



## **4.7.9 Water Pump Motor**

The contractor must provide a 20 Horsepower Single Stage submersible deep well borehole pump during the development of the well with the following minimum specifications:

- Able to deliver 80 USGPM
- Three-phase power supply
- 400V AC
- 60 Hz
- 3500 RPM
- Includes complete stainless steel non-return check valve.

## **4.8 WELL TESTING**

### **4.8.1 Scope**

The Contractor shall provide all personnel and labor, instrumentation and water level indicators and operate a Pumping Unit for the following purposes:

1. Well Flushing for a duration of two (2) hours prior to the Step-drawdown pumping tests (SDT). After the flushing, the well shall be allowed to recover prior to performing SDT, wherein the well's water level shall reach the static water level measured prior to flushing or as directed by the ZCWD.
2. Step-drawdown pumping tests on the completed well in accordance with the standard methods or as directed by the ZCWD.
3. Constant discharge pumping test on the completed well in accordance with the standard methods or as directed by the ZCWD.

### **4.8.2 Equipment Capacity**

- a. The Contractor shall provide and operate pumping machinery capable of carrying out the specified pumping and shall provide adequate controls to allow discharge rates to be kept constant at varying pumping water levels and to permit pumping with a variation of not more than 5% of the designated discharge rate during any period of yield or aquifer testing.



- b. The Pumping Unit set should be able to deliver a maximum discharge rate of **242.15 gallons per minute (15.27 lps)** at maximum pump setting of **77.40 meters**. Reduction of cost or variation order maybe allowed if **maximum well discharge is not reached even at a pump setting of 150 meters and if break suction does not occur.**

On the other hand, reduction of cost or variation order shall not be allowed if any of the following conditions occur: (1) **maximum well discharge reached at a pump setting lower than as required,** (2) **maximum well discharge is not reached due to equipment breakdown or pumping test assembly is not capable of delivering the required maximum discharge rate at the corresponding maximum pump setting.**

- c. Suitable pumping machinery will be deemed to be:
  - 1. Submersible electric pump unit together with generator and such accessories needed to run the pump.
  - 2. Lineshaft pump and internal combustion prime mover together with all accessories needed to run the pump.

#### **4.8.3 Equipment Operation**

- a. The Contractor shall supply and operate all equipment and accessories necessary for installation and removal of pumps.
- b. The Contractor shall provide a generator set which **operates at a noise level not louder than 85 decibels (dB)**. In the instance that the existing equipment of the Contractor emits noise more than 85 dB, the Contractor shall provide positive noise abatement devices to tone down the noise level of the generator set to the acceptable limit.
- c. The Contractor shall maintain on site sufficient fuels, lubricants, spares and other accessories needed to run the Pumping Unit for whatever period may be specified by the ZCWD.
- d. The Contractor shall provide sufficient competent personnel including a qualified fitter and electrician, as may be necessary to install and operate the Pumping Unit.



#### **4.8.4 Control of Discharge Rate**

The Contractor shall, during the pumping tests, provide a suitable gate valve on the discharge pipeline to facilitate easy control of the discharge rate.

#### **4.8.5 Water Level Sounding Pipe**

- a. The Contractor shall provide and install a temporary tube of at least one (1) inch diameter from the top of the well to 2 m above the pump bowl assembly to facilitate easy measurements of water level. The tube shall be open only at the bottom and top.
- b. Payment for providing, installing and removing the tube shall be deemed to be included in the rates given for pumping tests.

#### **4.8.6 Discharge Rate Monitoring**

Discharge rates shall be measured and recorded with a water meter. All items are subject to the ZCWD's approval before start of drilling.

#### **4.8.7 Definition of "Pumping Unit"**

- a. Pumping Unit refers to equipment used in the operation of the drilling activities, used in control of discharge rate, water level sounding pipe and discharge rate monitoring.

#### **4.8.8 Pumping Procedure**

The ZCWD through the Technical Specifications will determine the pumping procedure necessary to obtain the objectives of this Contract.

#### **4.8.9 Suspension of Pumping**

If the ZCWD considers that the absence or condition of any equipment, personnel, fuel, lubricants or accessories will prejudice the quality of data obtained from any pumping test, he may suspend the work in accordance with the provisions of the conditions of Contract.



#### **4.8.10 Equipment Breakdown during Pumping**

- a. The pumping must be continuous and at a constant rate during the pumping tests. The ZCWD will instruct the Contractor as to the expected maximum duration of each pumping test before start of each test.
- b. If pumping is interrupted or the discharge rate fluctuates by more than 5% of the designated discharge rate, the test may be repeated after a period of recovery determined by the ZCWD.
- c. If any pumping test is interrupted because of equipment breakdown or inadequate supervision or discharge control without any reasonable cause and at the failure of the contractor, no payment shall be made for any pumping period less than the minimum of **72 hours**. The Contractor has to recommence the pumping test at a minimum of 24 hours provided that the **maximum discharge rate of 242.15 gallons per minute (15.27 lps)** will be reached, otherwise, the pumping test shall continue until the required maximum discharge will be attained.
- d. In such case that the pumping test is interrupted due to dry pumping or at any valid and justifiable cause, whichever claims are subject for evaluation. Payment shall be made based on the actual period of the pump test prior the interruption.

#### **4.8.11 Duration of Tests**

- a. The step drawdown pumping tests shall be performed on 5 steps with duration of 1 hour each.
- b. The constant discharge pumping tests shall be performed for a period of three (3) days, unless otherwise specified in the Special Provisions or unless otherwise instructed by the ZCWD.

#### **4.8.12 Temporary Pipeline**

- a. The Contractor shall provide a temporary pipeline as directed by the ZCWD for the discharge from pumping tests and for clearance to a suitable watercourse or drain.  
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- b. Under certain circumstances when re-infiltration cannot be avoided or it is costly to provide for this condition, the ZCWD shall decide to what distance from the well water may be discharged on the ground.



## **4.9 CEMENT GROUTING**

### **4.9.1 Scope**

The Contractor shall, unless otherwise specified in the Special Provisions, provide the cement and mixing equipment required for the mixing of the grouting indicated in the Preliminary Well Design and shall place the cement grout as **specified**.

### **4.9.2 Grouting Materials**

- a. Cement grout shall consist of a mixture of 95% Portland Cement, 5% Bentonite, sand and clean water, mixed in the proportion of 52.5 kg. of Portland Cement/Bentonite to maximum of 30 liters of water.
- b. All cement shall, unless otherwise specified in the Contract Documents, conform to the "Specifications for Portland Cement" (ASTM C150 latest revision).

### **4.9.3 Method of Placing Grout Material**

- a. The method and equipment for placing the grout from the bottom of the casing/hole/annulus to be grouted, to the surface shall be to the approval of the ZCWD. Flushing of the annular space with fluid to assure the space is open and to remove loose material will be required by the Contractor before grouting is commenced.
- b. Any grouting operation shall be continuous and before starting, sufficient grout shall be mixed to complete the whole operation. During the grouting operation, the mixed grout shall be continuously stirred. The Contractor shall provide such tanks, hoppers and other equipment as may be necessary to meet these requirements.

### **4.9.4 Setting Time**

No work will be allowed on the well within a period after completion of grouting unless quick setting cement is used. In such case, the idle period may be reduced subject to the ZCWD's prior approval.



## **4.10 WELL COMPLETION**

### **4.10.1 Scope**

The Contractor shall provide and operate all equipment necessary to restore the site as near as possible to its condition before commencement of drilling and shall furnish and install a well head cap as specified in the Contract Drawings.

### **4.10.2 Site Restoration**

The site shall be restored to a condition as nearly possible to that, which existed before the well drilling and testing activities commenced. This work shall include, but not limited to, restoration of fences and structures, removal of drill cuttings, leveling of the disturbed ground surfaces and replacement or compensation for the destroyed plants and landscaping. The site shall also be cleared from all debris, excavated materials, temporary facilities and other related obstructions, or as directed by the ZCWD.

In such a case when the drilling is completed and concluded that no water could be extracted from the site, the Contractor shall restore the area to its original condition at no additional cost to the ZCWD.

### **4.10.3 Final Well Inspection**

After each material has been installed in place, an inspection shall be conducted by the ZCWD. A well camcorder will be performed in the well to ensure the integrity of the installed blank casing and well screens. Any discrepancy found during the inspection that entails cost will be subject to imposition of corresponding payment reduction.

### **4.10.4 Well Head Capping**

The well head shall be completed with a well head assembly fully welded to the upper casing as well as a water level sounding tube with screw cap in order to prevent any unauthorized tampering of the well.



## **4.11 SUBMITTAL OF REPORTS AND BOREHOLE DATA**

- a. The Contractor shall submit to the ZCWD daily records in duplicate containing the following information:
  1. Site
  2. Date
  3. Description of each stratum encountered
  4. Depth below ground of each change of stratum
  5. Depths and details of all disturbed samples
- b. The Contractor will be required to keep a record of penetration rate, mud losses and mud conditions.
- c. At the end of the well construction and before final payment is made, the Contractor shall submit to the ZCWD a report containing the following information:
  1. Total depth of the well
  2. Description of the strata encountered
  3. The sizes and the lengths/specifications of the casing installed
  4. The date of the start and the completion of the well construction
  5. The locations and the description of the casing perforations or the well screen placement
  6. The locations of the gravel, the size of gravel, if applicable, and the amount of cement grout installed
  7. Records of discharge rates and drawdown during well development together with description of the methods of development
  8. The well yield (expressed as discharge rate and drawdown), the dates and the duration of the test(s)
  9. The methods of measuring the discharge rate and the drawdown
- d. The cost of records shall be deemed to be included in the contract rates.



## **4.12 SPECIAL PROVISIONS**

### **4.12.1 MOBILIZATION AND DEMOBOLIZATION**

- a. The Contractor shall mobilize, and bring out into work, all personnel plant and equipment, in accordance with its approved Construction Program, Equipment Utilization Schedule and Manpower Schedule, from its regular place of business or another project to the site to undertake the Contract.
- b. Mobilization shall include the obtaining and transporting to jobsite of pipes, materials, equipment, personnel, constructional plant and all necessary items for the execution and completion of the work and shall also include the setting up and the verification of all equipment, instrument and all other plant until it is rendered operable. It shall include sufficient supply of spare parts for the pipe laying works. Breakdowns are to be repaired on site by the most expeditious method possible at no cost to ZCWD. In the event repairs being beyond the personnel or tools at the site to effect repairs in a reasonable time, such that it has to be removed from the site, then a replacement of machine or equipment of a similar capacity shall be provided by the Contractor at no additional mobilization costs to ZCWD nor extension of completion of works.
- c. Demobilization shall include dismantlement and removal from the site of the Contractor's plant, materials and equipment and all temporary facilities. Demobilization shall include clean-up of the site after completion of the Contract Work as approved by the ZCWD and transportation from the site of Contractor's employees.

### **4.12.2 TEMPORARY SITE FACILITIES**

#### **a. Contractor's Office**

During the performance of the Contract, the Contractor shall maintain a field office at the site of the work at which he or his authorized agent shall be present at all times while the work is in progress. Instructions from the ZCWD or its authorized Representative left at his field office shall be considered as having been delivered to the Contractor. One copy of the Contract Documents including the drawings and specifications for the work shall be kept at all times in the said office, ready for instant reference.





## **b. ZCWD's Field Office**

The Contractor shall provide the ZCWD's Field Engineer with a temporary office at project site; each office must be of the ZCWD/Field Engineers' approved type and must be air-conditioned or as required by the ZCWD (installed air-conditioned units shall be functional during the duration of the contract) which shall have the following specifications:

1. Floor area of temporary office – 12 square meters
2. Roofing – G.I. Corrugated Sheets
3. Wall – Double Walling Plywood
4. Office – Tables, Chairs, Cabinets, White Board and Kitchen Utensils

The Contractor at his option may provide alternative Field Engineers Office of any type other than specified herein, subject to the approval of ZCWD.

## **c. TEMPORARY CONNECTIONS DURING CONTRACT PERIOD (Water and Power)**

1. Water Supply – For all operations required in the execution of the Contract, the Contractor shall be responsible for providing ample water supply under a pressure sufficient for all construction purposes. The ZCWD may furnish reasonable quantities of water when available subject to corresponding fees' schedule of the ZCWD. All cost for water consumed in the implementation of the project shall be paid by the Contractor and shall be priced accordingly, this cost shall be included in its tender bid price. The ZCWD reserves the right to limit, suspend, or terminate this supply of water should it consider such action to be detrimental to the operation of the system. In this event, the Contractor shall obtain water from some other approved source at his own expense.
2. Power and Lighting – The Contractor shall make all necessary applications and arrangements and pay all fees and charges for all temporary wirings, switches, connections, meters and monthly bills for power and light necessary for the proper completion of this Contract. There shall be sufficient electric lighting so that all works may be done in a workmanlike manner when there is no sufficient daylight or during night work.



### **4.12.3 LOGBOOK**

A logbook shall be maintained by the Field Engineer at all times reflecting time extensions, work suspensions, change/extra work orders and circumstances, affecting the progress of work, to be signed by both the Field Engineer and the Contractor.

### **4.12.4 CONSTRUCTION CRITICAL PATH METHOD (CPM)**

The CPM network shall be the basis of the contractor in completing the project in the prescribed period of time.

The CPM shall be updated by the Contractor when required by the ZCWD but not more than once per month.

### **4.12.5 PROJECT SIGNS**

The Contractor shall furnish, erect and maintain a minimum of two (2) project signs and two (2) COA sign board (8ft. x 8ft.) to be located at the start and end of the project and in accordance with the Standard Drawings. The location for the erection of these signs by the Contractor shall be as directed by the ZCWD.

### **4.12.6 WORKMEN'S IDENTIFICATION BADGES AND SAFETY GEARS**

The Contractor shall provide all his men working in the project with proper identification badges and safety gears.

### **4.12.7 WORKING/CALENDAR DAYS**

The term "Working Day" refers to working days in the government service. The term "Calendar Day" refers to the days in a week, including Saturdays, Sundays and holidays. Whenever the word "day" is used, it shall refer to calendar day.

### **4.12.8 INSPECTION OF THE WORK SITE**

Contractor may inspect the site of the work by personal examination of the location of the proposed work and the actual visualization of the work to be done. They should be aware of the



conditions which might affect the execution of this contract and has made provisions in his bid.

## **4.13 MATERIALS AND WORKMANSHIP**

### **4.13.1 Safeguarding of Equipment, Materials and Work**

The Contractor shall properly safeguard all equipment, materials and work against loss, damages, malicious mischief, or tampering by unauthorized persons until acceptance of the work by the ZCWD.

Locked and covered storage or continuous surveillance by a watchman shall be provided if required to accomplish this purpose.

### **4.13.2 New Materials and Equipment**

Unless otherwise specifically shown, or permitted by the ZCWD, all materials and equipment incorporated in the work shall be new and of current manufacture. The ZCWD may request the Contractor to furnish manufacturer's certificate to this effect.

### **4.13.3 Title to Materials Found on the Work**

The ZCWD reserves the right to retain title to all materials developed and obtained from the operations connected with the work. Unless otherwise specified in the Special Provisions, neither the Contractor shall have any right, title, or interest in or to any such materials. The Contractor will be permitted to use in his work, without charge, any such materials that meet the requirements of the Specifications and Drawings.

### **4.13.4 Defective Equipment, Materials or Work**

Inspection of the work shall not relieve the Contractor of any of his obligations under the Contract. Even though the equipment, materials, or work required to be provided under the Contract have been inspected, accepted, and estimated for payment, the Contractor shall, at his own expense, replace or repair any such equipment, materials, or work found to be defective or otherwise not to comply with the requirements of the Contract up to the end of the maintenance and guarantee period.



- a. Any equipment or materials brought upon the job site by the Contractor and subsequently rejected by the ZCWD as not complying with the requirements of the Contract shall be removed immediately by the Contractor to a satisfactory distance from the job site.
- b. If the Contractor shall fail to repair or replace unsatisfactory equipment or materials from the job site within seven (7) calendar days after being ordered to do so by the ZCWD, the ZCWD, acting on behalf of the ZCWD, may make the ordered repairs or remove the condemned equipment or materials; and the ZCWD shall deduct the cost thereof from any moneys due or to become due the Contractor.

#### **4.13.5 Rubbish Control**

During the progress of the work, the Contractor shall keep the site of the work and other areas used by him in a neat and clean condition, and free from any accumulation of rubbish.

#### **4.13.6 Dust Control**

The Contractor shall at all times conduct his work so as to avoid unnecessary dust. He shall provide adequate equipment and water as determined by the ZCWD to be necessary for accomplishment of this objective.

#### **4.13.7 Cleaning Up**

The Contractor shall promptly remove from the vicinity of the completed work all rubbish, unused materials, concrete forms, equipment, and temporary structures used during construction.

#### **4.13.8 Character of Workmen**

Only qualified personnel and skilled workmen shall be employed on the site except in positions normally occupied by unskilled labor. When required in writing by the ZCWD, the Contractor shall discharge any person who is, in the opinion of the ZCWD, incompetent, disorderly, or otherwise unsatisfactory and shall not again employ such discharged person on the work except with the written consent of the ZCWD. Such discharged person shall not be the basis of any claim for damages



against ZCWD or any of its agents. If the Contractor permits such a person on the work site without the consent of the ZCWD, this alone shall be sufficient to immediately suspend the Contract until the ZCWD's instructions have been fulfilled.



## 5 PREPARATION OF ESTIMATES / FINANCIAL BID

In the preparation of the detailed estimates or financial bid, the DPWH Department Order No. 197, Series of 2016 shall be followed:

### 5.1 DIRECT COST

The **Estimated DIRECT COST** shall consist of the following:

#### 5.1.1 Cost of Materials

Cost of materials to be used in doing the work item called for, which shall include, inter alia, the following:

- Cost at source, including processing, crushing, stockpiling, loading, royalties, local taxes, construction and/or maintenance of haul roads, etc.
- Expenses for hauling to project site.
- Handling expenses.
- Storage expenses.
- Allowance for waste and/or losses, not to exceed 5% of materials requirement.

#### 5.1.2 Cost of Labor

Cost of Labor this shall include the following:

- Salaries and wages, as authorized by the Department of Labor and Employment.
- Fringe benefits, such as vacation and sick leaves, benefits under the Workmen's Compensation Act, GSIS and/or SSS contributions, allowances, 13th month pay, bonuses, etc.

#### 5.1.3 Equipment Expenses

Rental rates of equipment shall be based on the prevailing "Association of Carriers and Equipment Lessors, (ACEL) Inc." approved for use by the DPWH (Presently it is the 2014 ACEL Rates). Rental rates



of equipment not indicated in the ACEL booklet shall be taken from the rental rates prepared by the Bureau of Equipment. For simplicity in computation, the operated rental rates are preferred over the bare rental rates as the former includes operator's wages, fringe benefits, fuel, oil, lubricants and equipment maintenance. The make, model and capacity of the equipment should be indicated in the detailed unit cost analysis.

Mobilization and Demobilization shall be treated as a separate pay item. It shall be computed based on the equipment requirements of the project stipulated in the proposal and contract booklet. Mobilization and demobilization shall not exceed 1% of the Estimated Direct Cost (ECD) of the civil works items.

## **5.2 INDIRECT COST**

The Indirect Cost shall consist of the following:

### **5.2.1 Overhead Expenses**

Overhead Expenses which include the following:

- Engineering and Administrative Supervision.
- Transportation allowances.
- Office Expenses, e.g., for office equipment and supplies, power and water consumption, communication and maintenance.
- Premium on Contractor's All Risk Insurance (CARI).
- Financing Cost such as Premium on Bid Security, Premium on Performance Security, Premium on Surety for Advance Payment, Premium on Warranty Bond (one year).
- Fees, Permits and clearances.
- Provision of service vehicle.

### **5.2.2 Contingencies**

Contingencies includes the following:

- Expenses for meetings, coordination with other stakeholders, billboards (excluding Project Billboard which is a pay item under the General Requirements), stages during ground breaking & inauguration ceremonies, and other unforeseen events.



### 5.2.3 Miscellaneous Expenses

These include laboratory tests for quality control and plan preparation.

### 5.2.4 Contractor’s Profit Margin

The margin of contractor’s profit shall be in accordance with the table below. The profit is computed as the profit mark-up multiply by the Estimated Direct Cost.

### 5.2.5 Value Added Tax (VAT) Component

Which shall be the five (5) percent of the summation of Estimated Direct Cost, Overhead, Contingencies & Miscellaneous (OCM) and Contractor’s Profit.

### 5.2.6 OCM and Profit Mark-Up

1. The following items shall not be subjected to OCM and Profit mark-up:
  - Mobilization and Demobilization
2. The following non-civil works items shall not be subjected to OCM mark-up:
  - Field/Laboratory Office & Living Quarters (Rental Basis)
  - Furnishing of Furniture, Laboratory Equipment, Survey Equipment and Consumables
  - Assistance to the Engineers
  - Photographs
  - Health and Safety
  - Environmental Certificate
  - Traffic Management
  - Communication Equipment, etc.
3. The detailed estimates for this project shall not exceed with the following mark-ups:

Estimated Direct Cost	OCM	PROFIT	VALUE ADDED TAX (VAT)
Up to 5 Million	15%	10%	5%





## 6 BILL OF QUANTITIES



### BILL OF QUANTITIES

#### PROPOSED WELL EXPLORATION, TESTING AND DEVELOPMENT AT MERCEDES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (W/ OCM, PROFIT & VAT)	TOTAL
SPL - 1	MOBILIZATION/DEMOBILIZATION	1.00	LOT		
SPL - 2	CONSTRUCTION SAFETY & HEALTH PROGRAM	1.00	LOT		
SPL - 3	CONSTRUCTION OF PROJECT BILLBOARDS/ SIGNAGES	1.00	LOT		
<b>Well Exploration, Testing and Development at Mercedes</b>					
SPL - 4a	SITE PREPARATION, CONSTRUCTION OF TEMPORARY FACILITY AND SETTING-UP OF EQUIPMENT	1.00	LOT		
SPL - 4b	DRILLING OF PILOT HOLE	77.40	METERS		
SPL - 4c	BOREHOLE LOGGING OF PILOT HOLE	1.00	LOT		
SPL - 4d	REAMING TO 400mmØ BOREHOLE	77.40	METERS		
SPL - 4e	FURNISHING OF 250mmØ BLANK CASING	55.18	METERS		
SPL - 4f	FURNISHING OF 250mmØ SCREEN	23.22	METERS		
SPL - 4g	FURNISHING/FABRICATION OF 250MMØ END CAP	1.00	PC.		
SPL - 4h	INSTALLATION OF BLANK CASING, SCREEN AND END CAP	78.40	METERS		
SPL - 4i	FURNISHING AND INSTALLATION OF CASING CENTRALIZERS	6.45	PCS.		
SPL - 4j	FURNISHING AND INSTALLATION OF GRAVEL PACKING AT ANNULUS AROUND CASINGS AND SCREENS	62.40	METERS		
SPL - 4k	DE-FLOCCULATION OF DRILLING MUD WITH POLYPHOSPHATE SOLUTION	1.00	LOT		
SPL - 4l	DEVELOPMENT BY WATER JETTING	12.00	HOUR		
SPL - 4m	DEVELOPMENT BY SURGING AND BAILING	12.00	HOUR		
SPL - 4n	DEVELOPMENT BY AIRLIFTING	12.00	HOUR		
SPL - 4o	STEP DRAWDOWN PUMPING TEST	1.00	LOT		
SPL - 4p	WELL TESTING (72 hours Constant Rate Discharge Test)	72.00	HOUR		
SPL - 4q	CEMENT GROUTING OF ANNULUS	15.00	METERS		
SPL - 4r	WELL DISINFECTION AND CLEANING	1.00	LOT		
SPL - 4s	FURNISHING AND INSTALLATION OF 300 MM STEEL PIPE AS STICK UP PIPE	1.00	LOT		
SPL - 4t	SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF ONE (1) UNIT 20 HP SUBMERSIBLE VERTICAL PUMP, 2" INLET AND OUTLET SUCTION W/ COMPLETE ACCESSORIES	1.00	ASSY.		
SPL - 4u	WELL COMPLETION, FURNISHING & INSTALLATION OF GRAVEL FILL PIPE 50MMØ WITH SCREW CAP AND FURNISHING AND INSTALLATION OF WATER LEVEL 38MMØ SOUNDING TUBE	1.00	LOT		
<b>TOTAL BID AMOUNT</b>					

Prepared & Submitted by:

\_\_\_\_\_  
 Bidder's Authorized Representative



## 7 SIGNATORIES

Prepared by:

  
**JEREMIAH R. CRUZ**  
Senior Engineer A (E.E.)  
Design Division

  
**VERLIN ANN L. LORIA**  
Senior Engineer A (M.E.)  
Design Division

Checked by:

  
**REX D. SALE JR.**  
Supervising Engineer A  
Design Division

Submitted by:

  
**EDITO M. BAUTISTA JR.**  
Officer-In-Charge  
Design Division

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Recommending Approval for Implementation:

  
**MARLI P. ACOSTA - DE FIESTA**  
Assistant General Manager, Technical Services Group

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Approved for Implementation:

  
**REYNALDO R. CABILIN**  
Acting General Manager