



National Development Company



**DETAILED ENGINEERING DESIGN FOR THE
NDC INDUSTRIAL ESTATE PROJECT
(WITH REVISED WATER SUPPLY DESIGN)**

**TECHNICAL SPECIFICATIONS
VOLUME II**

OCTOBER 2015

PREPARED BY:



Infra Consultants in the Philippines (ICP) Inc.

TABLE OF CONTENTS

Page

II. TECHNICAL SPECIFICATIONS

INTRODUCTION.....	1
part A FACILITIES FOR THE ENGINEER.....	A-1
A.1 Requirements.....	A-1
A.1.1 Offices, Laboratories and Living Quarters for the Engineer	A-1
1A.1.1(a) Provision of Field Office.....	A-1
A.1.2 Vehicles for the Engineer	A-3
A.1.3 Assistance to the Engineer.....	A-4
A.1.4 Photographs	A-4
A.1.5 Schedule of Facilities for the Engineer.....	A-5
A.2 Measurement and Payment.....	A-10
A.2.1 Measurement	A-10
A.2.2 Payment	A-10
part B OTHER GENERAL REQUIREMENTS	B-12
B.1 Offices and Workmen’s Accommodation for Contractor	B-12
B.2 Project Information Sign Board.....	B-12
B.2.1 Method of Measurement and Payment	B-12
B.3 Construction Health and Safety	B-12
B.3.1 Health and Safety Plan	B-12
B.3.2 Construction Safety and Health Program (CSHP).....	B-13
B.3.3 Construction Safety and Health Organization	B-13
B.3.4 Personnel Protective Equipment and Devices (PPE).....	B-14
B.3.5 Signages and Barricades.....	B-14
B.3.6 Facilities	B-14
B.3.7 Payment	B-15
B.4 Quality Control of Materials.....	B-15
B.4.1 Source of Supply and Quality of Materials	B-16
B.4.2 Samples and Tests for Acceptance	B-16
B.4.3 Removed and Rejected Materials	B-17
B.4.4 Manufacturer’s Certificate of Compliance	B-17
B.4.5 Handling and Storing Materials.....	B-18
B.4.6 Compliance and Test Requirements	B-18
B.5 Transportation and Handling	B-19
B.5.1 Standards	B-19
B.5.2 Coordination and Others.....	B-19
B.5.3 Weight Limitations and Legal Requirements	B-20
B.6 Project Record Documents	B-20
B.6.1 Description	B-20
B.6.2 Submittal Requirements	B-20

B.6.3	Project Record Documents	B-21
B.6.4	Project Records for Materials & Equipment	B-21
B.6.5	Update and Maintenance of the Job Set Documents	B-21
B.6.6	Final Record Documents	B-22
B.7	Disposal of Material Outside the Project Boundaries.....	B-23
B.8	Clearing/Finishing the Site	B-24
B.9	Method of Measurements	B-24
B.9.1	Measurement of Quantities.....	B-24
B.10	Silence of Contract Documents	B-25
B.11	Meetings/Conferences	B-26
B.12	Mobilization and Demobilization.....	B-26
B.12.1	General Requirement.....	B-26
B.13	Maintenance of Project Road and Traffic Control	B-27
B.13.1	Provisions for Passage of Traffic.....	B-27
B.14	Traffic Management During Construction	B-28
B.14.1	Contractor's Liability and Responsibilities	B-36
B.15	Environmental Monitoring and Control	B-36
B.15.1	Environmental Protection Plan.....	B-36
B.15.2	Environmental Officer.....	B-38
B.15.3	Environmental Protection During Construction	B-38
B.15.4	Re-vegetation of Disturbed Ground	B-39
B.15.5	Prevention of Pollution.....	B-39
B.15.6	Noise and Vibration.....	B-39
B.15.7	Construction Waste	B-40
B.15.8	Air Contaminant (TAC).....	B-40
B.15.9	Water Quality and Sewage Disposal	B-40
B.15.10	Visual Impact.....	B-41
B.15.11	Measurement and Payment.....	B-41
part C	EARTHWORKS.....	C-42
part D	SUBBASE AND BASE COURSE.....	D-56
part E	SURFACE COURSES	E-58
part F	BRIDGE CONSTRUCTION (Not Applicable)	F-59
part G	DRAINAGE AND SLOPE PROTECTION STRUCTURES	G-60
part H	MISCELLANEOUS STRUCTURES	H-62

LIST OF TABLES

Table A-1: SCHEDULE A - Furniture/Fixtures and Equipment/Appliances for the Field Office	A-6
Table A-2: SCHEDULE B - Furniture/Fixtures and Equipment/Appliances for the Living Quarters	A-7
Table A-3: SCHEDULE C - Inspectors and Survey Personnel.....	A-8
Table A-4: SCHEDULE D - Operation/Maintenance of Field Office	A-8
Table A-5: SCHEDULE E- Supplies and Consumable Stores for Field Office.....	A-8

INTRODUCTION

The Specifications describe in detail the work to be executed, the character and quality of materials, workmanship and the specific responsibilities of the Contractor that are not covered by the Conditions of Contract. It includes the Technical Specifications, the General Specifications and Supplemental Notices or Addenda, if any, and shall be read in conjunction with the Plans and all the other Contract Documents.

The Technical Specifications comprise of:

PART I : DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS, VOLUME II, 2013 EDITION and DPWH STANDARD SPECIFICATIONS FOR PUBLIC WORKS STRUCTURES, VOLUME III, 1995 EDITION

Pertinent notes appearing in the Contract Plans or Drawings shall also be considered as part and parcel of the Technical Specifications.

Any further amendments to the Technical Specifications and to any other Document, if necessary, will be furnished to the Contractors by means of Supplemental Notice or Addendum.

The DPWH Standard Specifications, Volume II, 2004 Edition, is composed of nine (9) parts, Part A, Part B, and up to Part I with each part (except for Part I), providing the specifications of work items belonging to a particular type of work or work grouping as follows:

PART A	-	Facilities for the Engineer
PART B	-	Other General Requirements
PART C	-	Earthwork
PART D	-	Subbase and Base Course
PART E	-	Surface Course
PART F	-	Bridge Construction (Not Applicable)
PART G	-	Drainage and Slope Protection Structures
PART H	-	Miscellaneous Structures

Part A – Facilities for the Engineer and Part B – Other General Requirements stipulate the general requirements of the Contract (Temporary works or facilities) for the proper execution and completion of the project that do not necessarily become an integral part of the completed project.

Part C to Part G provide the specifications of permanent works with each part covering the items belonging to the particular type of work that it represents. The specifications for permanent work items are generally presented under five (5) distinct sections as follows:

1. Description of Work;
2. Material Requirements;
3. Construction Requirements;
4. Method of Measurement; and
5. Basis of Payment

Part H – Miscellaneous Structures provides the specifications of permanent works regarding structures pertinent to highways, bridges and airport-runways that cannot be properly classified as belonging to any particular type of work as represented in Part C to Part G of the DPWH Standard Specifications.

The **Supplemental Specifications** shall consist of modifications and additions to the DPWH Standard Specifications (Volumes II), to adapt the latter to actual conditions and/or requirements relative to this project. Some of these modifications and additions may actually be of general application but in the absence of a supplemental specifications adopted by the DPWH, subsequent to the publication of the DPWH Standard Specifications, 2004 Edition, Volume II – Highways, Bridges and Airports and DPWH Standard Specifications for Public Works Structures, these **Supplemental Specifications** have been included in the Technical Specifications of this project.

The **Supplemental Specifications** for this project shall consist of modifications and additions to the DPWH Standard Specifications as follows:

- (1) Modifications in the specification of standard work items under Part A to Part I of the DPWH Standard Specifications 2004 Edition, Volume II – Highways, Bridges and Airports. These modifications are carried out without changing the “number” and “name” of each of such standard work items.
- (2) Specifications for additional items of work, respectively for Part A to Part H of the DPWH Standard Specifications.

The **Special Provisions** are indicated on the Technical Specifications and shall consist of specifications for work Items that are based on applicable Department Orders issued by the DPWH or work items that are not stated in the DPWH Standard Specifications but shall be used for the project.

The Item Number of the Special Provisions is distinguished by placing the symbol “SPL” before its designated Number.

For Specifications of other special items of work not included in Volume II of the Technical Specifications of this project, the corresponding standard specifications shall be deemed to apply:

- AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition, 2003
- ASTM Standard Specifications

PART A FACILITIES FOR THE ENGINEER

A.1 Requirements

The following subsections on Offices and Laboratories for the Engineer of the DPWH Standard Specifications (2013 edition) is replaced and revised as follows:

A.1.1 Offices, Laboratories and Living Quarters for the Engineer

Modify this Sub-Section to read as follows:

1A.1.1(a) Provision of Field Office

1. Modify Sub-item No. 1 as follows:

During the period of construction, the Contractor shall provide and maintain field office and living quarters for the use of the Engineer and his staff in rented building(s) conforming to all the requirements and to the satisfaction of the Engineer.

The Contractor shall first seek the Engineer's approval of the building proposed to be rented before finalizing any rental agreement.

Living Quarters for the Engineer

The Project Proponent shall operate and maintain the Living Quarters for the Engineer and all utilities therein in good condition throughout the whole period.

The Contractor shall furnish as soon as the Engineer starts his mobilization on site, sufficient furniture, fixtures, equipment, appliances, and necessary supplies for use in the Living Quarters, with the Engineer's prior approval. All furniture, fixtures, appliances and equipment, consumables and other items shall be brand new when initially furnished and shall conform to those indicated and specified on the Drawings and/or Specifications under SCHEDULE B as to kind, grades, types and sizes or as determined by the Engineer.

All habitable rooms shall be properly insulated and shall be equipped with electric lights, air conditioning and/or mechanical ventilation, and the supporting facilities shall provide the necessary hot and cold water, sewer and electrical facilities, and all maintenance, all to the satisfaction of the Engineer. The Contractor shall pay for Electricity and water consumption costs.

Field Office

The Contractor shall Furnish, install, and maintain field offices and work sheds during entire construction period. The office shall be approved by the Engineer.

The Contractor shall furnish as soon as the Engineer starts his mobilization on site, sufficient furniture, fixtures, equipment, appliances, and necessary supplies for use in the Temporary Field Office, with the Engineer's prior approval. All furniture, fixtures, appliances and equipment, consumables and other items, for the use of the Engineer,

shall be brand new when initially furnished and shall conform to those indicated and specified on the Drawings and/or Specifications under SCHEDULE A and E as to kind, grades, types and sizes or as determined by the Engineer.

The unit of measurement for the provision of Engineer's Temporary Office shall be on a monthly basis.

2. Modify Sub-item No. 2 as follows:

All tests shall be carried out at an approved independent testing laboratory. The Contractor shall, if so approved, make all necessary arrangements for the supply and delivery of samples to, and collection of samples from such independent laboratory. Unless otherwise specified, the Contractor shall arrange for one copy of the independent testing laboratory test certificate to be delivered to the Engineer or its Representative not less than three (3) days before the materials covered by the relevant test certificate are incorporated into the Works, and the test certificate shall be related to the materials from which the samples were taken.

The Engineer shall define from the beginning of the Works, and in accordance with the specifications, all tests to be performed for each kind of materials and/or works, together with the corresponding frequencies to be used and amend or change such statement from time to time during the progress of work if deemed necessary.

3. Modify the text of this Sub-item with the following:

The telephone service shall have two separate direct landlines for the exclusive use of the Engineer and his staff. One of these connections shall be a dedicated facsimile service line and both shall have direct dial service available. In addition to telephone landline service, cellular phones shall be provided by the Contractor at no additional cost to the Employer for the whole duration of the Contract.

4. Modify the text of this Sub-item with the following:

The Contractor shall provide and maintain cellular phones of good quality, brand new, ready for use, complete with accessories including provision for pre-paid cards for the exclusive use of the Engineer.

The communication equipment shall be provided not later than thirty (30) calendar days after the receipt of the Notice to Proceed. If the Contractor fails to provide such equipment within the time stipulated, the Engineer shall be entitled to take such action as he may deem necessary, and charge all relevant expenses to the Contractor by deducting the amount from his billings.

The cellular phones will become the property of the Contractor at the end of the project.

5. Delete Sub-item No. 5 in its entirety.

6. This Sub-item is modified and supplemented as follows:

By way of maintenance, the Contractor shall provide all the necessary personnel specified under SCHEDULE D to maintain all the facilities in good operating condition, to adequately safeguard and secure the building, equipment and property day and night, and to take care of household help, all as directed and approved by the Engineer.

A.1.2 Vehicles for the Engineer

Modify the text of Sub-Section A.1.2 as follows:

a. **Provision of Vehicle for the Engineer**

The Contractor shall provide and deliver to the site, within thirty (30) calendar days upon receipt of Notice to Proceed, One (1) unit 2-WD pick-up type, double crew 2500cc displacement diesel for the exclusive use of the Engineer and his staff. The vehicle shall be at least 2013 model, with factory-installed air conditioner and car accessories accepted and approved by the Engineer.

The vehicle shall comply in all respects, with all relevant Philippine National or Local Laws, statutes and regulations, and shall be provided with comprehensive insurance, spare tire and wheel, and all standard tools for minor repair.

In case of major repair and/or breakdown of the service vehicles, the Contractor shall provide the equivalent substitute immediately.

Until the vehicle for the Engineer and his staff are provided within thirty (30) days, the Contractor shall provide temporary vehicle within three (3) days upon receipt of the NTP.

In case the Contractor fails to provide the transport vehicles within the stipulated time, the Engineer shall be entitled to provide such vehicles in a way he deems fit under the government regulations and charge the cost to the Contractor.

The vehicles may be used by the Engineer both on and off the site and outside the project area, both for business purposes during working hours and all reasonable recreational purposes.

Accordingly, when the assignments of the Engineer's personnel in connection with the execution of the Works have been completed, the vehicle shall be returned to the Contractor.

b. **Driver of Vehicle for the Engineer**

The vehicle shall be driven by a competent, qualified and experienced driver recruited and paid for by the Contractor, including overtime payments and the like. All such drivers shall be under the direct full-time control of the Engineer.

All drivers shall be:

- Properly licensed, with demonstrable previous experience in driving in and under conditions prevailing on a major civil engineering construction site;

able to read and write; available to work any hour on any day of the week; have the requisite flexibility to meet demands for their services at any time by the Engineer for any purpose under the Contract.

The Contractor shall manage and monitor the performance of drivers to ensure the provision and maintenance of drivers with a high level of skill and a demonstrated ability to drive efficiently and safely. Drivers not meeting these criteria shall be promptly replaced by the Contractor and/or when so directed by the Engineer.

c. **Operation and Maintenance of Vehicle**

The Contractor shall be solely responsible for all activities related to the operation and maintenance of the vehicle as well as its registration, provision of passes, access stickers and the like, and for providing fully comprehensive insurance until and including the date of issue of the Taking-Over Certificate; all costs thereof being at the Contractor's expense.

A.1.3 Assistance to the Engineer

No further instructions.

A.1.4 Photographs

This Sub-Section A.1.4 is modified and supplemented as follows:

The Contractor shall provide a photographic record of the Construction Work. Such photographs shall be taken before, during and after construction on the same angle of reference and as directed by the Engineer or under the following occasions or events:

- 1) When a portion of the work is difficult or impossible to inspect at the time of a particular operation, where a portion will be covered by backfill, or filling materials after completion and acceptance of the work by the Engineer.
- 2) When or where special or unusual features of the work or latent conditions on the site are present.

When taking photographs, the Contractor is required to observe that:

- 1) An Indicator, such as scale, pole or similar item shall be placed thereon to signify or illustrate the relative dimensions of the pictures.
- 2) Each picture shall be captioned and identified as to date, location, description of the work in progress or completed operation or activity or presence of unusual features.
- 3) Each picture shall be properly referenced, and with same angle as it was taken before, during and after construction.
- 4) The picture shall be clearly discernible in color having a dimension of not less than 12.5 cm x 9 cm (DPWH D.O. No. 55, Series of 1994).

All photographs shall be submitted at intervals of not less than one (1) month or as required, taken selectively by the Engineer, which represents the progress of the works.

The photographs selected by the Engineer, with copies furnished by the Contractor, shall be compiled in albums together with the jpeg electronic files and shall be arranged in consecutive order and in accordance with the construction program submitted to and approved by the Engineer. Each album shall show the name of the Project on the cover and shall contain a location map of the construction site.

All photographs retained by the Engineer shall become the property of the Owner. A set of photographs shall consist of ten (10) proof prints at five (5) copies each per month.

Add the following Sub-Section:

A.1.5 Schedule of Facilities for the Engineer

Please see schedules of facilities provided in the succeeding pages.

**PROVISIONS FOR FURNITURE, FIXTURES, EQUIPMENT AND APPLIANCES
FOR THE FIELD OFFICE FOR THE ENGINEER**

**Table A-1: SCHEDULE A - Furniture/Fixtures and Equipment/Appliances for the
Field Office**

A.1 Furniture and Fixtures

	Description	Unit	Quantity
1	Managerial Desk, 70 cm. x 150 cm. with right side cabinet	Each	2
2	Office Table, 70cm x 120 cm, with side table	Each	4
3	Executive chairs on rollers, padded with back and arm rest to match executive table	Each	2
4	Swivel Chair on rollers, padded with back and arm rest to match office tables	Each	4
5	Stacking chair, padded with backrest for visitors	Each	12
6	Conference Table w/ chairs, 6-seater	Set	1
7	Bookshelf, 5 layers/4 tier, boltless adjustable rack w/ slotted posts and laminated wooden shelves	Each	4
9	Steel Filing Cabinet, 4 drawers with lock and keys, fire resistant	Each	2

A.2 Equipment and Appliances

	Description	Unit	Quantity
1	Electronic calculator, scientific with at least 12-digit display	Each	4
2	Air Conditioning Unit, window-type with timer complete with standard accessories 1.0 Hp, 220V AC	Unit	4
3	Air Conditioning Unit, window type, 0.75 HP, 220V AC	Unit	2
4	Desktop Computers, Inter Core i5, 8GB memory, 1 TB 7200 SATA3, 24" LED monitor, 500 VA AVR, USB mouse, PS2 keyboard, Windows 10	Set	4
5	Laptop 13.3-inch IPS FHD, Inter Core i5-6200U, 4GB memory, 256 GB SSD, Windows 10	Unit	2
6	All-In-One Ink Tank System Wireless Printer, A4 size	Unit	1
7	Inkjet Printer, Original Ink Tank System,A3 size	Unit	1

	Description	Unit	Quantity
8	Whiteboard, 4' x 5' on roller stand, reversible	Each	1
9	Digital Camera, point & shoot, w/ micro SD card and complete with standard accessories	Each	1
10	Electric Stand Fan, 16" diameter blade	Unit	2
11	Fire Extinguisher, 10 lbs.	Unit	2
12	Wall Clock	Unit	2
13	Water Dispenser, hot and cold, 20 L capacity	Unit	1

Table A-2: SCHEDULE B - Furniture/Fixtures and Equipment/Appliances for the Living Quarters

	Description	Unit	Quantity
1	Single bed, with foam mattress, pillows and beddings	Set	2
2	Double deck bed, with foam mattress, pillows and beddings	Set	2
3	Dining table, 6-seater	Set	1
4	Sofa set with Ottomans and Center Table	Unit	16
5	Air conditioning unit, window type 0.75 hp	Unit	2
6	Refrigerator, 8.5 cu. ft.	Each	1
7	LED TV 32"	Each	1
8	Washing machine, fully automatic, top load	Each	1
9	Gas stove with two (2) burner complete with hose, regulator and LPG tank	Unit	1
10	Electric stand fan, 16" diameter blade	Unit	2
11	Fire Extinguisher, 10lbs.	Unit	2
12	Wall Clock	Unit	2
13	Electric flat iron with temperature control and foldable ironing table with pad	Each	1
14	Hot and cold water dispenser	Each	1
15	Set of kitchen ware for at least 10 persons consisting of the following: spoons, forks, knives, cup & saucers, serving plates, place mats, ash trays, rice plates, pitchers, kitchen knives, bolos, casserole, frying pan, chopping board, kettle and canister	LS	1

PROVISIONS FOR INSPECTORS

Table A-3: SCHEDULE C - Inspectors and Survey Personnel

- - Not applicable - -

**PROVISIONS FOR OPERATION/MAINTENANCE OF THE FIELD OFFICE
FOR THE ENGINEER**

Table A-4: SCHEDULE D - Operation/Maintenance of Field Office

Description	Quantity
a) Operation/Maintenance Staff	
Messenger / Utility Man	one (1)
Watchman / Security Guard	two (2)
Clerk Typist/Encoder	one (1)
c) Miscellaneous	
Water Bill	Entire project duration
Electric Bill	Entire project duration
Telephone Bill	Entire project duration

**PROVISIONS FOR FURNISHING SUPPLIES AND CONSUMABLE STORES
FOR THE FIELD OFFICE FOR THE ENGINEER**

Table A-5: SCHEDULE E- Supplies and Consumable Stores for Field Office

Description	Unit	Quantity
a) Office Supplies (to be provided only on the 1st month)		
Stapler	Each	1
Staple Wire Remover	Each	1
Two (2) Hole Puncher	Each	1
Tape Dispenser	Each	2
Triangle, 30 x 60 x 12"	Each	1
Triangle, 45 x 45 x 12"	Each	1
Protractor, 360 x 18" dia.	Each	1
Triangular scale, Metric	Each	1
Incoming/Outgoing Table Tray	Each	1
Mechanical Pencil, Staedtler	Each	6
Waste Paper Bin	Each	6
Scissors	Each	2
First Aid Kit	Each	1
Stamp Pad w/ Ink	Set	1
Field Book	Piece	4
Record Book	Piece	2
Mechanical Pencil 0.5 mm	Each	2
Heavy Duty Cutter	Each	1

Description	Unit	Quantity
b) Office Supply (Monthly)		
Printer Ink Refills	Set	2
Compact disk	Each	2
Bond Paper, A4 size	Ream	3
Bond Paper, A3 size	Ream	1
Yellow Pad Paper	Pad	4
Staedtler Pencil	Each	6
Ballpen	Each	12
Sign Pen	Each	6
Eraser, Staedtler	Each	6
Correction Fluid 15 ml	Each	2
Scotch Tape	Roll	1
Masking Tape	Roll	1
Magic Tape, 18 mm, 33 mm	Roll	1
Field Book	Piece	4
Staple Wire	Box	1
Paper Clip	Box	2
Brown Envelope, Long	Piece	15
Brown Envelope, Short	Piece	15
Expanding Envelope, Long	Piece	6
Folder, Long	Piece	15
Folder, Short	Piece	15
Fastener	Box	1
Ink Eraser	Each	3
Pencil Lead, 0.5 mm	Tube	3
Marker (Stabilo)	Piece	4
Paper Glue	Bottle	2
c) Consumable Stores (Monthly)		
Toilet Paper	Roll	6
Insect Spray (Baygon), 350 g.	Each	1
Toilet Deodorant	Each	2
Hand Soap	Each	4
Floor Mop/ Rug	Each	1
Replenishment of First Aid Kit	Lot	1
Broom	Each	2
Dust Pan	Each	1

A.2 Measurement and Payment

A.2.1 Measurement

Delete Sub-items 1 to 6 and substitute the following:

1. Lump sum items shall be provided for the following:
 - a. Provision of Furniture, Fixtures, Equipment and Appliances for the Field Office and Living quarters (Schedule A & B).
2. The following shall be paid on monthly basis:
 - a. Provision for Temporary Field Office for the Engineer on a rental basis during the construction period.
 - b. Provisions for cell cards for cellular phones for the Engineer;
 - c. Provision of Personnel for the Assistance to the Engineer.
3. Operation and maintenance of the temporary Field Office for the Engineer, including all supplies and consumable stores specified under SCHEDULES D and E will be paid for from the time the Engineer occupies the building until the final completion of the Contract. Payment shall be made on a monthly basis at the contract unit price shown in the Bill of Quantities.
4. The quantities for the provisions of communication system provided shall be the number of each type of required communication equipment and shall be paid per unit.
5. Operation and maintenance of vehicle for the Engineer as specified, will be paid for during the time which the Engineer is supplied with vehicle until the completion of the project. The unit of measurement to be paid shall be per vehicle-month.
6. The quantities for progress photographs shall be the number of photos taken and the number of each selected pictures provided as progress photographs. The unit of measurement to be paid shall be per set-month.

A.2.2 Payment

Add the following at the end of Sub-Section A.2.2

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
A.1.1(a)	Provide Temporary Field Office, for the Engineer	Month
A.1.1(d)	Provide Furniture, Fixtures, Equipment & Appliances for the Field Office (Schedule A & B)	Lump Sum

**CONSULTING SERVICES FOR THE REVISION OF DETAILED ENGINEERING DESIGN OF THE NDC
INDUSTRIAL ESTATE PROJECT IN DASMARIÑAS, CAVITE**

Pay Item Number	Description	Unit of Measurement
A.1.1(f)	Operate and Maintain Engineer's Field Office. (Schedules D and E)	Month
A.1.1(g)	Provision of Communication Facility for the Engineer, Mobile Cellular Phone	Unit
A.1.1(h)	Provision of Cell cards for Cellular Phones for the Engineer	Month
A.1.2(a)	Provision of One (1) unit 2WD pick-up type, Double crew 2500cc Displacement diesel with factory with installed air conditioner and car accessories	Each
A.1.2(b)	Operation and Maintenance of One (1) unit 2WD pick-up type, Double crew 2500cc Displacement diesel with factory with installed air conditioner and car accessories	Vehicle-Month
A.1.4	Provision of Progress Photographs (Proof Prints and E-file)	Set-Month

PART B OTHER GENERAL REQUIREMENTS

B.1 Offices and Workmen's Accommodation for Contractor

Add the provisions at the end of Item B.1 as follows:

The selection of the site shall be the responsibility of the Contractor and shall be approved by the Engineer. It is entirely up to the Contractor to make whatever arrangements he deems necessary with the landowners regarding the use of land for the purpose of erecting camps, workshops, garages, stockpiling of materials, locations of plant, housing of labor and staff, welfare facilities, etc. All costs incurred in connection with the rental or lease of such land shall be at the Contractor's expense.

The Contractor shall be solely responsible for the erection, maintenance and subsequent disposal of whatever facilities he deems necessary to execute the Works. The Contractor shall not be permitted to erect temporary buildings or structures within the road right-of-way without prior written approval from the Engineer.

Delete the title and text of Item B.2 and substitute the following:

B.2 Project Information Sign Board

Unless otherwise specified in other pay items of the contract, the Contractor shall provide and erect project signboard at the exact location approved by the Engineer. The design, layout and wording are all to be approved by the Engineer. All signboards shall display the title of the project, the name of the Project Proponent and the consulting engineering company. The signboard shall be maintained in good condition throughout the duration of the Contract, and shall be removed upon completion of the project to the satisfaction of the Engineer.

B.2.1 Method of Measurement and Payment

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
B.2	Standard Project Information Sign Board	Each

B.3 Construction Health and Safety

B.3.1 Health and Safety Plan

Prior to his arrival on site, the Contractor shall submit to the Engineer, the Construction Safety and Health Program (CSHP) he proposes to implement for the Project in accordance with Department Order No. 13, Series of 1998, of the Department of Labor and Employment (DOLE). The proposed CSHP shall be approved by DPWH for implementation, subject to the concurrence of DOLE-BWC, and which shall be fully implemented during the construction per DPWH Department Order No. 56, Series of

2005. No Interim Payment shall be made to the Contractor unless an approved CSHP has been in-place and good for implementation.

B.3.2 Construction Safety and Health Program (CSHP)

Section 5 of the DOLE D.O NO. 13 provide that every construction project shall have a suitable Construction Safety and Health Program (CSHP).

The Contractor's proposed CSHP shall be in accordance with DOLE D.O. NO. 13, series of 1998 and its Procedural Guidelines submitted during the bidding process approved by the DPWH authority, concurred by DOLE-BWC.

The required Construction Safety and Health Program (CSHP) for specific project shall include but not limited to the following:

- 1) Composition of the Safety and Health personnel responsible for the proper implementation of CSHP;
- 2) Specific safety policies which shall be undertaken in the construction site, including frequency of and persons responsible for conducting toolbox and gang meetings;
- 3) Penalties and sanctions for violations of the Construction Safety and Health Program;
- 4) Frequency, content and persons responsible for orienting, instructing and training all workers at the site with regard to the Construction Safety and Health Program which they operate; and
- 5) The manner of disposing waste arising from the construction.

Section 13 of DOLE D.O. No. 13 requires that the Contractor shall provide continuing construction safety and health training to all technical personnel under his employ.

B.3.3 Construction Safety and Health Organization

To ensure that the Construction Safety and Health Program are observed and implemented at the start of and during construction, each site shall have an established construction safety and health organization composed of the following personnel:

- 1) Safety Engineer/Officer

Section 7.1 of D.O. No. 13 states that "The General Contractor must provide for a full time Officer, who shall be assigned as the General Construction Safety and Health Officer to oversee full time the overall management of the Construction Safety and Health Program".

Section 7.2 states that "The General Contractor must provide for additional Construction Safety and Health Officer/s in accordance with the requirements for Safety Man / Officer of Rule 1033, Training and Personnel Complement, as amended by DOLE D.O No. 16 depending on the total number of personnel assigned to the Construction Safety and Health Program at the site, under the direct supervision of the General Construction Safety and Health Officer."

On the part of the government, the implementing office shall designate, as part of their project staff, a Safety Engineer who shall be responsible for ensuring compliance with the

pertinent DOLE guidelines, as well as the DPWH Guidelines on Occupational Safety and Health during the execution of the construction. The counterpart Safety and Health Officer of the Contractor shall closely coordinate and report to the Government Safety Engineer.

B.3.4 Personnel Protective Equipment and Devices (PPE)

Section 6 (Personal Protective Equipment) of D.O. No. 13 guidelines states that “every employer shall, at his own expense, furnish his workers with protective equipment for eyes, face, hands and feet, lifeline, safety belt/harness, protective shields and barriers whenever necessary by reason of the hazardous work process or environment, chemical or radiological or other mechanical irritants of hazards capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical agent”.

All Personal Protective Equipment and Device shall be in accordance with the requirements of the Occupation Safety and Health Standards (OSHS) and should pass the test conducted and/or standards sets by the Occupational Safety and Health Center (OSHC).

For General Construction Work, the required Basic PPE for all workers shall be Safety Helmet, Safety Gloves and Safety Shoes.

Special PPE shall be provided to workers in addition to or in lieu of the corresponding basic PPE as the work or activity requires.

B.3.5 Signages and Barricades

Construction Safety Signages and Barricades shall be provided as a precaution and to advice the workers and the general public of the hazards existing in the worksite.

For road construction signages and barricades, these shall be in accordance with Department Circular No. 9, Series of 2004 - Road Safety Manual and Handbook.

Section 16 of DOLE D.O. No. 13 requires that the employer shall provide the following welfare facilities in order to ensure humane working conditions;

- 1) Adequate supply of safe drinking water;
- 2) Adequate sanitary and washing facilities;
- 3) Suitable living accommodation of workers; and
- 4) Separate sanitary, washing and sleeping facilities for men and women workers.

For the purpose of these guidelines, facilities related to construction safety and health shall be in accordance with OSH Standards and shall be deemed to be included in different pay item in the contract.

The cost involved in providing the necessary safety equipment and manpower for an effective implementation of safety in the workplace, and in compliance with DOLE D.O. No. 13 shall be paid under a separate item SPL B.2.1 Construction Health and Safety on a lump sum basis, which shall be based on the following guidelines:

a) Personal Protective Equipment

The PPEs shall be provided by the Contractor, and its cost shall be duly quantified and made part of the overall cost of safety and health. The use of PPEs shall conform to Rule 1080, Personal Protective Equipment and Devices of OSHS.

b) Clinical Materials and Equipment

Clinical material and equipment such as medicines, beds and linens, other related accessories shall be to the account of the Contractors implementing the Project and shall be in accordance with the Rule 1960, Occupational Health Services of OSHS.

c) Signages and Barricades

For general signages and barricades necessary for promoting safety in and around the construction site, the quantities and cost shall be deemed to be included in the different items of work in the contract.

d) Facilities

Facilities for all staff and labor engaged in the works such as portable toilets, waste disposal, sanitary and washing facilities, convenient dwelling and office, adequate lighting, and other facilities related to construction safety and health in accordance with OSH Standards other than facilities paid for under Part A, "Facilities for the Engineer" shall be deemed to be included in the indirect cost overhead of the contractor.

e) Safety and Health Training

Cost associated for the provision of basic and continuing construction safety and health training to all safety and technical personnel shall be made part of the indirect/overhead cost of the project.

Delete the title and text of Item B.3 and substitute the following:

B.4 Quality Control of Materials

All Quality Control Procedures should be in accordance with the DPWH Bureau of Research and Standard Requirements and the Contractor's Approved Quality Control/Quality Assurance Plans and Procedures.

B.4.1 Source of Supply and Quality of Materials

After receiving the Notice to Proceed and the Contract Documents, the Contractor shall promptly notify the Engineer of all proposed material sources, including fabricators of steel or other finished products. Prior to delivery of materials, samples from sources shall be taken and shall be tested and approved first by the Engineer. If the proposed sources of materials are not acceptable to the Engineer, the Contractor shall locate other sources and obtain approval from the Engineer.

All equipment, materials, and articles incorporated into the permanent work shall:

- 1) be new, unless the Specifications permit otherwise;
- 2) meet the requirements of the contract and be approved by the Engineer;
- 3) be inspected or tested at any time during their preparation and use; and not be used in the work if they become unfit after being previously approved.

B.4.2 Samples and Tests for Acceptance

The Contractor shall deliver material samples from the Manufacturer, Producer, or Fabricator to the Engineer prior to execution of work. In providing samples, the Contractor shall provide the Engineer with sufficient time and quantities for approval before use. The Engineer may require samples at any time. Samples not taken in the presence of the Engineer will not be accepted for testing, unless the Engineer permits otherwise.

The Contractor shall designate his experienced and qualified personnel as direct contact person for material testing and acceptance. In his absence, the Contractor shall designate other personnel of the same experience to ensure that direct contact is maintained during the execution of work.

The Engineer shall also designate an experienced and qualified representative as point of contact for material testing and acceptance.

All field and laboratory materials testing to be undertaken by the Contractor shall be in accordance with the methods described in the contract documents, or in the recognized standards of national organizations. The following provisions will apply when the Contractor uses the specifications or methods from the sources named hereunder:

ASTM – American Society for Testing and Materials: The ASTM designation number refers to the society’s latest adapted or tentative standard. The standard or tentative standard in effect on the Commencement Date, will apply in each case.

Copies of any separate ASTM specifications or testing method may be obtained from: the American Society for Testing and Materials, 1916 Race Street, Philadelphia, USA.

AASHTO – American Association of State Highway and Transportation Officials: An AASHTO number refers to that organization’s currently published (1) “Standard Specifications for Transportation Materials and Methods of Sampling and Testing” or any adapted revisions, or (2) “Interim Specifications and Methods of Sampling and Testing adapted by the AASHTO Subcommittee on Materials.”

Copies of “Standard Specifications for Transportation Materials and Methods of Sampling and Testing” may be obtained from the American Association of State Highway and Transportation Officials, 917 National Press Building, Washington, DC, USA.

Unless otherwise provided, sampling and testing of materials shall be made by the Contractor, under the direct supervision of the Engineer in accordance with the methods given in the “Standard Specifications for Highway Materials and Methods of Sampling and Testing” of the latest edition of AASHTO.

B.4.3 Removed and Rejected Materials

The Contractor may, prior to sampling, select to remove any defective material(s) and replace it with new material(s) at no expense to the Employer. Any such new material will be sampled, tested and evaluated for acceptance as a sub-lot in accordance with the sampling and testing procedure.

The Engineer may reject a sub-lot wherein tests show to be defective. Such rejected material shall be removed from the site and the results or test run on the rejected material will not be included in the original lot acceptance tests.

B.4.4 Manufacturer’s Certificate of Compliance

The Engineer may accept certain materials on the basis of a Manufacturer’s Certificate of Compliance as an alternative to material inspection and testing. When a Manufacturer’s Certificate of Compliance is authorized by these Specifications, the certificate shall be furnished prior to the use of material.

The Contractor may request, in writing, authority from the Engineer to install such material prior to submitting the required certification; however, no payment shall be made for the work in the absence of the acceptable Manufacturer’s Certificate of Compliance.

The Engineer reserves the right to deny the request for good cause. If for any reason, the Contractor has no acceptable Manufacturer’s Certificate of Compliance on the completion date of the work, the Engineer may process the final payment without paying for the work performed on such basis.

The Manufacturer’s Certificate of Compliance must identify the manufacturer, the type and quantity of material being certified, the applicable specifications being affirmed, the signature of a responsible corporate official of the manufacturer and must include supporting mill tests or documents. A Manufacturer’s Certificate of Compliance shall be furnished with each lot of material delivered to the site and the lot so certified shall be clearly identified on the certificate.

All materials used and identified in the Manufacturer’s Certificate of Compliance may be sampled and tested at any time. Any material not conforming to the requirements will be subject to rejection whether in place or not. The Engineer reserves the right to refuse to accept materials not on the basis of a Manufacturer’s Certificate of Compliance.

B.4.5 Handling and Storing Materials

In storing and handling materials, the Contractor shall protect any materials against damage from careless handling, from exposure to weather, from mixture with foreign matter, and from all other causes. The Engineer shall reject and refuse to test materials improperly handled or stored.

B.4.6 Compliance and Test Requirements

All test and quality control works shall be done by the Contractor's Materials Testing and Laboratory Staff under the direct supervision of the Engineer.

All tests shall normally be carried out at the site, except for certain special tests which, subject to the approval of the Engineer, be carried out at an approved independent testing laboratory. The Contractor shall, if so approved, make all necessary arrangements for the supply and delivery of samples to, and collection of samples from, such independent laboratory. Unless otherwise directed by the Engineer, the Contractor shall arrange for one copy of the independent testing laboratory test certificates to be delivered to the Engineer not less than three (3) days before the materials covered by the relevant test certificate are incorporated into the works, and the test certificate shall be related to the materials from which the samples were taken. These test and quality control works shall be the responsibility of the Contractor.

The Contractor and/or independent testing entity shall comply with the Minimum Materials Testing Equipment Requirements given in, Appendix A of these Technical Specifications.

When requested, the Contractor shall furnish a complete written statement of the origin, composition and/or manufacture of any or all materials (manufactured, produced or grown) that are to be used in the work.

Samples shall be tested in accordance with the following:

1) Soils and Aggregates

- T 11 Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
- T 88 Particle Size Analysis of Soils
- T 89 Determining the Liquid Limit of Soils
- T 90 Determining the Plastic Limit and Plasticity Index of Soils
- T 99 Moisture Density Relations of Soils Using a 2.5 kg Rammer and 305 mm Drop
- T 100 Specific Gravity of Soils
- T 180 Moisture Density Relations of Soils Using a 4.54 kg Rammer and a 457 mm Drop
- T 191 Density of Soil in-Place by the Sand-Cone Method
- T 193 The California Bearing Ratio

- T 310 In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Method
- T 84 Specific Gravity and Absorption of Fine Aggregate
- T 85 Specific Gravity and Absorption of Coarse Aggregate
- T 19 Bulk Density (“Unit Weight”) and Voids in Aggregate
- T 27 Sieve Analysis of Fine and Coarse Aggregates
- T 96 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles machine

2) Concrete

- T 21 Organic Impurities in Fine Aggregates for Concrete
- T 22 Compressive Strength of Cylindrical Concrete Specimens
- T 23 Making and Curing Concrete Test Specimens in the Field
- T 24 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- T 97 Flexural Strength of Concrete (Using Simple Beam with Third Point Loading)
- T 119 Slump of Hydraulic Cement Concrete
- T 126 Making and Curing Concrete Test Specimens in the Laboratory
- T 141 Sampling Freshly Mixed Concrete
- T 148 Measuring Length of Drilled Concrete Cores
- T 231 Capping Cylindrical Concrete Specimens

Add the following Work Items to Part B of the DPWH Standard Specifications:

B.5 Transportation and Handling

B.5.1 Standards

Work processes shall be conducted in strict conformity to the National, Provincial and Municipal regulations governing the work as well as requirements for the preservation of natural resources and the environment.

B.5.2 Coordination and Others

The Contractor's attention is directed to the fact that he will be required to coordinate his transport operations with the work being performed or to be performed on other Contracts, with work of the other contractors or subcontractors, utility companies and others as may be required.

In case of interference in operations from different Contractors, the Engineer shall have the sole power to direct each Contractor and to determine the sequence of work necessary to expedite the completion of the entire project, and in all cases his decision shall be accepted as final and shall not be caused for a claim.

B.5.3 Weight Limitations and Legal Requirements

If required, the Engineer may impose weight restrictions for the protection of any existing road or structure within the vicinity of the project. The Contractor is responsible in complying with all legal weight restrictions of existing roads and highways used for his work. The Contractor shall be responsible for any damage to roads or structures resulting from his construction operations.

In case the hauling operations of the Contractor will cause damage to public road or structure, or will cause flooding that will result to work stoppage of the operation, the Engineer may direct the Contractor to use an alternative route and the Contractor shall have no right to any claims for any additional compensation to incurred damages during hauling operations.

To limit the required restoration in case of damages, the Contractors should conduct site investigation, determine pavement thickness and take the necessary precautionary measures before project implementation.

B.6 Project Record Documents

B.6.1 Description

Throughout the progress of the Works, the Contractor shall maintain accurate records of all changes in the Contract Documents on a "Job Set" herein specified and shall transfer the final as-built information to the Final Record Documents before the completion of the Works.

B.6.2 Submittal Requirements

The Contractor shall submit or make available for review by the Engineer, the job set of Project Record Documents as currently maintained on the 25th of each month. The Engineer's approval of these documents will be a prerequisite for approval of the Monthly Progress Payment Certificates.

The Contractor shall submit for the Engineer's approval the Final Project Record Documents at the time of application for Taking-Over Certificate. The Contractor shall accompany the submittal with a transmittal letter, containing:

- 1) Date
- 2) Project title and number
- 3) Contractor's name and address
- 4) Title and number of each record document
- 5) Certification that each document as submitted is complete and accurate
- 6) Signature of the Contractor, or his authorized representative

B.6.3 Project Record Documents

1) Job Set

Promptly following the Award of Contract, the Contractor shall obtain from the Engineer at no cost to the Contractor, one complete set of all Documents comprising the Contract.

The Job Set will include (unless otherwise stated in the Contract) the following:

- Conditions of Contract
- Plans or Drawings
- Specifications
- Addenda
- Modifications to the Contract (if any)
- Other Contract Documents as stipulated in the Contract Agreement

2) Storage of Job Set

The job set shall be stored in the field office in files and racks and the Contractor shall maintain the job set protected from loss and damage until the transfer of as-built data to the Final Project Documents has been completed.

The record documents shall not be used for construction purposes and the documents shall be available at all times for inspection by the Engineer and the Project Proponent.

B.6.4 Project Records for Materials & Equipment

All records concerning the testing and approval of materials and equipment to be incorporated into the Permanent Works shall form part of the project records. The Contractor shall develop and maintain a record system which clearly shows the current status of all material sources, testing and approval. All approved samples shall be maintained at the job site.

B.6.5 Update and Maintenance of the Job Set Documents

1) Responsibility

The Contractor shall delegate the responsibility for the maintenance of Record Documents to his authorized person with prior approval by the Engineer.

2) Identification

Immediately upon receipt of the job set, identify each of the documents with the title "PROJECT RECORD DOCUMENTS - JOB SET", in 5 cm high printed letters.

3) Preservation

Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, the Contractor shall devise a suitable method for protecting the job set with the approval of the Engineer.

4) Marking Entries on Drawings

Using an erasable colored pencil (not ink or indelible pencil); the Contractor shall clearly describe the change by notes and by graphic lines as required. The Contractor shall mark the date of all entries and call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes. Record documents shall be kept current and works carried out must not be permanently concealed.

The Contractor shall legibly mark and record the actual construction details of the following:

- Depths of various foundation elements in relation to datum shown;
- Horizontal and vertical location of underground utilities shall be referenced to permanent surface improvements;
- Locations of internal utilities concealed in construction shall be referenced to visible and accessible features of structures;
- Field changes of dimensions and details;
- Change Orders; and
- Details not on original Contract Drawings.

5) Timing

All entries shall be made within 24 hours after receipt of the information.

6) Accuracy

Use all the necessary means including the proper tools for measurement to determine the actual locations of the installed items and the accuracy of entries.

The Contractor shall thoroughly coordinate all the changes within the Record Documents and adequately and properly mark such changes on each page of the Specifications, on each sheet of Drawings and other Contract Documents. The accuracy of records shall be such that any future search for items shown on the Contract Documents may be obtained from the approved Record Documents.

B.6.6 Final Record Documents

1) General

The purpose of the Final Record Documents is to provide factual information regarding all aspects of the Works, both concealed and visible, to enable future modification of design to proceed without lengthy and expensive site measurement, investigation and examination.

2) Transfer of Data to Drawings

Carefully transfer all changes of data shown on the job set of Record Drawings to the corresponding original drawing of the Final Report Drawings and clearly indicate the full description of all changes made during construction and the actual location of all items. Call attention to each entry by drawing a "cloud" around the area or areas affected. Make all change entries on the originals neatly, consistently, and in ink or crisp black pencil.

3) Transfer of Data to Other Documents

If Documents other than Drawings have been kept clean and neat during the progress of the Work, and if entries have been sufficiently and orderly transferred with the approval of the Engineer, the job set of those Documents (other than Drawings) will be accepted by the Engineer as Final Record Documents. If any such document is not so approved by the Engineer, secure a new copy of that document from the Engineer and carefully transfer the change data to the new copy for the approval of the Engineer.

4) Review and Approval

Submit the completed set of Final Record Documents to the Engineer at the time of application for the Taking-Over Certificate. If requested by the Engineer, participate in a review meeting or meetings, execute any required changes and promptly re-submit the Final Record Documents to the Engineer for his acceptance.

5) Changes Subsequent to Acceptance

The Contractor shall have no responsibility of recording changes to the Works subsequent to the issue by the Engineer of the Taking-Over Certificate. He shall be responsible only for changes resulting from replacements, repairs, and alterations made by him as part of his guarantee or additional work that he has agreed to carry out during the Defects Liability Period.

B.7 Disposal of Material Outside the Project Boundaries

Proper disposal of materials outside the project boundaries shall be the responsibility of the Contractor. He shall make his own arrangements for the disposal of materials outside of the project boundaries and all the costs involved therein including the cost of hauling shall be considered as covered under the pay items involved in the Contract.

When any materials including excess or unsuitable materials from excavations are to be disposed of outside the project boundaries, the Contractor shall first obtain written permission from the property owner of the proposed disposal site. He shall submit to the Engineer the said written permission or a certified copy thereof, together with a written release from the property owner absolving the Government from any and all responsibilities in connection with the disposal of materials into his property. No material shall be disposed prior to the receipt of written approval and permission from the Engineer.

When materials are disposed of as provided above and if the site is visible from the highway, the Contractor shall make the disposal in a neat and presentable condition as to the satisfaction of the Engineer. The disposal site must not be an eyesore nor detrimental to the environment.

B.8 Clearing/Finishing the Site

Upon completion of all construction operations, the entire roadway or roadways shall be finished / cleared as specified in these Specifications.

Stockpiling of materials on the finished pavement and drifting of materials across the pavement will not be permitted. The finished pavement shall be cleaned of all dirt and foreign materials.

The slopes in embankments; excavations; road approaches; road connections; ditches; channel changes; and material sites within or adjacent to the project boundaries shall be cleared and finished to the lines and grades called for on the Drawings. Ditches and channels within or adjacent to the project boundaries shall be cleared of debris and obstructions. Sewers, culverts and other drainage facilities and their appurtenant structures constructed under the contract shall be cleaned out. All stores and other waste materials exposed on slopes, which are liable to become loosened, shall be removed and disposed of. All materials and debris resulting from clearing and grubbing operations not previously removed shall be disposed of.

All materials resulting from the above-specified clearing/finishing operations shall become the property of the Contractor and shall be disposed of outside the project boundaries unless otherwise permitted by the special provisions.

Disposal of materials outside the highway right of way shall be in accordance with the provision in Item B.6, "Disposal of Materials Outside the Project Boundaries". The entire roadway and right of way shall be left in a neat and presentable condition.

B.9 Method of Measurements

B.9.1 Measurement of Quantities

In measuring all acceptably completed bid items of work, the Engineer will:

- 1) Use SI metric standard measure;
- 2) Make all measurements as described in this Item, unless individual specifications require otherwise;
- 3) Follow methods generally recognized as conforming to good engineering practice;
- 4) Conform to the usual practice of the Project Proponent by carrying measurements and computations to the proper significant figure or fraction of units for each item, but not exceeding one decimal place;
- 5) Measure horizontally or vertically (unless otherwise specified).

The items listed below shall be defined as per the following in all measurements under this item:

- 1) "Lump Sum" (when used as an item of payment): complete payment for the work described for that item in the contract.
- 2) "Gage" (in measurement of plates): the U.S Standard Gage.

- 3) "Gage" (in measurement of galvanized sheets used to manufacture corrugated metal pipe, metal plate, pipe culverts and arches, and metal cribbing): that specified in AASHTO M 36, M 167, M 196, M 197, or M 219.
- 4) "Gage" (in measurement of wire): that specified in AASHTO M 32.
- 5) "Tonne": The metric ton equal to 1,000 kilograms of weight.

For each basis of measurement listed below, the Engineer will use the method of measurements as described herein.

- 1) Square Meter or Hectare - Measured on the neat dimensions shown on the Drawings or dimensions altered by the Engineer.
- 2) Linear Meter (pipe culverts, guard rail, under drains, etc.) - measured parallel to the structure's base or foundation or unless the Drawings require otherwise.
- 3) Weight - weighed as required in Item B.9.2.

Volume (of excavation and embankment) - measured by the average-end-area method. All or some computations may be based on ground elevations and other data derived photogram metrically. The Engineer may correct for curvature.

For each item listed below, the Engineer will use the method of measurement described herein as:

Structure - measured on the neat lines shown on the Drawings or to dimensions altered by the Engineer. When a complete structure or structural unit is specified as the unit of measurement, the unit shall include all fittings and accessories.

Standard Manufactured Items (fence, wire, plates, rolled shapes, pipe conduit, etc., when specified) - measured by the manufacturer's identification of gage, unit weight, section dimension, etc. The Engineer will accept manufacturing tolerances set by each industry unless cited specifications require more stringent tolerances.

- Cement - measured by bags

No measurement will be made for:

- 1) Work performed or materials placed outside lines shown on the Drawings or set by the Engineer;
- 2) Materials wasted, used, or disposed of in manner contrary to the contract;
- 3) Rejected materials (including those rejected after placement if the rejection resulted from the Contractor's failure to comply with the contract);
- 4) Hauling and disposing of rejected materials;
- 5) Material remaining on hand after the work is completed, except as provided in the contract; and
- 6) Any other work or material contrary to any contract provision.

B.10 Silence of Contract Documents

The apparent silence of the Drawings, General Specifications, Technical Specifications, and Special Notices, as to any detail or the apparent omission of a detailed description concerning any point shall be regarded as meaning that only the best general practice is to

prevail and that only material and workmanship of first class quality are to be used. All interpretation of the Contract Documents shall be made by the Engineer on the basis stated above.

B.11 Meetings/Conferences

As often as possible or as necessity arises, meetings/conferences shall be held to discuss matters of detail i.e. construction sequences, progress, materials, procedures, temporary works, quality control and similar subjects pertinent to the satisfactory execution of the Works, or to discuss problems arising out of the implementation of the Project.

Such meetings/conferences shall not be less frequent than twice a month and shall be attended by the Contractor and by the Engineer or his representative.

Minutes of the Meetings/Conferences shall be officially documented, confirmed or concurred to by the Contractor, copy thereof submitted to the Project Proponent, properly dated and numbered.

B.12 Mobilization and Demobilization

B.12.1 General Requirement

The work and other activities for the item, Mobilization and Demobilization shall include but not necessarily be limited to the following:

- 1) The purchase or rental of all land required for the Contractor's base camps and construction activities. The number and location of base camps to be mobilized shall be as approved by the Engineer and shall be fully consistent with the rock crushing, asphalt and/or concrete production quantity, and other requirements for the Works. Also, the operational capacity of the Construction Plant to be used by the Contractor, the location of suitable material sources and the Contractor's construction schedule(s) shall be made as basis in the establishment of the Contractor's camp.
- 2) The removal of the Constructional Plant from the existing site locations or port of unloading in the Philippines and their installation to the sites where they are to be used under this Contract.
- 3) The construction and maintenance of the Contractor's base camps including offices, living quarters, workshops, stores, etc.
- 4) Mobilization and Demobilization of the Contractor's labor forces.

The mobilization activities of the Contractor include the provision of all the base camp sites, plant, buildings, facilities, equipment and vehicles which will be required for the proper execution of the whole of the Works. This provision is regardless of the timing or staging of hand over of the Site to the Contractor and of the intended timing or staging of occupation or use of the base camps, plant, buildings, facilities, equipment and vehicles throughout the Contract Period.

Demobilization from the sites occupied by the Contractor at the end of the Contract including the removal of all installations, Constructional Plant and equipment from

Employer – owned or rented land, and the restoration of the site in accordance with the contract, shall also be included in this Item.

The cost for Mobilization and Demobilization shall not exceed 1%.

B.13 Maintenance of Project Road and Traffic Control

B.13.1 Provisions for Passage of Traffic

The Contractor shall carefully plan his traffic control arrangement and liaise with all concerned parties to advise and seek agreement on the most universally acceptable traffic management practices. Diversions shall be advertised in advance and shall be fully signed and lighted when implemented. Safety of all parties using and working on the road shall be paramount. The Contractor will be required to provide and maintain effective protective fences, bunding, etc. below slope works and to define the edges of steep excavations or existing down slopes, and in association provide signages and lighting as necessary.

The Contractor shall construct and maintain detours wherever the work will interfere with traffic on existing roads, footways or other ways over which there is a public or private right-of-way, until such time as permanent diversions to serve such traffic have been completed. No detours shall be constructed and no traffic diverted until the Contractor's proposals therefore have been approved by the Engineer and by the appropriate government authorities. Prior to the commencement of the construction and of the use of detours, the Contractor shall provide the Engineer with a full photographic record of the existing roads, pathways, etc. as directed by the Engineer and shall have the necessary temporary road signs ready for use.

No work which will cause inconvenience to the traveling public shall be started until adequate provisions, satisfactory to the Engineer, have been made to divert the traffic in safety and in comfort. No road shall be closed to the public except by permission in writing from the Engineer and from the appropriate government authorities. Where traffic conditions permit, one-way-lane may be permitted by the Engineer. Material stored upon the roadway shall be so well placed and the work shall be so conducted as to cause as little obstruction as possible to the traveling public.

All detours shall be maintained in good condition at all times and shall have a total width of at least 6 meters and provided with graveled surface having a minimum compacted thickness of 80 mm. Where existing public or private roads are used as detours, the same shall be maintained in good riding condition at all times and just before completion of the Contract, such roads shall be restored to a condition not less satisfactory than that existing prior to the commencement of the work.

Where part-width construction is adapted, the part-width not under construction shall be made available to public traffic under alternate one-way control. In such case, the Contractor shall furnish flagmen, pilot car and drivers to direct traffic through the section of road under one-way control. The length of part-width construction shall not exceed 500 meters for each section and the distance between successive sections of part-width construction shall not be less than 500 meters.

The Contractor shall so conduct his operations as to offer the least possible obstruction, inconvenience and delay to traffic and shall be responsible for adequate traffic control to achieve such an end.

Suitable warning signs, illuminated at night by electric bulbs, lanterns or flares shall be provided to mark the places not yet available to traffic. In part-width construction, the Contractor shall place acceptable barricades along the inside edge of the available surface so that traffic will be confined therein while the other part-width is under construction. One-way control shall continue until the adjoining surface is completed and opened to traffic.

At sections where part-width traffic is in operation, and when so ordered by the Engineer, the movements of the Contractor's equipment from one place of work to another shall be subject to such part-width traffic control. Spillage resulting from hauling operations along or across the roadway shall be removed immediately at the Contractor's expense. For further details in connection with this Item see Item SPL B.3.1.2 - Traffic Management During Construction provided hereinafter.

B.14 Traffic Management During Construction

Traffic Control

The Contractor shall ensure that signs are adequately posted on all works (see Table SPL.1) especially when restrictions on the width of the highway are imposed due to construction works. The Contractor shall provide details in writing to the Engineer for his approval at least 15 days in advance of the works. Upon receipt of the Engineer's approval, advance warning signs, coning and bunding, stop and give way signs, other appropriate signing and lighting shall be provided and maintained by the Contractor in accordance with his proposals. The Contractor shall constantly monitor the effectiveness of these signing and lighting devices.

All full, partial and temporary road closures shall be manned day and night by the Contractor. All operatives shall be trained and fully briefed by the Contractor on their responsibilities. These shall include achieving minimum description to traffic consistent with the safety of pedestrians, construction operatives and supervisory staff and vehicular traffic.

The construction area shall be bounded by steel fence as shown on the Drawings or as directed by the Engineer so that traffic can be more manageable. Informatory, regulatory and warning signs with proper lightings shall be installed wherever necessary. The Contractor shall coordinate his traffic management with the concerned government agencies and concerned private parties.

The Contractor shall furnish, install and maintain at all times for the duration of the Contract, necessary traffic signs, barricades, lights, signals and other traffic control devices and shall provide flagging and other means for guidance of traffic through the work zone. Traffic control shall be conducted in accordance with the prevailing government rules and regulations and where applicable, in accordance with the design details included in the Drawings.

All traffic signs and control devices furnished and installed by the Contractor shall be reviewed by the Engineer as to location, position, visibility, adequacy and manner of use under specific job conditions.

All traffic control devices necessary for the initial stage of construction shall be properly placed and in operation before any construction shall be allowed to start. When work of a progressive nature is involved, the necessary signs shall be moved to adjust to advancing operation.

If at any time, the Engineer determines that proper provisions for safe traffic control are not being provided or maintained, he may restrict construction operations affected by such defective signs or devices until proper satisfactory adjustments shall have been made. The Engineer may also suspend the entire work until the proper level of compliance is achieved.

In cases of serious or willful disregard of the Contractor for safety of the public or his employees, the Engineer may take appropriate corrective measures and deduct the cost thereof from monies of the Contractor.

The Contractor shall provide on the site the towing equipment to move stalled vehicles out of the traveled way to locations with no interference to traffic and the possibility of an accident.

Traffic Handling Equipment and Devices

All devices used by the Contractor in the performance of the work shall conform to the requirements of this Special Sub-item. Traffic handling-equipment and devices damaged from any cause during the progress of the work shall be repaired, including painting if necessary or replaced by the Contractor at his own expense.

When traffic control devices furnished by the Contractor are no longer needed for controlling traffic, they shall be removed from the site of work.

- **Barricades**

All barricades, fences and such other aids, as required, shall be provided with reflectors and shall conform to the regulation of the DPWH and shall be illuminated at night by lanterns.

Barricade shall be constructed of lightweight commercial quality materials as approved by the Engineer. "A"-frame designs shall not be rigid.

Markings for barricade rails shall be alternate orange and white stripes. Reflective sheeting shall be replaced on rail surfaces in such a manner that no air bubbles or voids are present between the rail surface and reflective sheeting. The predominant color for barricade components other than rails shall be white, except that unpainted galvanized metal or aluminum may be used.

Ballasting shall be by means of sand filled bags placed on the lower parts of the frame or stays, but shall not be placed on top of the barricade or over any reflectorized barricade

rail face facing the traffic.

If the barricades are displaced or are not in an upright position, from any cause, said barricades shall immediately be replaced or restored to their original location, in an upright position at the Contractor's own expense.

- **Flashing Arrow Signs**

Flashing arrow signs shall be finished with commercial quality flat black enamel and shall be equipped with yellow or amber lamps that form arrows or arrowheads are required. Each lamp shall be provided with a visor and the lamps shall be controlled by an electronic circuit that will provide between 30 to 45 complete operating cycles per minute in each of the displays and modes specified. The control shall include provisions for dimming the lamps by reducing the voltage to 50 percent, ± 5 percent, for night time use. Type I signs shall have both manual and automatic photoelectric dimming controls. Dimming in both modes shall be continuously variable over the entire dimming range.

Flashing arrow signs shall conform to the following legibility requirements. The minimum legibility distance is the distance at which flashing arrow signs shall be legible at noon on a cloudless day and at night by persons with vision of or corrected to 20/20.

Type	Minimum Size	Min. Number of Panel Lamps	Min. Legibility Distance
I	1220 mm x 2440 mm	15	1600 m
II	610 mm x 1220 mm	13	1200 m

Flashing arrow signs shall be capable of being operated in 4 different display modes as follows. The display to be used shall be as directed by the Engineer.

- 1) Pass Left Display
- 2) Pass Right Display
- 3) Simultaneous Display
- 4) Caution Display

Flashing arrow signs shall also be capable of operating in one or both of the following modes, at the option of the Contractor:

- 1) Flashing Arrow Mode
- 2) Sequential Mode

In the flashing arrow mode, all lamps forming both the arrowhead and shaft shall flash on and off simultaneously. In the sequential mode, either arrowheads or arrows shall flash sequentially in the direction indicated. In the caution display mode, a combination of lamps not resembling any other display or mode shall flash.

Each flashing arrow sign shall be mounted on a truck or on trailer and shall be capable of operating while the vehicle is moving and shall be capable of being placed and maintained in operation at locations as shown on the Drawings, or as directed by the Engineer.

Flashing arrow signs shall be mounted to provide a minimum of 2.10 meters between the bottom of the sign and the roadway. Trailers on which flashing arrow are mounted shall be equipped so that they can be levelled and plumbed.

Electrical energy to operate the sign shall be obtained from the vehicle on which the sign is mounted or from a generating plant mounted on said vehicle. Regardless of the sources, the supply of electrical energy shall be capable of operating the sign in the manner specified.

- **Portable Delineators**

Portable delineators, including the base, shall be composed of a material that has sufficient rigidity to remain upright when unattended and shall be either flexible or collapsible upon impact by a vehicle. The base shall be of such shape as to preclude roll after impact.

The base shall be of sufficient weight or shall be anchored in a manner such that said delineator shall remain in an upright position. Ballast, if used for the bases of portable delineators, shall be sand or water.

If the portable delineators are displaced or are not in an upright position, the Contractor shall immediately replace or restore to their original location, in an upright position, the said delineators.

The vertical portion of the portable delineators shall be of a fluorescent orange or predominantly orange colour. The posts shall be not less than 76 mm in width or diameter. The minimum height shall be 910 mm above the travelled way or as shown on the Drawings.

A minimum of 2 reflective bands each (not less than 76 mm wide), shall be mounted at a minimum distance of 38 mm and with a height on the post so that one reflective band will be between 0.76 m and 0.91 m above the roadway surface.

Reflective bands shall be white and shall be fabricated from flexible reflective sheeting as specified in the special provisions. The reflective bands shall be visible at 305 meters at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Only one type of portable delineator shall be used on the project. The type of portable delineator proposed for use on the project shall be submitted to the Engineer for approval prior to placement on the project.

- **Portable Flashing Beacons**

Each portable flashing beacon unit shall consist of a lighting unit, a flasher unit, a standard, a battery power source and a base. The units shall be assembled to form a complete, self-contained, flashing beacon which can be delivered to the site of use and placed for immediate operation.

The lens for the beacon lighting unit shall have a visible diameter of 300 mm. The lens shall be glass or plastic conforming to the provisions in ANSI Standard: D-10 for yellow traffic signal lens.

The beacon lighting unit shall be provided with a 200 mm minimum length of visor and a back plate. Visors will not be required during the hours of darkness.

The flasher unit shall provide 50 to 60 flashes per minute with 250 to 350 milliseconds dwell time.

The standard shall be adjustable to provide a variable mounting of the lighting unit between 1.8 and 3 meters measured from the bottom of the base to the center of lens, with provisions for securing the standard at the desired height. The standard shall be securely attached to the base and a sufficient length of multi-conductor, neoprene jacketed cable as required for full vertical height shall be provided.

The base shall be large enough to accommodate a minimum of two 12 volt, automotive type storage batteries and shall be of such shape and weight that the beacon will not roll in the event it is struck by a vehicle or pushed over.

The lamp shall be rated at 25 watts for operation on 12-volt battery current.

The flashing beacon assembly shall be weatherproof and shall be capable of operating a minimum of 150 hours between battery recharging and other routine maintenance.

The standard and base shall be finished with 2 applications of commercial quality orange enamel. The interior of the visor and the front face of the back plate shall be finished with 2 applications of commercial quality flat black enamel.

- **Construction Area Signs**

The term "Construction Area Signs" shall include all temporary signs required for the direction of public traffic through or around the work during construction. Construction area signs shall be installed at the locations shown on the Drawings or as directed by the Engineer.

Construction area signs designated as stationary-mounted on the drawings shall conform to the provisions in Sub-Section "Stationary Mounted Signs" and construction signs designated as portable signs on the Drawings shall conform to the provisions in Sub-Section, "Portable Signs".

Construction area signs not designated as stationary mounted nor as portable on the plans shall be, at the Contractor's option, either stationary mounted or portable signs conforming to the provisions in said Sub-Sections “Stationary Mounted Signs” or “Portable Signs”..

All construction area signs shall conform to the dimensions, colors and legend requirements of the Drawings and these specifications. All sign panels shall be the product of a commercial sign manufacturer, and shall be as specified in these specifications.

Sign panels for all construction area signs shall be visible at 150 meters and legible at 90 meters at noon on a cloudless day and at night under illumination of legal low beam headlights, by persons with vision of or corrected to 20/20, except that the night time requirement shall not apply to fabric sign panels for portable signs.

The Contractor may be required to cover certain signs during the progress of the work. Covers for construction area signs shall be of sufficient size and density to completely block out the message so that it is not visible either during the day or at night. Covers shall be fastened securely to prevent movement caused by wind action. The Contractor shall clean all construction area sign panels at the time of installation and as often thereafter as the Engineer determines to be necessary, but at least once every 4 months.

Signs with the specified sheeting material will be considered satisfactory if they conform to the requirements for visibility and legibility and colors conform to the requirements as directed by the Engineer. A significant difference between day and nighttimes reflective colour will be grounds for rejecting signs.

To properly provide for changing traffic conditions and damage caused by public traffic or otherwise, the Contractor shall be prepared to furnish on short notice additional construction area sign panels, posts and mounting hardware or portable sign mounts. The Contractor shall maintain an inventory of the commonly required items at the jobsite or shall make arrangements with a supplier who is able, on daily basis, to furnish such items on short notice.

- **Stationary Mounted Signs**

Stationary mounted signs shall be installed on wood posts in the same manner shown on the Drawings or as directed by the Engineer. Stationary mounted signs shall be installed in accordance with the following guidelines:

- 1) Use of back braces and blocks for sign panels will not be required.
- 2) The height to the bottom of the sign panel above the edge of travelled way shall be at least 1.50 meters, except when the sign is located in the path of pedestrians or bicycles, then the height to the bottom of the sign panel above the edge of the travelled way shall be at least 2.10 meters.
- 3) Construction area sign posts may be installed on above ground temporary platform sign supports as approved by the Engineer, or the signs may be installed on existing lighting standards or other supports as approved by the

Engineer. When the construction area signs are installed on existing lighting standards, holes shall not be made in the standards to support the sign.

- 4) The post embedment shall be 0.76 meter. If post holes are backfilled around the posts with Portland cement concrete produced from commercial quality aggregates and cement with not less than 168 kilograms of cement per cubic meter.

Post size and number of posts shall be as shown on the plans, except that when stationary mounted signs are installed and the type of sign installation is not shown on the plans, post size and the number of posts will be determined by the Engineer. Posts shall be good sound wood post, suitable for the purpose intended.

Sign panels for stationary mounted signs shall consist of reflective aluminium sheeting. Sign panels shall conform to the requirements specified in Item 605. Legend and border may be applied by a screening process or by use of pressure sensitive cut-out sheeting. Size and spacing of letters and symbols shall be as depicted on the sign specification sheets published by the Department.

All rectangular sheet aluminum signs over 140 centimeters measured along the horizontal axis and all diamond-shaped sheet aluminum signs, 152 centimeters and larger, shall be framed unless otherwise specified. Frames shall be constructed in accordance with Item 605 (Road Signs). Sign panel fastening hardware shall be commercial quality.

- **Portable Signs**

Each portable sign consist of a base, standard or framework and a sign panel. The units shall be capable of being delivered to the site of use and placed in immediate operation.

Sign panels for portable signs shall conform to the requirements of sign panels for stationary mounted signs in Section, "Stationary Mounted Signs" or shall be cotton drill fabric, flexible industrial nylon fabric, or other approved fabric.

Fabric signs shall not be used during the hours of darkness. Sizes, colors and legend requirements for portable signs shall be as described for stationary mounted sign panels in said Sub-Section "Stationary Mounted Signs" .

The sign standard or framework shall be capable of supporting a sign panel of 120 centimeters by 120 centimeters maximum dimension, in an upright position with the centre of the sign panel a minimum of 1.50 meters above the pavement.

All parts of the sign standard or framework shall be finished with 2 applications of orange enamel which will match the colour of the sign panel background. Testing of paint will not be required.

If portable signs are displaced or overturned, from any cause, during the progress of the work, the Contractor shall immediately replace the signs in their original locations at his own expense.

**Table SPL B.14.1:
Traffic Control Signs, Delineators and Warning Lights**

Item	Specification
1. General	The Contractor shall provide one-way traffic control along sections with on-going construction for a length of 200 meters or less, except for the repair of small areas of damaged concrete slabs. In these areas, the Contractor shall provide one-way traffic control devices beginning and ending 50 meters from the work area. Sign, delineators, warning lights and flagmen shall be posted and maintained as described in Items 2, 3 and 4.
2. Signs	1.2 x 1.3 meter square plywood painted reflective white with 12 centimeter reflective red letters shall be installed at 50-meter intervals commencing 150 meters from the work site. The signs shall be 1.2 high and placed on the edge of pavement facing the traffic flow. Signs shall have the following wordings: SLOW-LANE or ROAD CLOSED AHEAD; CAUTION: ROAD CONSTRUCTION AHEAD; REDUCE SPEED, CONSTRUCTION IN PROGRESS; STOP, OBEY FLAGMEN; REDUCE SPEED, ONE LANE AHEAD.
3. Delineators	Reflective red or orange plastic or rubber cones 45 centimeters high shall be placed at 30 meter intervals along the traffic side of the restricted area.
4. Warning lights	Amber flashing lights with a 15-centimeter diameter lens head shall be provided at all sign location. The intensity of the lights shall be at least 4 candlepower and have a flash rate between 50-75 flashes directing traffic movement.

- **Telescoping Flag Trees**

Telescoping flag trees shall be of good commercial quality material, suitable for the purpose intended and shall be capable of maintaining an upright position at all times while in use.

- **Traffic Cones**

Traffic cones shall be fluorescent and of good commercial quality, flexible material suitable for the purpose intended. The outer section of the portion above the base of the cone shall be translucent and be of a highly pigmented fluorescent orange polyvinyl compound. The overall height of the cone shall be at least 710 millimeters and the

bottom inside diameter shall be not less than 267 millimeters. The base shall be of sufficient weight and size or shall be anchored in a manner such that the traffic cone will remain in an upright position.

During the hours of darkness, traffic cones shall be affixed or covered with a minimum 330 millimeters flexible reflective cone sleeve, placed at maximum of 76 millimeters from the top of the cone. The sleeves shall be white and shall be fabricated from the reflective sheeting. The reflective sheeting shall be visible at 305 meters at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Traffic cones to be in place during daylight hours shall not be affixed or covered with reflectorized cone sleeves.

B.14.1 Contractor's Liability and Responsibilities

The Contractor shall be fully liable for traffic control and safety. Approval by the Engineer of the Contractor's traffic control and signage proposal will, in no way be construed as relieving the Contractor of any of his obligation or liabilities.

B.15 Environmental Monitoring and Control

B.15.1 Environmental Protection Plan

Environmental Protection Plan is aimed to promote awareness and present fundamental concepts of industrial pollution control, prevent biodiversity loss, maintain the balance of nature, and attain sustainable development.

The Contractor shall submit an Environmental Protection Plan (including construction waste management plan) with operational details within 20 calendar days after arrival on site.

The Contractor shall plan for the activities which will generate waste (and incorporate it in the Master Schedule of the project) by: analyzing properly the alternatives, determining the courses of action to be implemented, and evaluating the success of the program. The main target is to minimize construction wastes and waste disposal, utilizing conservation, and recycling alternatives, while minimizing the costs for such activities. The plan may be required by the Regulating Agencies prior to the project start as basis for monitoring compliance

The Contractor shall keep in mind the following objectives:

- To determine the viability of managing construction waste for conservation of resources;
- To evaluate the effects of recycling and re-use of materials for the profitability of a construction project;
- To prepare the framework for a Construction Waste Management Program that the company shall implement;
- To implement slope stabilization and erosion control of affected side slopes within the project site;

- To construct and maintain silt/sediment traps along the affected river systems and strategic areas;
- To implement proper measures to control the increase of surface runoff in the downstream section of any river; and
- To strictly implement zoning and sanitary ordinances in the water quality of affected river channels.

Basic Components of the Environmental Protection Plan

a) Analysis

Examine the project activities and estimate the amount of waste to be generated. Each project will have different mix of materials, in different sequences. Include the approximate quantity of wastes generated for each material, with quantities in volume (transportation) and weight (tipping fees), the sequence and the time frame for the waste generation, the nature of materials, to help determine the job site facilities to be provided for.

Formulate the strategies in dealing with the materials, ie. some materials can be ordered by specific lengths instead of a single length, or the utilization of framing lumber waste as blocking or trimmers.

Disposal alternatives need to be allocated and priced. Maintain a database for ready information. Complete the comparison of costs:

Costs of Disposal = Separation Costs + Transportation Costs + Tipping Fees

The correlation of quantities with the projected costs for sorting, cleaning, transportation and tipping fees will produce analysis to compare each alternative.

b) The Written Plan

It is the formalization of the analysis and procedures for implementation. It provides direction for waste management and documentation of the intent of the company to pursue cost effective waste management. The Written Plan can be used to satisfy requirements imposed by the Project Proponent or Regulatory Agencies and should include:

- The general policy statement and commitment to reduce waste, reduce land fill disposal, where possible
- Analysis of waste and establishment goals/objectives of waste disposal
- Means of implementing the plan, including separation/cleaning, materials handling and transportation
- Record keeping for waste disposal
- Evaluation of the results and reporting of the successes of the program

c) Implementation

This is critical in achieving any success in conserving resources and reducing the landfill waste stream. Actual opportunities for reducing waste and alternative disposal will change during the construction phase. The plan should be flexible to recognize the change and to adapt them. It includes job facilities and procedures to prepare the waste for disposal like placing bins in strategic locations to minimize labor in disposal activities.

Plan the layout of disposal facilities and educate the work force in conservation methods. Secure the commitment from job site personnel to separate waste with the minimum amount of labor to facilitate efficient waste collection.

Document the disposal method and location of waste (type of waste, location of disposal/recycler, type of disposal, amount of waste, date disposed, distance from job site, tipping fees and other associated costs).

d) Post-Construction Evaluation

This is helpful in formulating future plans. The cost control comparisons, database updating and summary of successes are important part of waste management plan. It also demonstrates the effectiveness of waste management activities to all concerned. This section should be part of the Project Close-Out Report.

B.15.2 Environmental Officer

The Contractor shall include in his staff on Site for the duration of the Contract a designated Officer qualified to promote and maintain sound environmental management during construction and specifically the implementation of the approved Environmental Protection Plan. This Officer shall have authority to issue instructions and shall take precautionary measures to prevent environmental damage, including but not limited to the establishment of environmentally sound working practices and the training of staff and labor in their implementation.

B.15.3 Environmental Protection During Construction

- a) The road crosses or passes closely to several areas of existing or recent instability. Therefore, the Engineer shall have the power to disallow the method of construction and/or the use of any borrow/stockpile/spoil disposal area if in his opinion the stability and safety of the Works or any adjacent feature is endangered. Likewise, the Engineer shall exercise such power if there is undue interference with the natural or artificial drainage, or if the method or use of the area will promote undue erosion. In particular, the Contractor shall note that side casting of spoil (downslide disposal of material from excavation) will not normally be permitted.
- b) Following excavation, the Contractor shall take all necessary steps to complete drainage and slope protection works in advance of each rainy season. Erosion or instability or sediment deposition arising from operations not in accordance with the specifications shall be made good immediately by the Contractor at his expense.

- c) Notwithstanding approval of the intended method of working, the Contractor shall at all times be responsible for constructing the earthworks in accordance with the Specifications and Drawings.

The Project area can experience inclement weather such as fog, heavy rainfall and typhoons, and earthquakes. It will be deemed that the Contractor is familiar with these conditions and has formulated his work program considering possible loss of time due to these causes. It shall be the obligation of the Contractor to Revise his work program and enhance his construction efforts as necessary to ensure timely completion of the work as scheduled for each working season. When damage from rainfall, flooding or earthquake is exceptional, the provisions for extension of time for completion due to force majeure will apply.

B.15.4 Re-vegetation of Disturbed Ground

- 1) When directed by the Engineer, the Contractor shall establish Vegetation on fill slopes, cut slope of 1V : 1H or flatter, worked out borrow pits, and other areas which may include roadway shoulders and verges, spoil disposal areas, stockpile areas, quarries, access tacks, plant sites, camps, landslide scars, gullies, and stream and river banks. Prior to placing topsoil and or establishing vegetation on embankments, all fill materials not compacted to the required standards shall be removed from the side slopes.
- 2) The Contractor shall be responsible for supplying sufficient planting material to carry out all re-vegetation work, and shall establish and operate plant nurseries as necessary and shall make his own arrangements for procuring cuttings, slips and seed for growing.

B.15.5 Prevention of Pollution

- 1) The Contractor shall ensure that his activities do not result in any contamination of land or water by polluting substances. He shall implement physical and operational measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores, oil and grease traps in drainage systems from workshops, vehicle and plant washing facilities, and service and fuelling areas and kitchens. He shall establish sanitary solid and liquid waste disposal systems, the maintenance in effective condition of these measures, the establishment of emergency response procedures for pollution events, and dust suppression, all in accordance with normal good practice and to the satisfaction of the engineer.
- 2) Should any pollution arise from the Contractor's activities including the improper deposition of sediment, he shall clean up the affected area immediately at his own cost and to the satisfaction of the Engineer, and shall pay full compensation to any affected parties.

B.15.6 Noise and Vibration

Workers must be protected from noise level, which can cause hearing impairment. Permissible noise exposures shall not exceed those listed in the Industrial Safety Manual,

6th Edition. Exposure to impact or impulse noise shall not exceed 140 –dB sound pressure level. Impact, impulse or vibration exposures shall be limited to 90-dB eight-hour a day.

For each decrease of 120-dB in the peak sound pressure level, the number of impact or impulse exposures can be increased by a factor of 10. When workers are exceeding acceptable levels, feasible administrative controls to reduce the exposure shall be utilized. If these controls fail to reduce the sound level to an acceptable limit, personal protective equipment shall be provided and used. Care must be exercised so as not to create noise hazards in residential or habitable areas adjacent or near the construction site.

In case an electric generator shall be used as a source of power supply at the project site, the unit must be of the silent type.

B.15.7 Construction Waste

Construction and clean-up activities being undertaken are for sources of wastes in various forms that should be reduced to enhance the conservation of natural resources and lessen the impact on the environment. The sources and possible ways of reducing construction wastes shall be analyzed by Contractor. This information will be provided in the framework for the Construction Waste Management Program to meet its objectives of reducing the costs of materials by recycling and re-using, increasing work efficiency, providing opportunities for material recyclers, and reducing wastes consigned to landfills. It would help in enhancing profitability, safety in the work place and image of protecting the environment for sustainable development that leads to the development of the project's Environmental Management System.

B.15.8 Air Contaminant (TAC)

All equipment and/or vehicles to be used must pass the anti-pollution emission test.

B.15.9 Water Quality and Sewage Disposal

Water quality criteria as defined and embodied in DAO 34 & 35 (Series of 1990) provides the set of values, which serve as guide to maintain/preserve the beneficial uses of the water.

No contaminated water must be disposed of into any public sewerage system without identifying and treating the contaminants.

For sewer water collection and disposal, either provide a holding tank and regularly collect and dispose sewage water or construct temporary leaching beds on site, whichever is applicable.

Vehicle and construction equipment maintenance wastes such as oil, coolants and hydraulic fluids should not be disposed into the sewer or drainage system but be placed in containers to be disposed of regularly.

B.15.10 Visual Impact

Proper arrangement of materials and equipment as well as construction related facilities should be adhered to during implementation of the project.

Materials should be stacked in a manner that it will not endanger the employees. It should not block access ways and create eyesores at the site.

All construction equipment must be parked in such a way that access into and out of the work area is easy. Repairs must not be permitted in the general work area where space is needed for movements of workers and materials within the construction area.

B.15.11 Measurement and Payment

The Contract price is understood to include the cost of environmental protection measures, monitoring and reporting.

PART C EARTHWORKS

ITEM 100 CLEARING AND GRUBBING

100.1 Description

Section 100.1 is revised to read as follows:

This Item shall consist of the removal, hauling, and stockpiling of all materials including trees, stumps, roots, vegetations, logs, wastes, debris and protruding objects except those that are designated to remain in accordance with other items of these Specifications and where directed by the Engineer. The holes resulting from grubbing operations shall be filled with approved materials, placed and compacted to the same dry density as that of the adjoining soil or as directed by the Engineer.

100.2 Construction Requirements

100.2.1 General

Modify 2nd paragraph of Sub-Section 100.2.1 as follows:

Clearing shall extend one (1) meter beyond the toe of the fill slopes, or beyond rounding of cut slopes or outside edge of drainage facilities, unless otherwise shown on the Drawings or directed by the Engineer, with the exception of trees under the jurisdiction of the Forest Management Bureau and/or such tree and bush designated for preservation. Trees, shrubs or bushes designated to remain in place shall be carefully trimmed as directed by the Engineer and shall be protected from scarring, debarking and other injuries during construction operations.

100.2.2 Clearing and Grubbing

Insert the following at the beginning of Sub-Section 100.2:

Prior to clearing and grubbing works, the following shall be made:

- 1) Contractor shall be given possession of project site in accordance with the construction limits set forth.
- 2) Contractor shall carry out and complete the as-staked survey works up to the stationing limits of the right-of-way defined on the drawings or as directed by the Engineer.
- 3) After the as-staked survey, the Contractor shall submit to the Engineer for approval a "Topsoil Recovery Plan" that shall indicate:
 - the areas for stock piling of materials
 - the locations where topsoil materials will be recovered
 - disposal method to be adapted

- 4) The Contractor shall seek approval of the Engineer of the completed as-staked survey and the Topsoil Recovery Plan before he can start with the clearing and grubbing works.

100.3 Method of Measurements

Delete the text of Section 100.3 and replace with the following:

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

- 1) Area Method. The work to be paid for shall be based on the total area cleared and grubbed which is calculated in hectares within the limits defined on the drawings or as directed by the Engineer including adjustment that may be made to satisfy certain site requirements.

100.4 Basis of Payment

Add the following paragraph after the first paragraph and amend the second paragraph of Section 100.4 to read as follows:

Pay Items 100(1), Clearing and Grubbing shall be paid in hectares and shall include the cost of removing all trees except those called for in Item 100.2.3 located in the areas designated to be cleared and grubbed. Removal of trees categorized as small and large in Item 100.3 shall be paid for by the DPWH.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
100(1)	Clearing and Grubbing	Hectare

Item 101 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

101.2 Construction Requirements

Add the following to Sub-Section 101.2:

101.2.5 Removal of Concrete Foundations and Other Unattended Structures:

The Contractor shall remove any and all materials not suitable for use in the Work, obstructions and all other structures or part of structures within the highway right-of-way, which are to be replaced, relocated, or interfere with or are rendered useless by new construction, unless otherwise provided on the Plans or in the Specifications.

The disposal of materials outside the project boundaries shall be the responsibility of the Contractor. He shall make his arrangements with the property owners of disposal sites outside the project boundaries as indicated on the Plans or Contract Documents.

The Contractor shall obtain a written permit from the property owner of the disposal site. He shall submit to the Engineer the said permit absolving the Project Proponent and the

government from any and all responsibility in connection with the disposal of materials on his property. No material shall be disposed without prior authority from the Engineer.

When materials are disposed as provided above and the site is visible from the highway, the Contractor shall make the disposal in a neat and presentable manner to the satisfaction of the Engineer.

101.2.6 Protection of Existing Utilities

The Contractor shall assume full responsibility for the protection of the existing utilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from damage of any kind. Any damage resulting from the Contractor's fault or negligence in his operations shall be repaired by him at his own expense. The Contractor's responsibilities shall apply even in the event damage occurs after backfilling.

101.4 Basis of Payment

Replace the second paragraph of Sub-Section 101.4 with the following:

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
101(1)	Removal of Structures and Obstructions	Lump Sum

ITEM 103 STRUCTURE EXCAVATION

103.1 Description

Add the following paragraphs to Section 103.1:

Excavation for structures shall be classified for measurement and payment as "Structure Excavation Above Ordinary Water Level (Above OWL)" and "Structure Excavation Below Ordinary Water Level (Below OWL)" as the case maybe and such classes shall include all types of materials encountered of whatever nature.

The water elevations shown on the drawings are approximate only and any variation in elevation discovered during construction shall not be used as a basis for extra claim for compensation of this Item.

Structure excavation shall also include the furnishing and placing of approved foundation fill materials to replace unsuitable materials encountered below the foundation elevations of the structures.

103.2 Construction Requirements

103.2.2 Excavation

Add the following paragraphs to Sub-Section 103.2.2:

Any excavation carried beyond the limits and dimensions shown or described on the Drawings or Specifications shall be backfilled with acceptable materials.

The sides of pits, trenches and other excavations shall, where required, be adequately supported and braced to the satisfaction of the Engineer, and all such excavations shall be of sufficient size to enable the pipes and concrete to be laid accurately and proper refilling and compaction to be carried out.

Should excavations be effected to a greater depth or width than is necessary then the Contractor shall at his own expense, backfill the excess excavation with approved materials, compacted to the density of the adjacent ground to the correct levels and dimensions to the approval of the Engineer.

When instructed by the Engineer, the Contractor shall carefully set aside the various materials encountered so that they may be replaced in their original position.

Trenches shall be kept clean and free from water during excavation, concreting, laying of pipes and backfilling, and the Contractor shall dig diversion channels, erect cofferdams or otherwise remove the water from the trench through pumping equipment or other acceptable methods

The Engineer's approval is required before placing concrete in all excavations for structures made through water bearing strata that require dewatering.

103.2.6 Backfill and Embankment for Structures Other than Pipe Culvert

Add the following paragraph to Sub-Section 103.2.6

Backfill and Embankment for structures other than pipe culverts shall be of suitable common materials excavated from required excavation or from borrow source.

Add the following Sub-Section to Section 103.2 of Standard Specifications:

103.2.8.1 Disposal Area

Unless otherwise directed by the Engineer, unsuitable excavated materials shall be transported and deposited in stockpiles at designated areas to be determined by the individual Contractor of each package, of which locations shall be subject to the approval of the Engineer.

The volume of material for stockpiling at each approved location shall be as directed by the Engineer.

103.3 Method of Measurement

103.3.4 Shoring, Cribbing and Related Work

Delete the text of Sub-Section 103.3.4 and substitute the following:

Shoring, cribbing, and related protective works if required in the construction shall not be measured and paid for separately but shall be considered subsidiary to the item for which they are constructed and utilized.

103.3.5 Basis of Payment

Delete the second sentence of Sub-Section 103.3.5 including items (1), (2), (3) and (4) and substitute the following:

The payment for structure excavation and bridge excavation shall be deemed to include the cost of backfilling, shoring, cribbing, protective works, removing and disposing unsuitable materials off-site and removal and hauling of excess suitable materials to stockpiles as directed by the Engineer. The payment shall be the full compensation for the work item including the cost of labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

No measurement for separate payment to the Contractor shall be made for back-fill being the relevant compensation included by the Contractor in his rates in the Bill of Quantities in the pay items for excavation for structures.

Replace the second paragraph of Sub-Section 103.3.5 with the following:

Payment will be made under:

Pay Item Number	Description	Unit Measurement	of
103(1)	Structure Excavation, Common Material	Cubic Meter	
103(3)	Foundation Fill (Granular Bedding)	Cubic Meter	
103(6)	Pipe Culverts and Drain Excavation	Cubic Meter	

ITEM 104 EMBANKMENT

104.2 Material Requirements

Add the following paragraph and modify Item (1) of Section 104.2 as follows:

Embankment shall be constructed of suitable materials in accordance with the following definitions:

1) Suitable Material

The material shall be acceptable in accordance with the Plans and which can be compacted in the manner specified in this item. It can be common material or rock.

Common Material shall have a CBR value OF 8% minimum, when tested according to AASHTO T 193. The CBR value shall be obtained at 95% of the maximum dry density as determined by AASHTO T 180.

Materials classified in the A-2-4 group or better (A-1-a to A-1-b) of AASHTO Soil Classification System satisfying the CBR value requirement shall be used.

Selected borrow shall be of such gradation that all particles will pass a sieve with 75 mm (3 inches) square openings and not more than 35 mass percent will pass the 0.075 mm (No. 200) sieve, as determined by AASHTO T 11. The material shall have a plasticity index of not more than 6 as determined by AASHTO T 90 and a liquid limit of not more than 30 as determined by AASHTO T 89. The material shall have a soaked CBR value of not less than 8% as determined by AASHTO T180.

Add the following item at the end of the Sub-Section 104.2:

104.3 Construction Requirements

104.3.1 General

Add the following paragraph at the end of Sub-Section 104.3.1

Prior to the construction of embankment, the Contractor shall submit for review and approval, the methodology he intends to apply for the formation of embankment satisfying all requirements to conform to the lines, grades and dimensions shown in the plans. The methodology shall show the systematic procedure of constructing the embankment in conjunction with the procedures proposed for the slope protection as shown in the drawings.

However, the approval of the proposed methodology does not relieve the Contractor of the responsibilities for any unsatisfactory or defective works as result of such methodology. The Engineer at his discretion may reject or require remedial measures to the defective works. The cost of replacing or remedying defective works shall be borne by the Contractor.

Before embankment construction starts, the Contractor shall construct in accordance with his methodology, a section of trial embankment in accordance with Sub-section 104.3.10, Trial Embankment

104.3.2 Methods of Construction

Modify third paragraph of Sub-Section 104.3.2

Unless shown otherwise on the Plans or Special Provisions, where an embankment height of less than or equal to 1.2 m (4') below subgrade is to be made, all sod and vegetable matters shall be removed from the surface upon which the embankment is to be placed and the cleared surface shall be completely broken up by plowing, scarifying or steeping to a minimum depth of 150 mm except as provided in Sub-Section 102.2.2. This area shall then be compacted as provided in Subsection 104.3.3. In cases where the embankment height is above 1.20 m, the Contractor shall prepare the site prior to placing of the first layer and shall follow the required compaction as specified in Item 104.3.3. Sod not required to be removed shall be thoroughly disc harrowed or scarified before construction of embankment. Wherever a compacted road surface containing granular materials lies within 900 mm (36 inches) of the subgrade, such old road surface shall be scarified to a depth of at least 150 mm (6 inches) whenever directed by the Engineer. These scarified materials shall then be compacted as provided in Sub-Section 104.3.3.

Add the following paragraphs to Sub-Section 104.3.2 to read as follows:

Manual cutting works by the Contractor on areas covered by cogon/talahib, wild grass and other vegetation shall be required but will not be included on Item for Clearing and Grubbing.

104.3.3 Compaction

Modify the first paragraph of text under the heading "Earth" of Sub-Section 104.3.3 to read as follows:

Each layer of embankment, except layers consisting of rock, shall be moistened or dried to uniform moisture content within 2% of the optimum moisture content, then thoroughly compacted to a minimum of 95% of the maximum density as determined by AASHTO T 180, Method D for all embankment except for the 300 mm below subgrade level which shall be compacted according to Sub-Clause 105.3.5.

Modify last sentence under the heading "rock" of Sub-Section 104.3.3 is amended to read as follows:

The embankment shall be compacted with compaction equipment over the full width and in a longitudinal direction until there is no visible movement of the rock fill materials when under the compacting equipment.

Add the following paragraph after the last paragraph of Sub-Section 104.3.3:

Placing of fill will be suspended, if in the opinion of the Engineer, there is no adequate compaction and grading equipment in good operating condition available on site to shape and compact the fill immediately upon placement.

Add the following Sub-Sections to Section 104.3

104.3.10 Trial Embankment

The following requirements shall be considered to supplement and modify the requirements of “Compaction Trials” of Sub-section 104.3.3

1) General

Before starting the embankment works, the Contractor shall carry out trial embankments and tests to demonstrate to the Engineer the performance of his equipment and to determine the effectiveness of the proposed construction method especially the blending, placing, spreading and compaction. All findings obtained from the trial embankments and tests shall be submitted to the Engineer for establishing desirable criteria for the quality control of the embankment works. The Contractor shall make joint efforts with the Engineer until acceptable criteria and methodology are established.

The Contractor shall submit to the Engineer for approval, his plan and schedule for the construction of the trial embankment including location and area of embankment, type and quality of equipment, manner of blending, placing, spreading and compaction, items and quantity of test, and other information for the trial embankment.

No separate payment shall be made for the trial embankment; all the costs thereof are deemed to be included in the payment specified in this work item.

2) Execution of Trial Embankment

The trial embankment shall be carried out simulating normal construction conditions by using all the equipment and methods proposed for placing, spreading and compacting the embankment materials.

Spreading depth of the trial embankment shall be not more than 20 cm after compaction.

The number of passes shall be varied to provide at least four (4) cases to establish a relation between number of passes and degree of compaction.

Several kinds of materials, which can cover representative soil characteristics of the whole embankment materials, shall be tested. Should clearly different materials be used for a section of embankment, such materials shall also be tested in the same manner.

3) Soil Test and Measurement

All materials of embankment shall be conditioned beforehand and tested in accordance with Clause 104.2 of this Specification. The Contractor shall carry out, as a minimum, the following tests during the operation of the trial embankment:

a) Settlement measurement of layer

Settlement of layer shall be measured after compaction at a minimum of nine (9) points per each trial in each site using a taut line horizontally strung between the batter boards at both ends of embankment.

b) Measurement of in-place density and moisture content

Measurement of in-place density and moisture content shall be in accordance with Sub-Section 104.3.11 of this Specification. Measurement shall be made at a minimum of nine (9) points per trial in each site.

4) Establishment of Criteria

The Contractor shall investigate results of the trial embankment and shall submit to the Engineer for approval, his proposed method and manner of embankment operation which shall include full height construction of embankment, spreading depth, number of passes, type of equipment, combination of equipment, construction of slope protection, and other information necessary for establishing the criteria of embankment operation.

If acceptable criteria are not established, the Contractor shall repeat the trial embankment at his own expense to the satisfaction of the Engineer.

104.3.11 Embankment Operation (Where Applicable)

a) General

This Sub-Section shall cover the manner of embankment construction. No separate payment shall be made for the requirements of this Sub-Section, and all the costs except surface preparation are deemed included in the payment specified in this work Item.

Costs of the surface preparation stated in the succeeding paragraphs are deemed included in the related items of payment such as clearing and grubbing.

1) Operation of Borrow Pit

Borrow pits shall be cleared and grubbed as directed by the Engineer to remove all unsuitable materials. The Contractor shall, at his own expense secure the necessary right-of-way and access thereto. The Contractor shall bear all royalty fees imposed by the owner and municipalities where these borrow areas are situated. The Contractor shall construct and maintain the haul roads, together with the necessary right-of-way for such roads and right of access thereto.

Borrow pits where practicable shall be excavated to drain it to the nearest natural outlet or to such outlet as directed by the Engineer. The surface of the borrow pits shall be left in a reasonably smooth and even condition and then stripped top soil, if any, shall be returned and spread to the satisfaction of the Engineer before abandoning such borrow pit areas. Planting trees and grass of the leveled area may also be required from the Contractor before abandoning the borrow pit as directed by the Engineer.

2) Surface Preparation

Ground surface to be covered with embankment materials shall be prepared as follows:

- a) Clearing and grubbing shall be executed in accordance with the requirements specified in Item 100 of these Specifications.
 - b) Stump holes or other small excavations in the limits of embankment shall be filled with embankment materials and thoroughly tamped by approved methods before commencing the embankment operation.
 - c) The embankment operation shall be performed always in the dry condition. Springs and seepage along the foundation, if any, shall be treated by the method approved by the Engineer.
 - d) Prior to placing any fill upon the area, all clearing and grubbing operations and stripping of top soil, where required, shall be completed.
 - e) Where shown on the Drawings or ordered by the Engineer, the surface of the existing ground shall be compacted to the depth of 200 mm and in accordance with the requirements of Sub-section 104.3.3.
- 3) Excavation, Transportation and Stockpile

The Contractor shall excavate embankment materials at approved borrow pits, or at the stockpiles when the materials are stockpiled under the scope of the excavation works specified in Item 102, Excavation.

The material suitable for the embankment, which is too wet for immediate compaction shall be placed temporarily at the stockyard and aerated until the moisture content is sufficiently reduced to permit use for the embankment operation.

4) Placing, Spreading and Compaction

Placing, spreading and compaction of embankment materials shall be executed in the manner of the approved criteria of embankment operation established through the trial embankment. Materials shall be placed and spread so that no single layer exceeds 200 mm in thickness after compaction. As far as practicable, the material shall be dried or wetted to have proper moisture content within the allowable range determined through the regular compaction test.

Equipment for placing, spreading and compaction shall be as specified in the approved criteria of embankment operation. No other equipment shall be used without the approval of the Engineer.

Degree of compaction shall be as specified in Sub-Section 104.3.3. When any layer fails to comply with the specified degree of compaction, the Contractor shall immediately re-compact, improve or replace the materials. All soft or yielding areas that may develop in the embankment shall be corrected by re-compaction or by immediately removing the unsuitable materials and replacing and compacting them to the required degree of compaction upon the order of the Engineer.

When the results of embankment monitoring show the possibility of slope or embankment failure, the Contractor shall take immediate action such as tentative removal of a part of embankment, tentative counterweight fill, or any other measure, which the Contractor deems necessary. The Contractor shall in this case, notify the Engineer of such

possibility and the measures being promptly taken by the Contractor to the extent possible.

5) Tolerance

The completed embankment section shall have elevation and dimensions, which fall within the following tolerances:

Elevation/Dimension	Tolerance (mm)
Crest Elevation of Embankment	± 50
	± 100
Crest Width of Embankment	± 200
Length of Embankment Slope	

Quality Control of Embankment Operation

1) General

Quality control of the embankment operation shall be carried out through the regular compaction test and the daily control test as specified hereinafter.

No separate payment shall be made for the requirements of this Sub-Section and all the costs thereof are deemed included in the payment specified in this work Item.

2) Regular Compaction Test

The regular compaction test shall be carried out once for every 1,500 m³ or fraction thereof per 20 cm layer of the materials before compaction in accordance with AASHTO T 180 or T 99 and before a new source of material is placed in the works. Measurement of natural moisture content and specific gravity of soils and determination of the optimum moisture content and the maximum dry density shall be made and results shall be submitted to the Engineer for approval.

3) Daily Quality Control Test

a) General

Daily quality control test shall be executed at embankment sites by use of the radioisotope type soil density and moisture gauge (RI gauge) which shall be procured by the Contractor.

The Contractor shall measure in-place dry density and in-place moisture content using the RI gauge on daily basis when the embankment operation is executed.

b) Execution of Daily Quality Control Test

Measurement of in-place dry density and in-place moisture content shall be made daily at the rate of one (1) point measurement per 500 square meter area of each layer of compacted fill.

All measurement data shall be recorded and filed with direct output from the RI gauge. Record format shall contain, but not limited to, the following items.

- Date and time of measurement
- Weather condition
- Rainfall
- Location of Embankment
- Location of Measurement
- Approximate work volume of embankment
- Type of embankment material
- Moisture content at borrow pit or stockyard
- In-place moisture content at embankment site
- In-place density of embankment material
- Degree of compaction
- Presence of the Engineer

The Contractor shall plot the data in a form of daily control graph and shall monitor its daily change.

The Contractor shall submit all the test results of daily quality control test to the Engineer once every week for approval.

The Contractor, when requested by the Engineer, shall measure in-place density of the soils by the sand replacement method in a manner specified in AASHTO T 191 (Density of In-Soil Place Density by the Sand-Cone Method) or AASHTO T 310 (In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods) or their ASTM equivalent.

104.3.13 Monitoring of Embankment

The settlement and stability of the major embankment shall be monitored by the Contractor periodically in accordance with the agreed embankment monitoring methodology.

104.4 Method of Measurement

Add the following paragraph after the last paragraph of Sub-Section 104.4:

Any material coming from roadway, structure, drainage or ditch excavations which are suitable for use but are replaced by the Contractor with borrow materials without prior approval by the Engineer, shall not be measured for payment.

Measurement of quantities for embankment shall be made by the volume of embankment materials placed and compacted to the lines, grades, and dimensions shown on the drawings or directed by the Engineer and shall be taken only in the presence of the Engineer. The Engineer shall be notified at least 24 hours before taking such measurement. The volume of embankment materials shall be computed by end area method and determined from the execution section of the embankment established on the original ground line after stripping. The original ground line shall be surveyed and reported to the Engineer for checking and approval prior to the execution of the embankment operation.

The quantity of Embankment from Borrow shall be calculated as the balance between the total embankment volume (as shown on the drawings) and the total volume of suitable material from roadway excavation, from excess structures, bridges, and drainage excavation and from excess dredging and realignment of river channel excavation, employing the compaction factor 0.95 for common soil. The quantity of Embankment from Borrow due to settlement shall be treated as a re-measurable item.

The volume of selected fill placed, compacted and accepted as called for in the Drawings and in accordance with this Specification or as otherwise required by the Engineer under this Item, shall be measured in cubic meters (m³).

104.5 Basis of Payment

Modify the text of Section 104.5 to read as follows:

The accepted quantities, measured as prescribed in Section 104.4, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities. The payment for accepted quantities for embankment with fill materials from roadway and borrow excavation shall be deemed to include the cost of excavation, hauling, blending, drying and wetting if necessary, placing, spreading and compaction of fill materials. The payment for accepted quantities for embankment construction with fill materials from realignment of river channel and structure excavation shall be deemed to include the cost of hauling from stockpiles, blending, drying and wetting if necessary, placing, and spreading and compaction of fill materials. The payment shall be full compensation for the furnishing, placing and compacting of all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

The unit price shall also include the costs for procurement and furnishing of required materials if not coming from approved excavation. No separate payment shall be made for the tentative removal of embankment, counterweight fill, placing and removal of surcharge and preload and secondary excavation and backfilling for structures to be constructed on the embankment, cost of which shall be deemed included in the unit price of the embankment.

Payment will be made under:

Pay Item Number	Description	Unit Measurement	of
104(1)b	Embankment from Common Materials (Borrow)	Cubic Meter	

PART D SUBBASE AND BASE COURSE

ITEM 200 AGGREGATE SUBBASE COURSE

200.2 Material Requirements

Add the following Provisions to Sub-Section 200.2:

If fillers, in addition to that naturally present in the aggregate subbase materials, are necessary for meeting the grading requirements and/or for satisfactory bonding of material, it shall be uniformly blended with the subbase course materials on the road. The materials for such purpose shall be obtained from sources that can supply materials passing the specification requirements. It shall be free from hard lumps and shall not contain more than 15 % of material retained on the No. 4 sieve.

If there is need for additional bonding, additional fillers shall be required and shall be blended with the subbase material on the road. The blending material shall be spread in a uniform manner over the loosely spread subbase layer in quantities specified by the Engineer. The material shall meet the grading and quality requirements in all respect.

After each layer of subbase course material has been placed and blending material added, when required, it shall be thoroughly mixed to the full depth of the required layer by scarifying and blading. When and if directed by the Engineer, the materials shall be watered to prevent segregation of particle sizes and to obtain the moisture content required for compaction. When uniformly mixed, the mixture shall be spread smoothly to the cross-section shown on the drawings.

200.3 Construction Requirements

Add the following sub-clause after 200.3.5 to read as follows:

200.3.6 Protection and Continuity of Work

Any part of the subbase that has been completed shall be protected from any damage resulting from traffic being permitted to these works and shall be brought back to the tolerance without additional payment. To prevent such deformation, the pouring of concrete shall be followed right after the compaction of the prepared subbase.

200.4 Method of Measurements

Add the following:

When filler for blending is required, no separate pay item shall be considered. Any work necessary to provide a subbase material conforming to the specified gradation and quantity is considered as subsidiary to the Aggregate Subbase Items.

200.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 200.4, shall be paid for at the contract unit price of Aggregate Subbase Course which price and payment shall be full

compensation for furnishings and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
200	Aggregate Subbase Course	Cubic Meter

PART E SURFACE COURSES

ITEM 310 BITUMINOUS CONCRETE SURFACE COURSE, HOT-LAID

310.3.2 Surface Tolerances

Add the following paragraph to Sub-Section 310.3.2:

The allowable tolerances for the flexible surfacing and cement concrete pavement are given in Table 310.5.

**Table 310.1
Tolerances for Flexible Surfacing and Cement Concrete Pavement**

		ASPHALT CONCRETE SURFACING (Binder & Wearing Courses)	CEMENT CONCRET E PAVEMEN T	BITUMIN OUS SURFACE TREATM ENT	GRAVEL SURFACI NG
Permitted variation from design THICKNESS OF LAYER	mm	±5	±5	-5	-5
Permitted variation from design LEVEL OF SURFACE	mm	±5	±5	-5	-5
Permitted SURFACE IRREGULARITY Measured by 3 m Straight-edge	mm	5	5	5	5
Permitted Variation from design CROSSFALL or CAMBER	%	±0.2	±0.2	±0.2	±0.2

PART F BRIDGE CONSTRUCTION (NOT APPLICABLE)

PART G DRAINAGE AND SLOPE PROTECTION STRUCTURES

ITEM 505 RIPRAP AND GROUTED RIPRAP

Material Requirements

505.2.1 Stones

Modify Section 505.2.1 in addition to second paragraph to read as follows:

Cobbles and boulders for Class A riprap shall consist of rock as nearly rectangular in section as is practicable or round natural stones ranging from 200 mm to 250 mm in diameter. Boulders shall be clean, sound, tough, durable, dense, resistant to the action of air and water, and suitable in all aspects for the purpose intended and shall be subject to the approval of the Engineer.

505.3 Construction Requirements

505.3.4 Weepholes

Modify Section 505.3.4 in addition to the paragraph to read as follows:

For weepholes, non-woven geotextiles sewed like a bag and filled with gravel, 20 mm in diameter and in accordance with DPWH standards shall be used as filter as shown in the Drawings.

The PVC pipe shall be durable and of accepted quality and shall be subject to the approval of the Engineer. Unless otherwise shown on the drawing, the pipe shall be schedule 40.

505.5 Basis of Payment

The table in Section 505.5 shall only include the following:

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
505(5)	Grouted Riprap, Class A	Cubic Meter
505(9)	Filter Layer of Granular Material	Cubic Meter

ITEM 510 CONCRETE SLOPE PROTECTION

510.1 Description

Modify Section 510.1 to read as follows:

This Item shall consist of furnishing and placing of concrete slope protection including all necessary excavation, a bed course and reinforced concrete to the required thickness and

extent to protect slope against erosion. Construction details shall be as shown to the drawings.

PART H MISCELLANEOUS STRUCTURES

ITEM 608 TOPSOIL (Where Applicable)

608.5 Basis of Payment

Modify Second paragraph of Sub-Section 608.5 to read as follows:

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
608	Furnishing and Placing Topsoil	Cubic Meter

ITEM 610 SODDING (Where Applicable)

610.1 Description

Modify Section 610.1 to add the following:

There are two types of sodding that shall be done a) sodding using ordinary grass and b) sodding using watergrass.

610.1.1 Sodding (Ordinary Grass)

This item consists of furnishing and laying/planting of live sod (ordinary grass) with or without vetiver grass on embankment slopes as designated and shown on the plans or as ordered and laid out by the Engineer in accordance with these standard specifications.

This item is recommended on nonflooded sections of the embankment and to be planted starting from the toe of the embankment working upwards to the bottom of subbase layer.

For embankment with a height more than 1.5 meters, ordinary grass sodding shall be planted together with vetiver grass. Vetiver grass shall be planted in three (3) rows starting from the toe of the embankment going up.

610.1.2 Sodding (Watergrass)

This item consist of furnishing and laying/planting of live sod (watergrass) from the toe of the embankment up to fence or ROW limit in flooded and inundated sections of the project alignment as shown on the Plans or as directed by Engineer.

610.2 Material Requirements

Add the following paragraphs to Section 610.2:

Vetiver grass material requirements shall be in accordance with Item SPL 518(A).3

Sodding (watergrass) material shall be certified or identified watergrass plant that can thrive in waterlogged, swampy and flooded areas.

All sod materials shall be subject to the approval of the Engineer.

610.3 Construction Requirements

Add the following to Section 610.3:

610.3.6 Placing Requirements for Vetiver Grass

Vetiver grass construction/placing requirements shall be in accordance with Item SPL 518(A).4.

610.5 Basis of Payment

Modify Section 610.5 to read as:

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
610(a)	Sodding (Ordinary Grass/Carabao Grass)	Square Meter

ITEM 612 REFLECTORIZED PAVEMENT MARKINGS

All the provisions of DPWH Standard Specifications, 2004 shall apply to this item except when supplemented or modified herein.

612.9 Basis of Payment

Modify 2nd paragraph of Section 612.9 as follows:

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
612 (1)	ReflectORIZED Thermoplastic Pavement Markings (White)	Square Meter