not meet specification requirements both sections shall be removed at the Contractor's expense. Full production shall not begin without the Engineer's approval.

V. MEASUREMENT AND RATES

1. Measurement

- 1) The of measurement for the asphalt concrete surface and binder course shall be in metric tons (M.T.)
- 2) The quantity shall be as the area flat on plan of the top surface multiplied by the average thickness of layer and the unit weight of compacted asphalt as calculated from the dimensions indicated on the Drawings.

2. Rates

- 1) Rates shall further include for:
 - a) Placing, spreading and compacting
 - b) Maintenance and repair work
 - c) Side and end waste
 - d) Curved work
 - e) Cutting of joints
 - f) Testing

Table 3.1 (A) - **QUALITY CONTROL STANDARDS - MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Asphalt Concrete Surface and Binder Course	Asphalt cement	As approved by the Engineer	Once for every 500 tons at receiving materials	To meet the requirements of penetration grade 60 to 70 under ASTM D 946	Manufacturer's test data may be substituted as directed by the Engineer
	Gradation of aggregate	AASHTO T 11 and T 27	Once for every quarry	To meet the requirements of Table 10.1 na gradation range under AASHTO M 17 (Mineral filler)	
	Abrasion of aggregate	AASHTO T- 96	- ditto -	Not more than 30%	
	Soundness of aggregate	AASHTO T-104	- ditto -	Not more than 12% C.A. Not more than 10% F.A.	
	Flatness of aggregate	By the Engineer instruction	- ditto -	Not more than 10% by weight	
	Absorption of aggregate	AASHTO T-84 an T 85	- ditto -	Not more than 3% (Dry specific gravity)	
	Plasticity index aggregate	AASHTO T 90	- ditto -	Not more than 6%	Aggregate passing No. 40 sieve including mineral filler

Table 3.1 (B) – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Asphalt Concrete Surface and Binder Course	Material proportioning in laboratory	As approved by the Engineer	Once for every change in proportioning	To meet the requirements Table 11.2	
	Material proportioning in place	- ditto -	- ditto -		
	Report of job	- ditto -	- ditto -	Mixing	
Asphalt Concrete Surface and Binder Course (Asphalt Plant)	Asphalt temperature	Kettle	4 times per day	Within +/- 15°C of the designated temperature and not more than 170°C	
	Gradation of aggregate	AASHTO T 27	Once per day at hot bins	Percentage of weight passing 20 mm mesh sieve is within ± 8% of designated For No.4 mesh sieve within ± 4.5% of designated	Designated: Represents the gradation as determined for the job mixing
	Aggregate temperature hot bins	As approved by the Engineer	Once per day		
	Moisture content of aggregate	As approved by the Engineer	Once per day		
	Filler (stone dust) screening	AASHTO T 37	Once for every 500 tons	To meet the requirements of AASHTO M 17	Aggregate passing No. 8 Sieve including mineral filler

Table 3.1 (C) - **QUALITY CONTROL STANDARDS - MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Asphalt Concrete Surface and Binder Course	Heating temperature	As approved by the Engineer	Every truck bed	Within $\pm 15^{\circ}\text{C}$ of the designated temperature and not more than 170°C	
	Marshall stability	ASTM D 1599	Once per day (3 pieces)	To meet the requirements of Table 11.2	
	Placing temperature	As approved by the Engineer	Once per day	120°C to 150°C	
	Quantitative extraction of asphalt	AASH T 164 or as approved by the Engineer	Once per every 500 m. tons	Within $\pm 0.3\%$ of the prescribed amount of asphalt cement	
	Sample screening	AASHTO T11 and T27	Once per day (times screening/once)	Percentage of weight passing 13 mm mesh sieve is within $\pm 8\%$ of designated For No.10 mesh sieve within $\pm 3.5\%$ of designated	Designated: Represents the gradation as determined for the job mixing

Table 4 (D) – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Asphalt Concrete Surface Course	Percent compaction	As approved by the Engineer	Once for every 1,000 m ²	Surface course of airport pavement: Not less than 98% of the standard density	
	Measurement of standard density	By the method specified in para 11-4-1 (d)			

Table 4 – **QUALITY CONTROL STANDARDS – MATERIAL**

WORK ITEM	TEST ITEM	TEST METHOD	FREQUENCY	STANDARD VALUE	NOTES
Asphalt Concrete Surface and Binder Course	Finish elevation	By surveying specified on Drawings	Once for every 400 m ² at point designated by the Engineer	+ 5 mm	
	Thickness	As approved by the Engineer	Once for every 1,000 m ² at point designated by the Engineer	+5 mm	
	Width	By the Engineer's Instruction	At point designated by the Engineer	+ Not specified - 20 mm	
	Flatness	As approved by the Engineer	At determined by the Engineer	Standard deviation shall be within 2.4 mm.	

ANTI-RUTTING ADDITIVE FOR ASPHALT MIXTURE

DESCRIPTION

This item is the additive of the asphalt mixture, which is developed for the purpose of preventing the occurrence of rutting on the asphalt pavement surface at a high temperature.

Anti-Rutting Additive: An additive material in asphalt mixture used to increase the strength and durability of the adhesion between aggregates.

MATERIALS REQUIREMENTS

Types of Anti-Rutting Additives

The types of Anti-Rutting Additives to be used are high density polyethylene and several polymeric materials, and auxiliary agent which makes promote dissolution.

Physical and Chemical Requirements

The Anti-Rutting Additives shall conform to the physical requirements given in Table 1, and the physical requirements of the asphalt mixture was added to Anti-Rutting Additives requirements given in Table 2.

Table 1 – Physical Requirements of Anti-Rutting Additives

Item	Unitage	Standard Index	Test Method
Diameter		< 5m m/GRANULE	ASTM C 136
Specific Gravity		< 1.0	ASTM D 792
Melt Flow Rate	g/10min	> 1.0	ASTM D 1238
Moisture Content	%	< 0.5	ASTM D 6869

Table 2 – Physical Requirements of the asphalt mixture was added to Anti-Rutting Additives

Base Asphalt Mixture: GRADING D (Dense-Graded Asphalt Mixture)

Item	Unitage	Standard Index	Test Method
Marshall Stability	kN	Min. 7.5	ASTM D 1559
Flow Value	1/10mm	20-40	ASTM D 1559
Residual Marshall Stability	%	Min. 75	JHS 202
Dynamic Stability	pass/mm	Min. 7,000	JHS 230

The content of Anti-Rutting Additives : 0.3% (to Asphalt Mixture Weight)

CONSTRUCTION REQUIREMENTS

Additive Amount

The proportion of Anti-Rutting Additives on the basis of weight of Asphalt mixtures shall be from 0.30 weight percent. If you need more strength, the percentage to be used shall depend on the job mix formula and the other quality control requirements established in the laboratory.

Mixing Method

The Anti-Rutting Additives is add into a mixer directly at the time of a mix of hot asphalt mixture. The mixer injection order of materials is supplied in a mixer in following order:

1. Heating Aggregate
2. Filler
3. Anti-Rutting Additives
4. Asphalt

The mix temperature shall be $175\text{ }^{\circ}\text{C} \pm 5^{\circ}\text{C}$, the mixed time carries out dry mixing during 15 seconds and Mixing for 60 seconds after Anti-Rutting Additives and asphalt injection.

SAMPLING

Samples of Anti-Rutting Additives shall be taken at the place of manufacture or at a destination as agreed upon by the parties concerned.

TESTING

Anti-Rutting Additives shall be tested in accordance with ASTM C 136, ASTM D 792, ASTM D 5630, ASTM D 1238, ASTM D 6869 and ASTM D 1559, JHS 230.

REJECTION

Materials failing to meet the specification requirements shall be reported to the manufacturer within one (1) week after tests have been completed and the cause for rejection shall be stated.

PACKING AND MARKING

Anti-Rutting Additives may be shipped in containers agreed upon by the manufacturer and the purchaser. It shall be packed in plastic or other suitable packing materials. These containers shall be properly sealed. Each container shall be marked with the following information:

- a. Name of the product
- b. Lot number of manufacture
- c. Net weight
- d. Name of manufacturer

STORAGE AND HANDLING

- Handling : Keep dry, avoid extremely crash when transporting, away from fire and explosion.
- Storage : Store in original container only in cool, dry, well-ventilated, secure area.

METHOD OF MEASUREMENT

The weight of Anti-Rutting Additives is measured at multiplying by the weight of asphalt mixture and the amount of Anti-Rutting Additives. The weight of asphalt mixture to be measured for under this item shall be the number of square meters (m²) of asphalt pavement placed and compacted and accepted based on the thickness and density of the cores taken in accordance with Subsection 307.3.10 (Acceptance, Sampling and Testing) "Standard Specifications for Highways, Bridges and Airports, 2013").

PORTLAND CEMENT CONCRETE PAVEMENT

SCOPE OF WORKS

The work under this Section to be carried out by the Contractor, consists of the execution and completion of Portland Cement Concrete Pavement to all required areas.

Portland Cement Concrete Pavement shall include the construction of Portland Cement Concrete Pavement, with or without reinforcement, constructed on the prepared base in accordance with this Specification and shall include provision of materials, mixing plant, mixing, hauling, placing and consolidating. The work shall meet the requirements of location, thickness, line, and grade indicated on the Drawings and as specified herein.

The Contractor shall, before the work on the Portland cement concrete pavement is started, design the concrete mixes in accordance with the requirements of this Section and the Drawings, and also secure the Engineer's approval of the materials to be used and the construction method to be employed.

MATERIAL

Cement

- (1) The cement shall be factory produced standard color Portland cement of the specified type complying in all aspects with ASTM C150 (AASHTO M 85).
- (2) All bags showing initial setting or lumps of caked cement, as well as half used bags, shall be rejected.
- (3) The Contractor shall provide manufacturer's test certificates and proof that the specifications have been complied with and certified by an independent laboratory. The Engineer shall have the power to reject a part or the whole of any consignment of cement if he considers it to be unsuitable for use in the works.

Water

The water shall be free of oil, acid, salt, organic matter or other deleterious substances which may have an adverse effect on the quality of concrete.

Fine Aggregate

- (1) Fine aggregate shall consist of natural or manufactured sand, having hard, strong, durable particles. Fine aggregates shall be clean and free from extraneous materials, clay ball organic matter or other detrimental material in accordance with this Specification. The maximum combined quantity of soluble chlorides and sulphates in the fine aggregate shall not exceed 1000 ppm fine aggregate.
- (2) The gradation of the fine aggregate shall be based on the range specified in Table 11-1.

Table 11-1 Gradation of Fine Aggregates

Sieve Designation		Percentage by mass passing sieve
Alternative	Standard	
3/8 inch	9.5 mm	100
No. 4	4.75 mm	95 to 100
No. 8	2.36 mm	80 to 100
No. 16	1.18 mm	50 to 85
No. 30	0.600 mm	25 to 60
No. 50	0.300 mm	5 to 30
No. 100	0.150 mm	0 to 10

- (3) The sieve analysis of the fine aggregate shall be executed in accordance with AASHTO T 27.
- (4) When the fineness modulus of the fine aggregate shows variation of not less than 0.2 as compared with the value established in the material proportioning for concrete, the material proportioning shall be corrected.
- (5) The limits of deleterious substance content shall be in accordance with the values specified in Table 11-2. The deleterious substances not specified in Table 11-2 shall be handled as directed by the Engineer.

Table 11-2 Fine Aggregates

ASTM / AASHTO	Testing Requirements	Specification
C-40 / T-21	Organic Impurities	Lighter than Standard
C-88 / T-104	Soundness Test	5% max
C-117 / T-11	Material finer than 200 sieve, Mineral aggregate (Manufactured sand)	3% max
C-117 / T-11	Material finer than 200 sieve, Mineral aggregate (River sand)	1% max
C-136 / T-37	Fineness Modulus (Sieve Analysis)	2.3 – 3.1
C-142 / T-112	Clay lump & Friable Particles	1% max. by weight
C-123 / T-113	Lightweight Pieces in Aggregate	0.5% max. by weight
D-2419 / T-176	Sand Equivalent Test	75% minimum

Coarse Aggregate

- (1) The coarse aggregate shall consist of crushed stone and shall be tough, durable, and free of dirt, organic matter or other deleterious substance, proceeding from the crushing and processing of natural rocks.
- (2) The gradation of the coarse aggregate shall be based on the range specified in Table 11-3. If the coarse aggregate does not meet the gradation specified in this Table, the blending of other materials must be approved by the Engineer. The sieve analysis of coarse aggregate shall be executed in accordance with AASHTO T 27.

Table 11-3 Gradation of Coarse Aggregate

Sieve Designations (Square Openings)		From 1 1/2" to No. 4 (38 mm to 4.75 mm) By Weight Passing Sieves
Alternative	Standard	2" – No. 4
2-1/2"	63.5 mm	-
2"	50.8 mm	100
1-1/2"	38 mm	95 to 100
1"	25.4 mm	-
3/4"	19 mm	35 to 70
1/2"	12.5 mm	-
3/8"	9.5 mm	10 to 30
No. 4	4.75 mm	0 to 5

- (3) The limit of deleterious substance content shall be in accordance with the values specified in Table 11-4. The deleterious substances not specified in Table 11-4 shall be handled as directed by the Engineer.

Table 11-4 Coarse Aggregates

ASTM / AASHTO	Testing Requirements	Specification
C-88 / T-104	Soundness Test	5% max.
C-131 / T-96	Abrasion Test	30% max.
C-142 / T-112	Clay lumps and friable particles	0.25% max by weight
	Thin and elongated pieces	8% max. by weight
C-117 / T-11	Amount of material finer than	1% max. by weight
C-123 / T-113	Lightweight Pieces in Aggregate	0.5% max. by weight

Admixtures

- (1) The use of admixtures in the concrete mix shall only be permitted after the approval of the Engineer.
- (2) The air-entraining admixtures shall meet the requirements of ASTM C 260.

- (3) The water reducing admixtures shall meet the requirements of ASTM C 494.

Joint Filler

- (1) The joint filler to be used shall be suitable for expansion and contraction of the concrete slabs and shall also be durable enough to hold without permanently being collapsed or deformed during the construction.
- (2) The joint filler shall meet the requirements of size as indicated on the Drawings and shall be of sponge rubber type and meet the requirement of ASTM D 1752.

Joint Sealer

The joint sealer shall be well adapted to expansion and contraction of concrete slabs and shall be excellent in water and oil proofing. It shall also be durable enough to withstand the hot weather and the impact caused by the traffic. Any joint sealer shall meet the requirements of ASTM D 5893 or approved equivalent.

Reinforcing Mesh

Reinforcing mesh shall consist of welded deformed steel fabric conforming to the requirements of ASTM A 497.

Dowel and Tie Bars

- (1) Dowel bars shall be plain steel bars of grade 40 and shall meet the requirements of ASTM A 996, and their axis shall be perfectly straight. The dimensions of dowel bars shall be in accordance with the requirements shown on the Drawings.
- (2) Tie bars shall be deformed steel bars of grade 40 and conform to the requirements of ASTM A 996. The dimensions of tie bar shall be in accordance with the requirements shown on the Drawings.

Underlay Paper

- (1) Underlay paper shall be provided according to the instructions of the Engineer at the Contractor's expense to the areas where Prime Coat is eroded and where the Cement Treated Base Course surfaces are rough.
- (2) The underlay paper shall be made of polyethylene film or kraft paper. The material of the underlay paper must be (t=4 mills minimum) and approved by the Engineer.

Cover Material for Curing

The curing materials shall conform to any of the following requirements:

- (1) Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C 309 TYPE 2;
- (2) White polyethylene film for curing concrete shall conform to the requirements of ASTM C 171;
- (3) White burlap-polyethylene or jute sack sheeting for curing concrete shall conform to the requirements of ASTM C 171; and

- (4) Waterproof paper for curing concrete shall conform to the requirements of ASTM C 171.

STORAGE OF MATERIAL

Cement

- (1) Cement shall be delivered to the site in sealed bags or water-tight barrels bearing the manufacturer's name, cement type and the date of manufacture. The bagged cement shall be stored in piles not more than eight bags high. Storage areas shall be dry waterproof sheds or other such temporary buildings, exclusively for cement and erected with the floors raised well above the ground in areas agreed with the Engineer. The storage capacity shall correspond on the amount of concrete required for the largest units to be casted. On completion of the Works the storage shall be dismantled and removed, and the site restored to its original condition by the Contractor at his own expense.
- (2) A passage of at least one meter shall be left between the cement and the side walls of the storage sheds. Access ways shall also be left between containers so that everyone is visible. Each consignment of cement shall be stored separately, and consignments shall be used in the order in which they are delivered. Any cement showing signs of initial setting or otherwise adversely affected shall be rejected and removed from the Site completely at the Contractor's own expense.
- (3) Access shall be available to the Engineer at all times.
- (4) Cement delivered by bulk carriers shall be stored in purpose made silos. All operations for handling of bulk cement shall be by approved methods that prevent contamination of the cement. The cement storage silos shall be provided with interior moisture control devices that keep the cement dry and prevent premature hydration in the silos. The silos shall be provided with access ladders and entry ways so that samples can be extracted from various levels of each silo for testing purposes.

Aggregate

- (1) Aggregates shall be stored in such a way as to prevent segregation and contamination. Aggregates from different sources or of different grading shall be stored in separate compartments, each having a concrete or similar hard bed, laid to a fall to drain off surface water.
- (2) Aggregates shall be protected from moisture during periods of prolonged severe weather.
- (3) Aggregate which has become segregated or contaminated with foreign matter during storage or handling will be rejected and shall be removed and reprocessed and/or replaced with material of acceptable quality. Aggregates shall be restored in sufficient quantity to ensure that there is no interruption of concreting work at any time.

Admixture

- (1) The admixture shall be stored separately and kept free from all impurities and shall be used on a first-in/first-out basis.
- (2) The admixture in powder form shall be kept free from moisture absorption or caking in storage, while the liquid admixture shall be kept free from decomposition or denaturation. Care should be extended to promptly use the stored materials prior to their indicated expiration dates if there are any.

Joint Materials

The joint filler and the joint sealer shall be stored in a warehouse with a suitable cover. The joint filler shall be set on a flat surface to prevent deformation. Care should be extended to promptly use the stored materials prior to their indicated expiration dates if there are any.

Steel Materials

The steel materials shall not be laid directly on the ground and shall be stored in a warehouse or with suitable cover on them as flat as practicable to avoid initial stresses on the reinforcing materials.

Underlay Paper

The underlay paper shall not be stored directly on the ground but in a warehouse or with suitable cover on them.

CONSTRUCTION METHOD

Contractor's Equipment

- (1) The Contractor's equipment necessary for handling the materials and performing all parts of the work shall be approved by the Engineer as to design, capacity, and mechanical condition.
- (2) The Contractor's equipment shall be at the job site before the start of construction operations for inspection and approval.

(a) Batching Plant and Equipment

(i) General

The batching plant shall include bins, weighing hoppers, and scales for the fine aggregate and coarse aggregate. If bulk cement is used, a bin, hopper, and separate scale for the cement shall be included. The weighing hoppers shall be properly sealed and vented to preclude dusting during the operation. Sufficient dust controls should be installed to conform with any Environmental regulation.

(ii) Bins and hopper

The bins with adequate separate compartments for the fine aggregate and coarse aggregate shall be provided in the batching plant. Each

compartment shall discharge efficiently and freely into the weighing hopper. Means of control shall be provided so that, as the quantity desired in the weighing hopper is approached, the material may be added slowly and shut off with precision.

A port or other opening for removing an overload of any one of the several materials from the hopper shall be provided.

The weighing hoppers shall be constructed to eliminate accumulations of materials and to discharge fully.

(iii) Scales

The scales for weighing the aggregate and cement shall be of either the beam or the springless dial type. They shall be accurate within 0.5 % throughout their range of use.

When the beam-type scales are used, the provisions such as a "telltale" dial shall be made for indicating to the operator that the required load in the weighing hopper is being approached. A device on the weighing beams shall clearly indicate critical position. The poises shall be designed to be locked in any position and to prevent any unauthorized change. The weigh beam and "telltale" device shall be in full view of the operator while charging the hopper and the operator shall have convenient access to all controls. The scales shall be inspected and sealed as often as the Engineer may deem necessary to assure their continued accuracy. The Contractor shall have on hand not less than 23 kg weights for testing of all scales when directed by the Engineer.

(b) Mixers

(i) General

The concrete shall be mixed in a central mixing plant. The mixer shall have attached in a prominent place a manufacturer's name plate showing the capacity of the drum in terms of volume of the mixed concrete and the speed of rotation of the mixing drum or blades.

A measuring device accurate within 3 % in weight and satisfactory to the Engineer shall be provided at the mixer for determining the amount of air-entraining agent or other admixture to be added to each batch requiring such admixtures.

(ii) Central Plant Mixer

The mixing shall be made in an approved mixer capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified mixing period, and of discharging the mixture without segregation.

The central plant mixers shall be equipped with an acceptable timing device that will not permit the batch to be discharged until the specified mixing time has elapsed. The water system for a central mixer shall be composed of

either a calibrated measuring tank or a meter and shall not necessarily be an integral part of the mixer.

The mixers shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades.

The pickup and throw over blades shall be replaced when they have worn down 19 mm or more.

The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

(iii) Dump Truck

Dump trucks shall be used for hauling the central-mixed concrete.

(c) Paving Equipment

(i) Paving Machine

The paving machine shall consist of concrete spreader, finisher, leveller, built-in vibrators, floating and texturing machines, of appropriate type and capacity, all approved by the Engineer.

(ii) Vibrators

The vibrators may be the internal type with either immersed tube or multiple spuds, for the full width of the concrete slab. They may be attached to the spreader of the finishing machine and shall not be in contact with joints of any type, load-transfer devices, subgrade, or side forms. The frequency of the internal type shall not be less than 7,000 vibrations per minute for spud vibrators. When the spud-type internal vibrators are used adjacent to the side forms, they shall have a frequency of not less than 3,500 vibrations per minute. The hand vibrators should be used to consolidate the concrete along forms and other isolated areas. The number, spacing, frequency, and eccentric weights shall be determined as necessary to achieve an acceptable concrete density and finishing quality.

Adequate power to operate all vibrators at the weight and frequency required for a satisfactory finish shall be available on the paving machine.

The internal vibrators may be supplemented by vibrating screeds operating on the surface of the concrete. The frequency of surface vibrators shall not be less than 3,500 vibrations per minute. The Contractor shall furnish a tachometer or other suitable device for measuring the frequency of the vibrators. The vibrators and tamping elements shall be automatically controlled so that they shall be stopped as forward motion ceases.

(iii) Concrete Saw

The Contractor shall provide at the site sawing equipment of 1 meter minimum diameter circular saw blade adequate in number of units and power to complete the sawing to the required dimensions. The Contractor

shall provide at least 1 standby circular saw in good working order. An ample supply of saw blades shall be maintained at the Site of the work at all times during the sawing operations. The Contractor shall provide adequate artificial lighting facilities for night sawing if such night work is permitted. All of this equipment shall be on the job both before and at all times during the concrete placement.

(iv) Forms

The straight side forms shall be made of steel having a thickness of not less than 6 mm and shall be furnished in sections of not less than 3 m in length. The forms shall have a height equal to the prescribed edge thickness of the concrete without horizontal joint, and with a base equal to height of the forms.

The forms shall be provided with adequate devices for secure setting so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment.

The forms with battered top surfaces and bent, twisted, or broken forms shall be removed from the work. The repaired forms shall not be used until inspected and approved by the Engineer. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 3 mm in 3 m, and the upstanding leg shall not vary more than 6 mm.

The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting.

Form Setting

- (1) The forms shall be set sufficiently in advance of the concrete placement to ensure continuous paving operation. After the forms have been set to correct grade, the base shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. The forms shall be staked into place with not less than 3 pins for each 3 m section. A pin shall be placed at each side of every joint. The form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 6 mm at any point. The forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. The forms shall be cleaned and oiled prior to the placing of concrete.
- (2) The alignment and base elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete, if necessary. When any form has been disturbed or any base has become unstable, the forms shall be reset and rechecked. The forms shall be removed after 24 hours have elapsed from the concrete placement. However, it shall require the prior approval of the Engineer.

Conditioning of Base Course, Side-Form Construction

Ruts or depressions in the base course caused by hauling or usage of other equipment shall be filled as they develop with suitable material (not with concrete or concrete aggregates) and thoroughly compacted by rolling. If damage occurs to the base course, it shall be corrected full depth by and at the expense of the Contractor. Alternatively, the damaged areas shall be filled with concrete integral with the pavement. If required by the Engineer, a multiple-pin template weighing not less than 454 kg per 6.1 m or other approved template shall be provided and operated on the forms immediately in advance of the placing of the concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and maintained at the correct contour of the base course. The adjustment and operation of the template shall be such as to provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed. Low areas may be filled and compacted to the proper grade or filled with concrete integral with the pavement. The template shall be maintained in accurate adjustment at all times by the Contractor and should be checked daily.

Handling, Measuring and Batching Material

The proposed batch plant size, layout, equipment, and provisions of material shall be assured by the Contractor for a continuous supply of concrete material to the work. The aggregate from different sources and of different grading shall not be stockpiled together. Improperly placed stockpiles shall not be accepted by the Engineer.

Proportions

- (1) The proportioning requirements for the concrete shall be designed for a flexural strength of 5.0 MPa at 28 days.
- (2) The quality of concrete shall be as specified in Table 11-5.

Table 11-5 Quality of Concrete

Work Item	Quality	Test Method	Remarks
Design flexural strength	5.0 MPa	AASHTO T 97	
Air content at unloading	5 ± 1.5 %	AASHTO T 121	At 28 days
Slump at unloading	25 to 50 mm	AASHTO T 119	

- (3) Prior to the start of paving operations and after the approval of all materials to be used in the concrete, the Contractor shall submit to the Engineer test data showing the proportions in place and actual flexural strength obtained from the concrete

specimens. The minimum cement content shall be maintained to produce the concrete of suitable durability and workability. The maximum water cement ratio for the concrete shall not be exceeded, and the entrained air shall be as required to increase durability and provide workability.

- (4) The format for presentation of specified mix shall be in accordance with Table 11-6, which shall be submitted for the Engineer's approval.

Table 11-6 Format of Proportioning Specifications

Aggregate	Target Value of Slump		Target Value of Entrained Air		Water cement Ratio W/C (%)	Fine Aggregate	Quantity (kg/m ³)		
	Plant (cm)	In Place (cm)	Plant (%)	In Place (%)			Water Cement	Fine Agg.	Coarse Agg.

- Remarks:
- | | |
|--|-------------------------------------|
| Design Compressive Strength kg/cm ² | 6. Type of Coarse Aggregate |
| Compressive Strength of Concrete | 7. Porosity of Coarse Aggregate |
| Type of Cement | 8. Type of Admixture |
| Type of Fine Aggregate | 9. Time required for Transportation |
| F.M. of Fine Aggregate | 10. Time of Construction |

Mixing and Transportation

(1) Weighing of Materials

- (a) Before weighing the materials, the material proportion in the laboratory shall be adjusted to the equivalent material proportion in place and shall be approved by the Engineer.
- (b) Each material shall be weighed for the quantity to be used in one mixing, except for the quantity of water and liquid admixture which may be volumetrically measured.
- (c) Variation in the quantity measure shall not be more than the values shown in Table 11-7.

Table 11-7 Allowance for Quantity Measurement

Type of Material	Allowance by Weight (%)
Water, Admixture	1
Cement	2
Aggregate	3

- (d) The water used for dissolving or diluting the admixture shall be included in measuring the total quantity of the water in mixing the concrete.

(2) Mixing

- (a) The mixing time of concrete shall be determined by testing. The standard mixing time without the test shall not be less than 1.5 minutes with a tilting mixer and not less than 1 minute with a pan mixer after all materials are charged in the mixer. In no case shall the mixing be continued beyond 3 times the standard mixing time.
- (b) No new materials shall be added into the mixer before all mixed concrete is discharged from the mixer.
- (c) The mixer shall be cleaned before and after the mixing operation. Proper decantation basins should be provided to collect the washings from the mixers and dump trucks and prevent clogging of drains in the area.

(3) Transportation of Concrete

- (a) The concrete shall be transported in such manner as to prevent segregation of material and shall be placed promptly after arrival at the Site.

- (b) The time from mixing to commencing the placement shall not exceed the time when concrete will start its initial set. Placing of the concrete shall be performed in a manner that does not damage the concrete already placed ahead.
- (c) In the dry season, or in the presence of strong wind or in other conditions the concrete shall be provided with reasonable protection from drying during transportation.
- (d) The distance from loading to unloading shall be as short as possible to prevent the concrete from segregation.
- (e) The trucks used for the transportation of concrete shall be cleaned before and after use.

(4) Limitations of Mixing

During dry season, the following precautions shall be taken. The forms and the base shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed during the coolest hours of the day, and in no case shall the temperature of the concrete when placed exceed 32°C. The aggregates and mixing water shall be cooled as necessary to maintain the concrete temperature at not more than 32°C.

Placing Concrete

- (1) For the side-form method, the concrete shall be deposited on the base to require as little handling as possible. Unless otherwise approved by the Engineer, the concrete shall be unloaded into the bucket of the lateral transporter at the adjoining lane and carried to the lane for concrete placing by a side loading machine or a conveyor system, and dumped on the base to prevent segregation of materials from discharged bucket or hopper of box type spreader. The placing shall be continuous between the transverse joints without the use of intermediate bulkheads. Necessary hand spreading shall be done with shovels, and not with rakes. The workmen shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with soil or foreign substances. When the concrete is to be placed adjoining a previously constructed lane of pavement and when mechanical equipment will be operated upon the existing lane of pavement, the concrete shall be at least 7 days old and at a flexural strength approved by the Engineer. If only finishing equipment is carried on the existing lane, paving in adjoining lanes may be permitted after 3 days, if so approved by the Engineer.
- (2) The concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete.
- (3) The vibrators shall not be permitted to come in contact with a joint assembly, the base course, or a side form. In no case shall the vibrator be

operated longer than 15 seconds in any one location, nor shall the vibrators be used to move the concrete.

- (4) The concrete shall be deposited as near to the expansion and contraction joints as possible without disturbing them but shall not be dumped from the discharge bucket or hopper into a joint.
- (5) Should any concrete material fall on a completed slab, it shall be removed immediately by approved methods.

Strike-off of Concrete

- (1) Following the placing of the concrete, it shall be struck off to conform to the cross section specified on the Drawings and to the elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation specified on the Drawings.
- (2) When concrete pavement with reinforcing mesh is placed in 2 layers, the bottom layer shall be struck off to such length and depth that the reinforcing mesh may be laid full length on the concrete in its final position without further manipulation. The reinforcing mesh shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When concrete with reinforcing mesh is being used then the mesh may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Joints

(1) General

(a) Longitudinal and Transverse Joints

The longitudinal and transverse joints shall be constructed as indicated on the Drawings and in accordance with these requirements by saw cutting the proposed joints within 16 hours or a time frame that necessitate early cutting to be determined by the Engineer thru trial cutting after placing the concrete. All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement. The joints shall not vary more than 13 mm from the true line or from their designated position. The vertical surface of the pavement adjacent to all expansion and construction joints shall be finished to the true plane and edged to radius of 6 mm.

The surface across the joints shall be tested with a 3 m straight edge as the joints are finished and any irregularities in excess of 6 mm shall be corrected before the concrete has hardened. The transverse joints

shall be at right angles to the longitudinal joints of the pavement and shall extend the full width of the slab.

(b) Tie Bars

Tie bars shall consist of deformed bars installed in longitudinal joints as shown on the Drawings. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals as shown on the Drawings. They shall be held in position parallel to the pavement surface and midway between the surfaces of the slab. These bars shall not be painted, greased, or enclosed in sleeves.

(c) Dowel Bars

The dowel bars shall be placed across transverse or other joints in the manner as specified on the Drawings. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. A metal, or other type, dowel expansion cap or sleeve with spring, shall be furnished for each dowel bar used with expansion joints. These caps shall be substantial enough to prevent collapse and shall be placed on the ends of the dowels as shown on the Drawings. The caps or sleeves shall fit the dowel bar tightly and the closed end shall be watertight. The portion of each dowel painted with rust preventive paint shall be thoroughly coated with asphalt or an approved lubricant, to prevent the concrete from binding to that portion of the dowel.

(2) Installation

- (a) The top of an assembled joint device shall be set at the designed distance below the pavement surface and the elevation shall be checked. Such devices shall be set to the required position and line and shall be securely held in place by stake or other means during the pouring and finishing of the concrete. The pre-molded joint material shall be placed and held in a vertical position. Dowel bars shall be checked for exact position and alignment as soon as the joint device is staked in place, and the device shall be tested to determine whether it is firmly supported. The maximum permissible tolerance for dowel bar alignment in either the horizontal or vertical plane shall be 21 mm per meter. The most effective way to obtain proper alignment is with well-fabricated dowel baskets and dowel assemblies. In lieu of using dowel assemblies at contraction joints, dowel bars may be placed in the thickness of pavement by mechanical device approved by the Engineer.
- (b) When the joints in the concrete pavements are sawed, the joints shall be cut as shown on the Drawings. The equipment shall be as described in this Section. The circular cutter shall be capable of cutting

a groove in a straight line and shall produce a slot of at least 8 mm wide and to the depth shown on the Drawings. The top portion of the slot or groove shall be widened by means of a second shallower cut to provide adequate space for the joint sealer. Sawing of the joints shall commence immediately within certain hours as determined by the Engineer that the concrete has hardened sufficiently to permit cutting completely without chipping, spalling, or tearing.

- (c) The joints shall be sawed at the required spacing consecutively in sequence of the concrete placement, unless otherwise approved by the Engineer.

(3) Longitudinal Joints

(a) Construction

The longitudinal construction joints necessary for lane construction shall be formed against suitable side forms as indicated on the Drawings. The edges of the joints shall be finished with a grooving tool or edging tool, and a space or slot shall be formed along the joint of the specified dimensions, to receive the joint sealer, as indicated on the Drawings.

The longitudinal construction joints shall be sawed or formed to provide a groove at the top conforming to the details and dimensions indicated on the Drawings.

Provisions shall be made for the installation of the bars as indicated on the Drawings.

(b) Expansion

The longitudinal expansion joints shall be installed as indicated on the Drawings. The pre-molded filler shall extend for the full depth and width of the slab at the joint, except for space for sealer at the top of the slab as indicated on the Drawings. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A metal or wooden cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete is placed and struck off, the cap shall be carefully withdrawn leaving the space over the pre-molded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic.

(4) Transverse Joints

(a) Expansion

The transverse expansion joints shall be installed at the locations indicated on the Drawings. The joints shall be installed at right angles to the centerline and perpendicular to the surface of the pavement. The

joints shall be installed and finished to ensure complete separation of the slabs.

All devices used for the installation of expansion joints shall be easily removable without disturbing the concrete and held in proper transverse and vertical alignment. Immediately after forms are removed, any concrete bridging at the joint space at the ends shall be removed for the full width and depth of the joint.

The expansion joints shall be equipped with dowels of the dimensions and at the location indicated on the Drawings. The dowels shall be firmly supported in place and accurately aligned parallel to the centerline of the pavement by means of a dowel assembly which will remain in the pavement and will ensure that the dowels are not displaced during the construction.

(b) Contraction

The transverse contraction joints shall be installed at the locations indicated on the Drawings. These joints will be installed by forming a groove or cleft by means of an approved iron or wooden separator at the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. The dowel bar assemblies shall be installed, where required.

(c) Construction

The transverse construction joints shall be installed at the end of each day's placing operations and at any other points in the progress of paving when the concrete placement is interrupted for more than 30 minutes. The installation of the joint shall coincide with the designed doweled construction joint.

Final Strike-off, Consolidation and Finishing

(1) Sequence

The sequence of operations shall be the strike-off and consolidation, floating and removal of laitance, straight edging, and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations shall not be permitted.

(2) Finishing at Joints

- (a) The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material. The concrete adjacent to joints shall be mechanically vibrated as specified in para 11-4-7 of this Section.
- (b) After the concrete is placed and vibrated adjacent to the joints, the finishing machine shall be operated in the manner to avoid damage or misalignment of joints.

(3) Machine Finishing

- (a) The concrete shall be spread as soon as it is placed, and it shall be struck off and screeded by an approved finishing machine. Excessive operation over a given area shall be avoided. The tops of the forms shall be kept clean by an effective device attached to the machine. The travel of the machine on the forms shall be maintained true without lift, wobbling, or other variation tending to affect the precision finish. During the first pass of the finishing machine, a uniform ridge of concrete shall be maintained ahead of the front screed for its entire length.
- (b) When in operation, the screed shall be moved forward with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing. If necessary, this shall be repeated until the surface is of uniform texture, true to the designed grade and free of porous areas.

(4) Hand Finishing

- (a) The manual finishing methods shall not be permitted, except under the following conditions. In the event of breakdown of the mechanical equipment, the manual methods may be used to finish the concrete already deposited on the base. The concrete, as soon as placed, shall be struck off and screeded. An approved portable screed shall be used.
- (b) The screed for the surface shall be at least 0.6 m longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed either of metal or of other suitable material covered with metal. Consolidation shall be attained by the use of a suitable vibrator.

(5) Floating

After the concrete has been struck off and consolidated, it shall be further smoothed, trued, and consolidated by means of a longitudinal float, using one of the following methods.

(a) Hand Method

The hand-operated longitudinal float shall not be less than 1.5 m in length and 150 mm in width, properly stiffened to prevent excessive flexibility and warping.

The longitudinal float, operated from foot bridges resting on the side forms and spanning but not touching the concrete, shall be worked with a sawing motion, and moved from one side of the pavement to the pavement centerline and passing gradually.

Forward movement along the centerline of the pavement shall be conducted in successive advances of not more than one-half the length of the float. Any excess water or soupy material shall be wasted over the side forms on each pass.

(b) Mechanical Methods

The Contractor may use a machine composed of a cutting and smoothing float, suspended from and guided by a rigid frame. The frame shall be carried by 4 or more visible wheels riding on, and constantly in contact with, the side forms or pavement subgrade. If necessary, long-handled floats having blades not less than 1.5 m in length and 150 mm in width may be used to smooth and fill in open-textured areas of the pavement.

Long-handled floats shall not be used to float the entire surface of the pavement in lieu of mechanical methods. When strike-off and consolidation are done by hand and the crown of the pavement will not permit the use of the longitudinal float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation.

After floating, any excess water and laitance shall be removed from the surface of the pavement by a straightedge 3 m or more in length. Successive drags shall be lapped one-half the length of the blades.

(6) Straight-Edge Testing and Surface Correction

(a) After the pavement is struck off and consolidated and while the concrete is still plastic, it shall be tested for trueness with a 5 m straightedge. For this purpose, the Contractor shall furnish and use accurate 5 m straightedge swung from handles 0.4 m longer than one-half the width of slab. The straight-edge shall be held in contact with the surface in successive positions parallel to the centerline of the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straight edge. Any excess water and laitance shall be removed from the surface of the pavement. Any depression shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meet the requirements. Surface testing and correction shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section.

(b) The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

Surface Texture

The surface of the pavement shall be finished with a broom for all constructed concrete pavements. It shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 2 mm in depth. It is important that the texturing equipment does not tear nor unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected.

Surface Test

- (1) As soon as the concrete is hardened sufficiently, the pavement surface shall be tested with a 5 m straightedge. Areas in a slab showing high spots of more than 6 mm but not exceeding 13 mm in 5 m shall be marked and immediately ground down with an approved grinding machine to an elevation that will fall within the tolerance of 6 mm or less. Where the unevenness exceeds 13 mm, the pavement shall be removed and replaced at the expense of the Contractor as directed by the Engineer. Any area or section so removed shall not be less than 3 m in length nor less than the full width of the lane involved.
- (2) When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints, that is less than 3 m in length, shall also be removed and replaced.

Curing

Immediately after the finishing operations have been completed and marring of the concrete has not occurred, the entire surface of the placed concrete shall be cured in accordance with two of the methods described below. In all cases in which curing requires the use of water, the curing shall have prior right to all water supply or supplies. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be a sufficient cause for immediate suspension of concreting operations. The concrete shall not be left exposed to the weather for more than 30 minutes during the curing period.

(1) Impervious Membrane Method

- (a) The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. The curing compound shall be applied by mechanical sprayers under pressure at the rate of 4 liters to an area not more than 14 m². The spraying equipment shall be of the fully atomizing type equipped with a tank agitator.

(b) At the time of use, the compound shall be in a thoroughly mixed condition with pigment uniformly dispersed throughout the liquid. During application the compound shall be stirred continuously by effective mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. Curing compound shall not be applied to the inside faces of joints to be sealed, but approved means shall be used to insure proper curing for 72 hours (at the joints).

(c) The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause within the required curing period, the damaged portions shall be repaired immediately with additional compound. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

(2) Polyethylene Films

The top surfaces and sides of the pavement shall be entirely covered with polyethylene sheeting. The units shall be lapped at least 0.5 m. The sheeting shall be placed and weighted to cause it to remain in contact with the surface covered. The sheeting shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the pavement. The sheeting shall be maintained in place for 72 hours after the concrete has been placed.

(3) White Burlap / Jute Sack

The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be of such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully wetted and in position for 120 hours after the concrete has been placed.

Removing Forms

(1) The forms shall not be removed from freshly placed concrete until it has set for at least 24 hours, except where auxiliary forms are used temporarily in widened areas. The forms shall be removed carefully to avoid damage to the pavement. After the forms have been removed, the sides of the slab shall be cured by one of the methods indicated in above para 11-4-13.

(2) Major honeycombed areas shall be removed and replaced. Any area or section so removed shall not be less than 3 m in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab

adjacent to the joints that is less than 3 m in length shall also be removed and replaced.

Protection of Pavement

The Contractor shall protect the pavement and its appurtenances against construction traffic. The protection of the pavement shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, and bridges. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense. In order that the concrete, be properly protected against the effects of rain before the concrete is sufficiently hardened, the Contractor will be required to have available at all times materials for the protection of the edges and surfaces of the unhardened concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 0.1 mm in thickness of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop, and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

Application of Joint Sealing Materials

- (1) Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic.
- (2) Immediately before sealing, the joints shall be thoroughly cleaned of all dirt, curing compound, and other foreign material. Cleaning shall be accomplished by sandblasting or wire brushing. Upon completion of cleaning, the joints shall be blown out with compressed air. The joint faces shall be surface dry when the primer is applied.
- (3) Prior to installation of sealants, joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

(a) Backup Material and Breaker

The backup material or the bond breaker shall be filled in the bottom of the joints, if so required on the Drawings. Backup material and bond breakers should be compatible with the sealant, should not be deleterious to the sealant. It should be compressible without extruding the sealant and should recover to maintain contact with the joint faces when the joint is opened.

(b) Cold Poured Sealant

The joint sealant shall be applied uniformly solid from bottom to top and shall be filled without formation of entrapped air voids. A backing

material shall be placed as shown on the Drawings and shall be non-adhesive to the concrete or the sealant material. A direct connecting pressure type extruding device with nozzles shaped for insertion into the joint shall be provided. Any sealant spilled on the surface of the pavement shall be removed immediately.

Opening to Traffic

The pavement shall not be opened to traffic until test specimens molded and cured in accordance with AASHTO T 23 have attained a flexural strength of 43 kg/cm² when tested in accordance with AASHTO T 97. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete has been placed. Prior to opening to traffic, the pavement shall have been cleared of all construction materials, equipment and other obstructions and properly cleaned all to the satisfaction of the Engineer.

Quality Control

(1) Materials

The quality shall satisfy the standard values shown in Table 11-8 (A) through 11-8 (E).

(2) Workmanship

The workmanship shall be controlled in the manner shown in Table 11-9.

Test Condition

- (1) Prior to full production, the Contractor shall prepare a quantity of the Portland Cement Concrete mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 15 m long and 5.0 m wide placed in two sections and shall be of the same depth specified for the construction of the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be of the same type and weight to be used on the remainder of the course represented by the test section.
- (2) If the test section should prove to be unsatisfactory, the necessary adjustments to the mix design and plant operation shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. When the test sections do not conform to specification requirements, the pavement shall be removed and replaced at the Contractor's expense. A marginal quality test section that has been placed in an area of little or no traffic may be left in place. If a second test section also does not meet specification requirements both sections shall be removed at the Contractor's expense. Full production shall not begin without the Engineer's approval.

MEASUREMENT AND RATES

Measurement

- (1) The unit of measurement for the Portland Cement Concrete Pavement shall be the square meter (m²).
- (2) The quantity shall be computed as the area flat on plan from the dimensions indicated on the Drawings.

Rates

- (1) The rates shall be full compensation for all plant, materials, labor, equipment, transport, temporary works, establishment charges, overheads, profit and taxes required to complete the work described in this Section of the Specification and/or shown on the Drawings.
- (2) Rates shall further include for:
 - (a) all formwork
 - (b) provision of expansion and contraction joints
 - (c) dummy or construction joints
 - (d) tie bars, dowel bars, caps, springs, keys, hinge details, installation of hurricane tie down rings and housings
 - (e) joints to varying thicknesses and types of adjoining pavements, including additional concrete, tie bars and mesh reinforcement
 - (f) forming edges
 - (g) curved work
 - (h) curing elements
 - (i) transition slabs
 - (j) brooming to approved surface texture
 - (k) joint filler and sealant
 - (l) side and end form waste
 - (m) concrete saw cutting

Table 11-8 (A) Materials

Work Item	Test Item	Test Method	Frequency	Standard Value	Notes	
Portland Cement Concrete Pavement	Cement	As approved by the Engineer.	Once for every receiving of materials	To meet the requirements of Section 11-2-1	Manufacturer's test data may be substituted as directed by the Engineer.	
	Fine aggregate: Gradation	AASHTO T 27	Once for every 500 m ²	To meet the Requirements of Table 11-1		
	Amount of Material Finer than 0.075 mm	AASHTO T 11	- ditto -	Not more than 3%		
	Organic impurities	AASHTO T 104	- ditto -	Brighter than the standard hue		
	Soundness	AASHTO T 104	- ditto -	Not more than 5%		
	Specific gravity and absorption	ASTM C 128	- ditto -	-----		
	Claylump and Friable Particles	ASTM C-142	- ditto -	1% max. by weight		

Work Item	Test Item	Test Method	Frequency	Standard Value	Notes
	Light Weight Pieces in Aggregate	ASTM C-123	- ditto -	0.5% max. by weight	
	Coarse aggregate: Gradation	AASHTO T 27	- ditto -	To meet the Requirements in Table 11-3	
	Amount of Material				
	Finer than 0.075 mm	AASHTO T 11	- ditto -	Not more than 1%	
	Soundness	AASHTO T-104	- ditto -	Not more than 5%	
	Clay Lumps and Friable Particles	AASHTO T-112	- ditto -	0.25% max. by weight	
	Light weight pieces in Aggregate	AASHTO T-113	- ditto -	0.5% max. by weight	

Table 11-8 (B) Materials

Work Item	Test Item	Test Method	Frequency	Standard Value	Notes	
Portland Cement	Coarse aggregate abrasion	AASHTO T 96	Once for every 500 m ³	Not more than 30%		
	Flatness	As approved by the Engineer	- ditto -	Not more than 10% by weight		
	Specific gravity and absorption	AASHTO T 95	- ditto -	-----		
	Admixture	As approved by the Engineer	Once a month	Standard values specified in this Specification	Manufacturer's test data may be substituted as directed by the Engineer.	
	Joint filler and joint sealer	- ditto -	Once for every receiving of materials	- ditto -		
	Steel bars	- ditto -	- ditto -	- ditto -		

Table 11-8 (C) Materials

Work Item	Test Item	Test Method	Frequency	Standard Value	Notes
Portland Cement Concrete Pavement (Proportioning)	Proportioning of materials	As approved by the Engineer (By test mixing)	Once for every change in the quarry and the proportioning	-----	
	Mixing at plant	- ditto -	- ditto -	-----	
Portland Cement Concrete Pavement (Mixing Plant)	Aggregate screening	AASHTO T 27	Fine aggregate: 2 times per day Coarse aggregate: Once per day	To meet the requirements of gradation range of Tables 11-1 and 11-3	
	Surface moisture of aggregate	ASTM C 70 or as approved by the Engineer	Fine aggregate: 2 times per day Coarse aggregate: once per day	-----	
	Calibration of scales	As approved by the Engineer	Every day before starting operation	Allowance of measure: Water, admixture - not more than 1% Cement - not more than 2% Aggregate - not more than 3%	

Table 11-8 (D) Materials

Work Item	Test Item	Test Method	Frequency	Standard Value	Notes
Portland Cement Concrete Pavement	Slump	ASTM C 143	4 times per day	25 mm to 50 mm	
	Flexural strength	ASTM C 78 AASHTO T 97	The following specimen shall be taken once for every 200 m ³ or as directed by the Engineer: For 7 days - 3 each For 28 days- 3 each For x days - 2 each Total 8 each	Not less than 5.0 MPa (at 28 days) 1 each (underwater) 1 each (in the air)	
	Air content	ASTM C 138 AASHTO T 121	4 times per day or frequency as directed by the Engineer	5 ± 1.5 %	

Table 11-8 (E) Materials

Confirming of Job Mixing :	1. The mixing shall be checked on the materials scale auto-recorder device. In case the auto-recorder is not installed, the result of mixing shall be checked with attendance of the Engineer.
Concrete Strength Test :	1. The preparation of test specimens shall be in accordance with the requirements of ASTM C 31. However, the curing of such specimens shall be done in field conditions. 2. The flexural strength test shall be in accordance with the requirements of ASTM C 78. The specimens shall be taken on a random sampling basis. 3. The flexural strength of the concrete shall meet the requirements: a. The average of any 4 consecutive strength tests, tested at the end of 28 days, shall have an average flexural strength equal to or greater than the design flexural strength. b. Not more than 20% of the specimens tested at the end of 28 days shall have a flexural strength less than the design flexural strength.

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Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class “A” Documents

Legal Documents

- (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages) **in accordance with Section 8.5.2 of the IRR;**

Technical Documents

- (b) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**
- (c) Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided for in Sections 23.4.1.3 and 23.4.2.4 of the 2016 revised IRR of RA No. 9184, within the relevant period as provided in the Bidding Documents; **and**
- (d) 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**
- (e) Conformity with the Technical Specifications, which may include Pictures/Brochures, Literature and/or Description of the Equipment to be used, production/delivery schedule, manpower requirements, and/or after-sales/parts, if applicable; **and**
- (f) 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

- (g) The prospective bidder’s computation of Net Financial Contracting Capacity (NFCC) **or** A committed Line of Credit from a Universal or Commercial Bank in lieu of its NFCC computation.

Class “B” Documents

- (h) If applicable, a duly signed joint venture agreement (JVA) 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

- (i) Original of duly signed and accomplished Financial Bid Form; **and**
- (j) Original of duly signed and accomplished Price Schedule(s).

Other documentary requirements under RA No. 9184 (as applicable)

- (k) *[For foreign bidders claiming by reason of their country’s extension of reciprocal rights to Filipinos]* Certification from the relevant government

office of their country stating that Filipinos are allowed to participate in government procurement activities for the same item or product.

- (l) Certification from the DTI if the Bidder claims preference as a Domestic Bidder or Domestic Entity.

