



Republic of the Philippines



**LIGHT
RAIL
TRANSIT
AUTHORITY**

BIDDING DOCUMENTS

**Contract for the Civil Works of LRT Line 2
East (Masinag) Extension Project**

**PACKAGE 2 – DESIGN AND BUILD OF
STATIONS
(Volume 2)**

26 August 2016

Section VI. Procuring Entity's Requirements

Part 1: Terms of Reference
for the
DESIGN & BUILD OF EMERALD AND MASINAG STATIONS

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General Information

1.1 Background of the Project

The proposed LRT Line 2 Extension Project (herein referred to as the “Project”) was conceptualized to augment the ridership and traffic demand in the eastern portion of LRT Line 2 route, hence, improving the domestic transportation current capacity of the existing railway and to provide a more convenient access to commuters to Metro-Manila and vice versa. For this purpose, the Government of the Philippines (GOP) has approved the budget to fund the implementation and utilize the world class expertise of local contractors in the successful development program of upgrading the transport services.

The Project was planned to expand the railway structures to the eastward sections along the Marcos Highway from Santolan the last existing station of LRT Line 2 in Pasig City to Masinag in Antipolo City. The proposed Project will include the construction of the viaduct structure with a length of 3.934 kilometers to Masinag junction; and the design and build of two (2) stations, tentatively referenced as Emerald and Masinag Stations.

The assignment which is the subject of this Terms of Reference (TOR) is for the Design and Build of two (2) stations.

1.2 Responsibility of the Bidder (Designer-Builder)

It is the responsibility of the Bidder to ensure that all the necessary tasks and associated costs required for the successful completion of the Works, in conjunction with this Terms of Reference (TOR) and the Particular Design and Performance Specifications (PDPS), are considered and outlined in his technical and financial proposals.

The bidder, by submitting his bid, represents that:

- a) He has thoroughly read, carefully examined and fully understands all the bid documents and his bid will be in accordance therewith.
- b) His bid is based upon the conditions and requirements of the bid documents without exception.
- c) He has visited and inspected the site of the Works and its surroundings and satisfied himself as to all matters pertaining to the Project, including the location and the nature of the Work; climatic conditions; the nature and condition of the terrain: geological conditions at the site; transportation and communication facilities; the requirement and the availability of materials, labor, water, electric power and roads; the locations and extent of aggregates sources, and other factors that may affect the cost, duration and execution of the Work; that he has determined the general characteristics and conditions of the Project.
- d) He has acquainted and familiarized himself with all conditions, local or otherwise, affecting the carrying out of the Work and has arrived at an estimate of the facilities available and the facilities needed for the Project.

- e) He is aware that the Procuring Entity shall not assume any responsibility regarding erroneous interpretations out of any data furnished by the Procuring Entity.
- f) He has familiarized himself with all laws, decrees, and regulations of the Philippines, and the local government where the Emerald and Masinag Stations are located which affect or apply to the operations and activities of the Bidder.

1.3 Work Schedule

The Designer–Builder shall complete the services or “Work” within Five Hundred Forty (540) calendar days from receipt of Notice to Proceed scheduled as follows:

- a) Detailed Design Phase including review and approval should be completed within One Hundred Twenty (120) calendar days from receipt of the Notice to Proceed.
- b) Construction Phase should be completed within Four Hundred Twenty (420) calendar days from approval of design.

2. Scope of Works

In line with the guidelines and provisions of Annex “G” of the revised IRR of R.A. No. 9184 for the Procurement and Implementation of Contracts for Design and Build Infrastructure Projects, the Scope of Works includes the following activities:

2.1 Review of Reports and Station Conceptual Design Plans and Performance Specifications

The Bidder shall review all pertinent Reports and Conceptual Plans provided for this Project for his considerations in the preparation of his bids and comment on, but not limited to, the following:

- Errors, if any or missing information;
- Constructability or inherent construction issues associated with the plans;
- Initial cost estimates.

2.2 Ancillary Works for the Engineering Design and Construction of the Works

Topographic surveys, soil and geotechnical investigations have been undertaken by the Consultants who prepared the Conceptual Design Plans for the indicative works as shown in **Volume 3**. The Bidder shall review and assess these surveys and investigations and establish if the available topographic surveys, hydrological, soil and geotechnical testing results will suffice his detailed design requirements.

The Bidder however is expected to conduct his actual site survey of the Project area to identify preliminarily; the meet’s and bounds of the proposed Emerald and Masinag Stations. In the process, he shall be able to familiarize himself with site and nearby occupancy. It is also expected that the bidder shall familiarize himself with existing relevant materials and literature available from the Procuring Entity/Consultant to enable him to come up with an intelligent proposal.

2.2.1 *Survey and Mapping*

The survey and mapping shall determine the boundaries and provide the stationing along control lines to establish feature and design criteria location and identify existing and future right-of-way limits and entry/exits to the stations based on the conceptual design plan provided to the Bidders contained in this bidding documents.

In the conduct of structural surveys, the following parameters need to be considered:

a) **Man-made structures**

Determine existing and proposed infrastructure, facilities, etc., which may have bearing on the planning and design exercises.

b) **Utilities**

The Bidders shall identify/locate the existing utilities at the site, namely:

- i) Electrical Power Supply (underground and overhead);
- ii) Water Supply;
- iii) Sewer and Storm Drainage; and
- iv) Telephone Lines (underground and overhead).

2.2.2 *Soil & Geological and Hydrological Investigations*

For bidding requirements, Bidders may use the Geotechnical and Hydrological Investigation Reports conducted by the Civil Works Design Consultant for the detailed engineering design of the viaduct and for conceptual design of the stations.

For the winning Bidder, he is expected to conduct comprehensive Soil/Geological investigation to fully determine the bearing capacity and other data for foundation design which is necessary for the overall structural analysis and design of the two (2) Stations, in order to ensure the safety of the structure, with a Certification from the Geotechnical/ Geological Engineer that the winning Bidder conducted the Soil and Foundation Investigation.

The winning bidder shall validate the findings of the Hydrological Investigation Report, subject to approval by the Procuring Entity's representative, before application to his design of the stations.

2.2.3 *Value Engineering Analysis*

For bidding requirements, the Bidder shall perform Value Engineering analysis of his design and construction method alternatives develop during the conceptualization stage into design elements that fit into the project. The merit of each alternative shall be evaluated for its integration into the project without sacrificing the quality and integrity of the structure while maintaining its essential function, performance and safety, its impact on other project elements, and its impact on other value alternatives.

Any negative factors associated with a value alternative shall be noted, where in certain cases, an alternative may provide value in a certain location but may be less effective when the whole project is considered. It is important that the bidder must note if certain value alternatives function better with certain original project elements.

The information related to the value engineering analysis shall include the following:

- Original concept;
- Proposed changes;
- Discussion of benefits of changes;
- Cost/benefit analysis;
- Initial and subsequent schedule impacts;
- Implementation considerations;
- Initial and subsequent changes to the scope;
- Follow-up actions;
- Lifecycle cost analysis;
- Impacts on other key attributes; and
- Sketches and other information aids.

2.2.4 Design and Construction Methods

For the bidding requirements, the Bidder shall prepare a narrative description of the design and construction procedures and methods he intended to apply for this contract to demonstrate how it will meet the Procuring Entity's objective and requirements, stating among others, brief description of the project/contract, design approach and methodologies, construction methods and procedures, manpower scheduling and equipment utilization. Name, qualifications, and particulars of the design firm (if sub-contracted) and designers in charge of the design of the Works must also be provided.

The construction methods shall state the general approach in construction in terms of use of equipment-intensive or labor-based methods, any special techniques, procedures or methods to ensure completion on time and quality of construction, testing and commissioning, and handover of the works.

At a minimum, the Method Statement shall address the following:

- a) Details of the arrangements and methods which the Bidders propose to adopt for the design and construction of the Works, in sufficient detail to demonstrate their adequacy to achieve the requirements of the Contract including completion within the Time for Completion.
- b) Outline of the arrangements which the Bidder proposes to adopt to manage coordination of Site access.
- c) Commentary on the geotechnical and subsurface aspects of the Works including materials, material sources and any constraints.
- d) Commentary on logistics and traffic management (*as may be appropriate*).
- e) Outline of the arrangements which the Bidder proposes to adopt to ensure compliance with the DOTr Specifications.
- f) Outline of the arrangements which the Bidder proposes for testing upon completion.

- g) Outline of arrangements for handover, including completion of as-built drawings, preparation of operation and maintenance manuals, and any additional matters.

2.2.5 Design and Construction Schedules

The Bidder shall set out a detailed Work Schedule for the Design and Construction of the Works to be undertaken, including estimated start and finish dates for individual components and identification of major milestones and critical path. The proposed Work Schedule shall be developed to address the following:

- a) Detailed Design Schedule

Detail of the proposed schedule including the submission of design documents, review and approval of the design by the Procuring Entity's Representative.

- b) Construction Schedule

The "Schedule" shall be accompanied by a narrative statement that shall describe the activities, assumptions and logic, and highlight the Bidder's perception of the major constraints and critical areas of concern in the organization, manufacturing and supply of equipment or constructions and completion of the Works.

The "Schedule" shall:

- i. Be developed as a critical path network and shall show the division of the Works, the start and completion dates for major activities and their interrelationships and keys dates, permitting processes that may be necessary in order to commence the Works, including the preparation of required studies, supporting information, and applications.
- ii. Be prepared using MS Project or other applicable software;
- iii. Show the proposed sequence in which the Works will be performed;
- iv. Show the start dates, completion dates and floats for the major activities, including the proposed timeline for the testing, commissioning and handing over of the completed Works;
- v. Show how the Works will progress in a manner that will meet the Key Dates and Milestone. Milestones shall not be introduced into the program as constraint dates, nor shall the Milestones impose constraints which in any way affect the program logic and float or limit the achievement of Key Dates of the Works;
- vi. Clearly identify proposed timeline for carrying out the Works within the Time for Completion, in the form of a bar chart and S-curve showing notably the critical path in the program and fully describe it in the accompanying narrative;
- vii. Show the dates and periods relating to the interfaces with the work of other Contractors, Subcontractors and Contractors under Subcontractors; and
- viii. The activities of the "Schedule" shall be organized to include, but shall not be limited to the following phases;
 - mobilization;
 - design;

- procurement of major components and materials;
- construction;
- type test, and routine tests;
- delivery and commissioning; and
- Work plan during defects liability period.

2.2.6 *Traffic Management Plan*

The successful Bidder shall clearly define and set out his Traffic Management Plan with due considerations of the inbound and outbound traffic of the Station Area affected by the activities during construction period specifically, but not limited to, necessary lane closure, including the acquisition of its approval from national and local traffic authorities.

The Contractor shall be fully liable and responsible 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 obligations or liabilities.

2.2.7 *Quality Management System*

The successful Bidder shall set out details of the Quality Management System for the design and construction phases of the project, describing the basis and operation of the proposed quality management system, including management reviews, procedural audits, checking procedures for monitoring, reporting and dealing with nonconformities, corrective actions, and feedback and the data management plan in accordance with the Procuring Entity's requirements, describing the proposed system for storing, indexing, and accessing data such as correspondence, meeting minutes, reports, drawing, etc.

The Quality Management Plan shall consist of the following:

- a) Project Management and Project Implementation Plan, which shall be the basis for the development of the more detailed document to be submitted, if awarded the contract.
- b) Proposals for use of Site and Site (Land) Management Plan which shall form the basis for the development of the more detailed and comprehensive document to be submitted, if awarded the contract.
- c) Quality Assurance Scheme and Quality Plan illustrating the intended means of compliance with the Procuring Entity's Requirements and setting out in summary form an adequate basis for the development of the more detailed documents.
- d) The Quality Management Plan shall contain sufficient information to demonstrate clearly the proposed method of achieving the Bidder's quality objectives with regard to the requirement of the Contract. The Bidder may be requested to amplify, explain or develop their Quality Management Plan prior to the date of acceptance

of the Bid and to provide more details with a view for reaching provisional acceptance of such a plan.

2.2.8 Environmental, Safety and Health Programs

The successful Bidder shall set out the details of the Environmental, Safety and Health Program for the Project and provide the documents to show that it has in place sufficient environmental awareness and protection measures in accordance with Philippine Environmental Laws, and safety policy documents and safety awareness to be able to perform their responsibilities in a safe and workmanlike manner.

- a) Environmental Plan illustrating the intended means of compliance with the Procuring Entity's Requirements including noise standards. This shall form the basis for the development of the more detailed document to be submitted, if awarded the contract. The Environmental Plan shall contain sufficient information to demonstrate clearly the proposed method of achieving the Bidder's environmental objectives with regard to the requirement of the Contract.

The Bidder may be requested to amplify, explain or develop his Environmental Plan prior to the date of acceptance of the Bid and to provide more details with a view to reaching provisional acceptance of such a plan.

- b) The Contractor shall include in his staff on Site for the duration of the Contract a designated Environmental 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.
- c) Site Safety Plan with sufficient information to demonstrate clearly the Bidder's proposal for the safety of Plant/Equipment and personnel as the site. On the basis of this information, the Contractor shall develop a Detailed Site Safety Plan for the project approved by the Department of Labor and Employment (DOLE).
- d) Health Program for the workers approved by the Department of Labor and Employment (DOLE).

The successful Bidder will be required to design and carry out the Works in accordance with the Site-specific Health and Safety Plan to be developed by it following Contract award, and approved by the Procuring Entity's Representative.

2.2.9 Environmental Management and Monitoring

The Contractor is required to perform his contractual obligations to undertake the Works in such a manner that it will prevent any adverse effect to the environment and to conform to the requirements of the Environmental Compliance Certificate (ECC) issued by the Environmental Management Bureau (EMB) and the Department of the Environment and Natural Resources (DENR). In particular, the Contractor shall perform his operations and activities in accordance with the latest Philippine Environmental Rules and Regulations,

and to comply with the international conventions that have been ratified by the Government of the Philippines.

The Contractor shall be responsible for monitoring the environmental impact of the execution of the Works during the whole of the construction period, up to the date of issuance of the Taking-Over Certificate for the whole of the Works, and for ensuring that the existing natural and social environment are not adversely affected by the execution of the Works.

Where a certain amount of environmental degradation is unavoidable, the Contractor shall apply mitigation measures in order to keep to an absolute minimum level to any adverse impact on the surrounding area caused by the carrying out of the Works.

Notwithstanding any more particularized requirements set out in the Specifications, the Contractor shall be entirely responsible for monitoring by observations and measurement the following areas of possible pollution and contamination on a continual basis throughout the execution of the Works and for reporting and taking preventive and corrective measures as necessary to protect and preserve the existing natural and social environments:

- number and variety of trees and shrubs removed;
- construction dust;
- air pollution caused by construction equipment and vehicle exhaust fumes;
- noise and vibration caused by construction equipment;
- debris on public roads caused by the large volume of earthwork or demolition materials being taken into and out of the Site;
- groundwater pollution;
- socio-economic impacts and other possible problems for people residing and working in the locality; and
- waste oils, fuel spillage, sewage discharge, and any other discharges, pollution and contamination arising from the Contractor's operations and activities.

The Contractor shall satisfy the requirements of Department of Natural Resources (DENR) through Administrative Order No. 34 for Class "C" receiving water bodies in controlling the water quality of natural streams and rivers crossing the site during construction, the Noise Standards of the "Rules and Regulations of the National Pollution Control Commission" (1978), and the National Ambient Quality Guideline Values are not exceeded as embodied in Republic Act No. 8749, otherwise known as the "Philippine Clean Air Act of 1999.

2.3 Preliminary and Detailed Engineering Design for Construction of the Works

2.3.1 Design Criteria and Guidelines

During his preparation of preliminary and detailed design of the Stations, the Bidder shall review and validate the appropriateness of the design, specifications and construction criteria to conform to the standards and guidelines set by:

- DPWH Standard Specifications Volume I-II, 2012
- DPWH Design Guidelines and Criteria, Volume I-III

- RA 6541 National Building Code of the Philippines (NBCP)
- National Structural Code of the Philippines, Volume I, 4th Edition, 2009
- BP 344 Accessibility Law
- RA 9514 Fire Code of the Philippines
- Philippine Electrical Code 2009 Vol. I & II
- National Plumbing Code of the Philippines, 2012
- Code of Practice Refrigeration & Air Conditioning, 2013
- NFPA 130 Standard for Fixed Guideway Transit
- American Concrete Institute
- American Institute of Steel Construction
- American Welding Society
- American Railway Engineers and Maintenance Association
- American Society of Testing and Materials

2.3.2 Detailed Design Documents

- a) Detailed design documents include design presentation (technical reports), design drawings, bill of quantities, cost breakdowns and total cost estimates, and project operation and maintenance manuals. The document set shall show clearly the following:
 - technological alternatives;
 - usage functions;
 - architectural/structural concepts and alternatives;
 - project longevity;
 - fire fighting measures;
 - solutions for high performance of energy consumption;
 - environmental protection measures; and
 - cost breakdown and total cost estimates of the project for construction.
- b) Technical Reports shall be prepared on the structural, mechanical, electrical, and sanitary engineering works.
- c) A complete set of architectural and engineering plans in appropriate scales indicating all necessary details in order that the structures can be set out and constructed in accordance with guidelines and standards of the National Building Code of the Philippines shall be prepared by the successful bidder (Contractor), including but not limited to the following:
 1. Entire Architectural and Detailed Engineering Design
 2. Complete Excavation and Backfilling
 3. Complete Re-bars Works
 4. Complete Concrete Works
 5. Complete Roofing Works including Steel Framing

6. Complete Masonry Works including plastering
7. Complete Electrical Works, including supply, installation, testing and commissioning of the system, wiring devices, panels, transformers and metering devices
8. Plumbing works including supply, installation, testing and commissioning of roughing ins, plumbing fixtures, piping, fittings, supports, water heaters (where indicated)
9. Complete Steel Decking of cast in place slabs (where so indicated)
10. Complete supply and installation rough-ins of Electronics and Communications System (subject coordination and/or agreement with electro-mechanical contractor)
11. Complete supply, installation, testing and commissioning of pumps and motors
12. Complete supply, installation, testing and commissioning of elevators and escalators
13. Complete supply, installation, testing and commissioning of air conditioning equipment, ducting, etc.
14. All finishing works including painting works and cladding and landscaping.

2.4 Specific Design Requirements for Construction of the Works

2.4.1 Site Development Plan

- a) Maximize the output of the planning exercise to have a building footprint that has more useable areas within the design standards. Parking facilities/areas within the immediate vicinity of the stations shall have to be considered as well as the smooth flow of vehicular traffic. Areas for appropriate landscaping adjacent to the structure shall be factored in.
- b) The structure will be positioned in accordance with the conceptual location and site development plans of the stations.
- c) The site development plan shall take into consideration but shall not be limited to the following planning parameters;
 - (i) Adequate areas for support facilities such as bunkhouses for workers, temporary latrines, materials warehousing, equipment/motor pools, etc. shall be provided and shall be rationalized in terms of relative location and area.
 - (ii) Power supply requirements shall be supplied by the local power utility through the initiative of the Designer-Builder.
 - (iii) Water supply shall be supplied by Manila Water Company, Inc.
 - (iv) The local telephone company having the franchise on the area shall supply the communication facilities.

2.4.2 Configuration of Emerald and Masinag Stations

- a) The stations shall be constructed in a rectangular shaped footprint, external access from both sides of the stations along Marcos Highway, access stairs, fire exit stairs, escalators and elevators and ramps. The whole structure shall contain the following minimum space utilization.

Room Name	Minimum Size (s.m.)	
	Emerald Station	Masinag Station
A. Street Level		
Garbage Room	5.0	5.0
Fire Tank & Pump Room	30.0	30.0
Water Tank & Pump Room	15.0	15.0
Escalators & Stairs	As per drawing	As per drawing
Elevator & Ramps	As per drawing	As per drawing
Total Street Level Area	90.0	90.0
B. Concourse Level		
Concourse Public Area	As per drawing	As per drawing
Bridgeway	As per drawing	As per drawing
Station Control Area	10.0	10.0
Station Manager's Room	30.0	30.0
Ticket Office	As per drawing	As per drawing
Cash & Ticket Room	16.0	16.0
Passenger Assistance Office	4.0	4.0
First Aid Room	10.0	10.0
Security/Police Room	10.0	10.0
Storage Room	10.0	10.0
Janitor's Room (incorporating rest area & Locker space for cleaners)	20.0	20.0
Staff Dining Area	30.0	30.0
Staff Toilets	20.0	20.0
Staff Lockers	20.0	20.0
Public Toilets	30.0	30.0
Breast Feeding Room	12.0	12.0
Traction Substation	TBD	TBD
Signaling Room	TBD	TBD
Telecommunications Room	TBD	TBD
Station Auxiliary Substation	TBD	TBD
Commercial Spaces & Kiosks	As per drawing	As per drawing

Room Name	Minimum Size (s.m.)	
Storage and wash area for concessionaires		
Emergency Stairs	As per drawing	As per drawing
Total Concourse Level Area	2,310.0	2,510.0
C. Platform Level		
Line Dispatcher's Booth	12.0	12.0
Train Operators' Room with CR (for Masinag Station only)	20.0	20.0
Platform Public Area	As per drawing	As per drawing
Total Platform Level Area	1,590.0	1,790.0
D. Total Station Area	3,990.0	4,390.0

b) Height requirements shall adhere to the following:

Location	Requirements
1. Height from Street Finish Grade Line to Concourse Level	Refer to viaduct profile
2. Design Height of Concourse Level Ceiling	
2.1 Ceiling under the viaduct	
From finished floor line	Over 2.80m
From finished floor line	Between 2.40m–2.80m
2.2 Ceiling under Steel Truss Beams	
From finished floor line	Over 4.8m
2.3 Ceiling clear of the Substation	
From finished floor line (Masinag)	Over 5.5m
3. Design Height of Platform Level Ceiling	
From finish floor line	Over 4.0m
From finish floor line	Between 3.0–4.0m

2.4.3 Architectural Design

- a) The architecture must be in harmony and blend with existing design and architecture of the stations and promote urban renewal in the Commercial/ Business District.
- b) The building should be designed to optimize natural ventilation system and provision for air conditioning systems at designated areas.
- c) The roof must be insulated and easily accessible for maintenance work.

- d) The bidder shall prepare the Architectural, Electrical, Sanitary, Electronic and Communication, Fire Protection System and Mechanical Plans and in accordance with the requirements of the National Building Code of the Philippines.
- e) Minimum Finishes (Refer to Part 2 - Particular Design and Performance Specifications of Stations).

2.4.4 Structural Design

- a) The bidders shall prepare the necessary structural analysis/ calculation and design of the structural members (foundations, columns, girders, beams shear walls in accordance with the National Building Code of the Philippines with its referral codes such as the National Structural Code of the Philippines, etc. The Design for the structure shall take into account, among other things, seismic requirements of the area to determine the optimum safety of the whole structure and to minimize possible earthquake damage. The design must consider the occurrence of flooding in the site and the typhoon strength for the Metro–Manila and Eastern Rizal.
- b) Floor load at Masinag Station’s Sub-station shall consider 18 tons deadweight of the equipment.
- c) On the basis of the Data obtained from the detailed site investigations, topographical survey, foundation investigation, material testing, survey of existing site conditions, the seismic requirements of the area and other investigations required to obtain the data necessary to ensure the safety of the structures.

2.4.5 Engineering and Utilities Design

- a) General
 - i. The detailed design shall conform to the general standards adopted by the National Building Code and other pertinent laws of building construction.
 - ii. All design assumptions shall be based on the results of the required technical studies, detailed analysis, and design computations.
 - iii. The technical drawings and specifications shall clearly indicate all the details required to ascertain the care and thoroughness devoted in the preparation of the drawings.
- b) Electrical System
 - i. The bidders shall prepare a design for the electrical and power supply system of the stations in accordance with the Philippines Electrical Code.
 - ii. The bidder shall prepare a design for the electrical and power supply system considering ease of maintenance and prevention of illegal connection
 - iii. Electrical supply will be sourced from the station substation equipment supplied by and installed by E&M System Contractor.
 - iv. Provision of individual metering for each section or concessionaire of commercial spaces.
 - v. Provision for general lighting and one (1) mother meter

- c) Electronics and Communications System
 - i. The bidders shall prepare a design for the provisions for conduits, ducting, locations of boxes and entrances for electronics and communication system of the stations in accordance with the appropriate and applicable codes and in coordination with the electro–mechanical contractor of the system.
 - ii. The bidder shall prepare the design for the electrical system considering the ease of maintenance and prevention of illegal connection
 - iii. The Design and Build Contractor shall be consulted and coordinated by the electro–mechanical contractor before and during their installation, testing and commissioning of the system.
 - iv. Provision for individual connection/tapping points for each section and concessionaire of commercial spaces.

- d) Mechanical Systems
 - i. The bidders shall prepare a design for the mechanical engineering system of the stations in accordance with the appropriate and applicable codes.
 - ii. The bidder shall prepare a design for the fire protection system, air conditioning system, escalators, elevators, pumps and motors considering the ease of maintenance.
 - iii. Manufacturers/Suppliers of equipment to be installed shall be consulted for their installation, testing and commissioning requirements.
 - iv. Provision for individual connection/control/tapping points for each section and concessionaire of commercial spaces.

- e) Drainage System
 - i. Drainage lines shall be pipe culverts with curb inlets and/or with steel gratings
 - ii. The drainage layout shall show all the required information such as direction of flow, manhole to manhole distance and sizes of lines, invert elevation of manholes/canals, location of outfalls, etc.
 - iii. The design should be on the basis of the results of the hydrological study and, the drainage survey taking into consideration the general and particular problems such as the source and the volume of water supply, water consumption, piping network, drainage discharge area, and conveyance and treatment of sewer flow, in accordance with the applicable laws, rules and regulations governing health safety and sanitation.
 - iv. Design shall be supported with design computation.

- f) Potable Water and Waste Water System
 - i. The bidders shall carry out a detailed design for the water supply and waste water system of the stations. The design should be on the basis of the volume of water supply, water consumption, piping network, conveyance and

treatment of sewer flow, in accordance with the applicable laws, rules and regulations governing health safety and sanitation.

- ii. Water supply source will be sourced from the local water source (Manila Water Co. Inc.).
- iii. Water outlets should be provided on convenient locations for the cleaning/flushing.

2.4.6 Driveway, Lay-bays and Sheds

a) General

- i. A 6m driveway shall be provided in front of Robinson's Metro East Mall and Sta. Lucia East Mall adjacent to the eastbound access stairs as indicated in the Conceptual Site Development Plan.

The bidder shall consider the cost for the removal and reconstruction of covered walkways and power Service Entrance affected by the driveway fronting Robinson's Mall.

- ii. A 3m width lay-bays or drop-off bays shall be provided within and around the Masinag and Emerald Stations as conceptualized in the Site Development Plan.
 - iii. Sheds shall be provided at locations shown in the Conceptual Site Development Plan. The specific location(s) shall be validated by the winning bidder.
- b) The architectural and structural concepts of the sheds shall adhere to Sections 2.4.3, 2.4.4 and 2.4.5 above.
 - c) The civil works design of the driveways and lay-bays, civil design concept for sheds shall adhere to the DPWH Design Standards for Highways. Proper coordination with the two (2) mall owners shall be made by the winning bidder to facilitate his construction activities.

2.4.7 Ancillary Works

The bidders shall provide the ancillary works such as street lights, parking lights and property boundary lights, pavement markings, signages, traffic signs, landscaping, bike parking slots, etc. within the station boundary/limits.

2.5 Submittals

2.5.1 Building Plans

The Approved Detailed Design Building Plans of Emerald and Masinag Stations shall consist of the following:

I. List of Required Drawings

- Coversheet
- Index of Drawings
- Details of Architectural Drawings

- Details of Structural Drawings
- Details of Plumbing Drawings
- Details of Electrical Drawings
- Details of Mechanical Drawings
- Details of Electronics Drawings

II. Required Supporting Documents

- Geotechnical Investigation Report/Data (scope of work, Methodology of Investigation, Details of Field Works, Test Pits, Auger Borings, Drilling Works, Details of Laboratory Works, Pile Capacity Data, Seismic Design Consideration, Liquefaction Potential).
- Hydrology Report/Analysis (scope of work, methodology applied for the determination of design discharge, delineated drainage area, actual field condition of the project site, recorded maximum rainfall data, design flood frequency analysis, analysis/calculation of design discharge).
- Design Analyses and Computations (for structural, plumbing, electrical mechanical and electronics)

III. Drawings

The following table describes the drawings to be submitted;

- By participating Bidders at the bidding stage in his Technical Proposal, and
- By Winning Bidder during the detailed design stage respectively.

Accordingly, participating Bidders shall include the drawings which are specified in Table 2.5.1 'Drawing Lists to be submitted **By Participating Bidders and Winning Bidder**' as per clause 1.4 'SUBMITTALS' and clause 1.6 'DETAILED DESIGN DRAWINGS', Appendix to TOR, Volume 2 in the Technical Proposal.

Table 2.5.1 Drawing Lists to be submitted By Participating Bidders and Winning Bidder

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
A	Drawing size	A3	A1 as per clause 1.4 Submittals and clause 1.6 Detailed design drawings, Appendix to Vol. 2
B	Drawing Scale	Fit to A3 size	Same as above

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
C	Title Block	As per clause 1.4 Submittals, Appendix to Vol. 2	As per clause 1.4 Submittals, Appendix to Vol. 2
Station Architectural Drawings			
1	Drawing List	*	*
2	Legends (Abbreviations, General Notes)	*	*
3	Index / Vicinity map, location plan	*	*
4	Site Development Plan	*	*
5	Ground Level Plan	*	*
6	Concourse Plan (all)	*	*
7	Platform Plan	*	*
8	Roof Plan	*	*
9	Cross Section (Paid area-in, Ancillary rooms, Guideway Area, Elevator Area)	*	*
10	Detailed Concourse Level Plan (masonry wall thickness, room fire rating)		*
11	Concourse Level Partial Plan, 1/2, 2/2, (detailed dimension)		*
12	North and South Elevation/Longitudinal Section	*	*
13	East & West Elevation	*	*
14	Curtain Wall Detail, Stair No. 1, 2, 3 & 4		*
15	Ground Level Reflected Ceiling Plan		*
16	Concourse Level Reflected Ceiling Plan, 1/2, 2/2		*
17	Platform Level Reflected Ceiling Plan, 1/2, 2/2		*
18	Stair/Escalator No. 1, 2, 3 & 4; (plan, longitudinal section, cross section)		*
19	Stair No. 5 & 6 and Escalator No. 5 & 6, (plan, section)		*
20	Access Stair No. 7 & 8 (plan, section)		*
21	Emergency Exit Stairs (plan, section)		*
22	Typical Service Stairs (plan, section)		*
23	Elevators No. 1 & 2 (concourse plan, platform plan, elevations & sections)		*
24	Detailed Ancillary Rooms Plan (Detailed masonry wall plan)		*
25	Partial Longitudinal Section At Ancillary Spaces		*
26	Detailed Sections at Ancillary Spaces (Sections, elevations)		*
27	Concourse Floor Pattern Plan (floor tiles)		*

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
28	Platform Level Floor Pattern Plan (floor tiles)		*
29	Roof Details - Roof hatch, System duct, Various details - Cat ladders		* *
30	Roof and Drain Details		*
31	Platform Details (truss section, noise barrier, fire rated boards, aluminum ceilings)		*
32	Gate Details (plans and elevations)		*
33	Kiosk/Ticket Booth Details (plans, sections, elevations)		*
34	Platform Edge Lighting and System Duct Details		*
35	Floor Details, 1/2, 2/2 - precast concrete tread unit; plan, section, nosing detail / precast basecove section detail / floor drain detail plan - paving tile typical joint-grouter, control joint, tile layout – turning point unidirectional, tactile layout – end or start of route, tactile & warning tile detail, platform edge nosing section & plan detail)		* *
36	Metal Panel Details, 1/3, 2/3, 3/3, - balustrade section detail, escalator-stair interface, escalator-wall panel interface, - corner detail, balustrade-column interface, top cap detail, bottom cap detail, end detail - details (carrier rail at balustrade, handrail at metal wall panel, handrail bracket, carrier rail bracket details.)		* * *
37	Miscellaneous Details (HID lighting fixture detail, escalator intermediate support details, etc.)		*
38	Door and Window Schedule, 1/2, 2/2	*	*
39	Room Finish Schedule	*	*
39	Link Bridge - detailed concourse level plan - roof plan - reflected ceiling plan - cross section - elevations - elevator No. 3 & 4 (plan, section, elevation) - Stair/Escalator No. 5 & 6, (plan, roof plan, longitudinal section, cross section) - Access Stair No. 7 & 8 (plan, roof plan, section, elevation)		* * * * * * *
STATION STRUCTURAL DRAWINGS			
1	Drawing List	*	*
2	Construction Notes		*

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
3	Standard Reinforcement Details		*
4	Substructure_ Framing elevation grid 1, 3, 4, 6, 7, 9, 10, 12	*	*
5	Substructure_ a. Bored pile schedule and b. Re-bar details	*	*
6	Substructure_ Foundation plan (coordinates, existing ground level, top of footing level)	*	*
7	Substructure_ Footing re-bar and column starter bars		*
8	Substructure_ Grids E/1, E/3, E/4, E/6, A/6, I/6, E/7, A/7, I/7, E/9, E/10, E/12 Column re-bar detail and schedule		*
9	Substructure_ Concourse level framing plan (Girders, tie-beams and cast-in-place concrete slab)	*	*
10	Substructure_ Longitudinal elevation along grids A, B, C, E, G, H, I		*
11	Substructure_ Main girder dimension details along grid 1 ~12 (plan, front elevation, rear elevation)		*
12	Substructure_ Main girder re-bar details along grid 1 ~ 12 (tie-beams, main girder top bar, bottom bar, rear elevation, front elevation, section details, bar bending diagram)		*
13	Substructure_ Partial plan dimension detail grid 1-3, 4-6, 7-9, 10-12 along grid E (cast-in-place concrete slab plan and section)		*
14	Substructure_ Partial plan dimension detail grid 1-3, 3-4, 9-10, along grid G-H/grid 3-4, 9-10, 10-12, grid B-C (partial concourse level framing plan and section)		*
15	Substructure_ Tie-beam re-bar details along grid A, B, C, E, G, H, I (sectional elevation, bar schedule)		*
16	Substructure_ Cast-in-place concrete slab re-bar details (elevator pit re-bar details)		*
17	Substructure_ Tie-beam re-bar details grid 6-7, along grid A, I (re-bar sectional elevation, section, re-bar schedule)		*
18	Substructure_ Main Concrete Frame Encast Fixings (All encast fixings into concrete, Anchor bolts, sleeves, anchor plates, grout tubes, encast plates with stud bolts)		*
19	Superstructure_ Cross Section, grids 1, 3, 4, 6, 7, 9, 10 & 12, structural slabs at platform, full steel structure, stair supports, viaduct girders, main concrete		*

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
	support frames		
20	Superstructure_ Longitudinal Section, precast concrete floor beams, viaduct girders, guideway slab, steel structure columns, platform trusses, roof structure, all other structural steel work, stairs and escalators, main concrete support frames		*
21	Superstructure_ Concourse plan, precast concourse floor beams, structural topping, floor finishes, steel stairs and supports, steel columns, main concrete support frames	*	*
22	Superstructure_ Platform level framing plan – include detailed section of platform	*	*
23	Superstructure_ Guideway Framing Plan: truss girder bottom chord framing plan. Guideway are in the P1 Contract.	*	*
24	Superstructure_ Roof Framing Plan: All work	*	*
25	Superstructure_ Main Concrete Frame Schedule from grid 1 to 12: plan, elevation and section, all concrete work, encast fixings, anchor bolts		*
26	Superstructure_ Concourse Tie-beam Schedule: Precast tie-beams, structural topping and floor finish, cast-in-place concrete slabs		*
27	Superstructure_ Concourse Precast 2T-Beam Schedule and Details: plan, elevation, section and detail		*
28	Superstructure_ Stair/Escalator Enclosure, Stair 1, 2, 3, & 4: concourse, platform & roof plan, elevation and section		*
29	Superstructure_ Stair Details: plan, elevation and section - Main stair No. 1 ~ 4 - Exit stair No. 5 ~ 8 - Service stair No. 9 ~ 12		* * *
30	Superstructure_ Elevator Enclosure Details, EI. No.1 & No. 2 (base plan concourse, horizontal sectional plans, vertical sections, roof plan, details, ladder fixings)		*
31	Superstructure_ Link Bridge Details (concourse plan, cross section, elevation and roof framing plan)		*

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
32	Superstructure_ Elevator Enclosure Details, EI. No.3 & No. 4 (Elevator foundation (plan, section & re-bar details) ground level, concourse base plan, horizontal sectional plans, vertical sections, roof plan, details, ladder fixings)		*
33	Superstructure_ Access Stair/Escalator No.5 & 6, - Foundation plan, section and re-bar details - Roof plan, elevation & sections		* * *
34	Superstructure_ Access Stair No. 7 & 8 - Foundation Plan, Section and re-bar details - Roof plan, elevation and sections		* *
35	Superstructure_ Main Concrete Frame Encast Fixings (All encast fixings into concrete, Anchor bolts, sleeves, anchor plates, grout tubes, encast plates with stud bolts)		*
36	Superstructure_ Stair Support Details		*
37	Superstructure_ Floor Slab Penetrations		*
38	Superstructure_ Steel Work Details - Roof Structure		*
39	Superstructure_ Steel Work Details - Platform		*
40	Superstructure_ Steel Work Details - Cladding supports		*
41	Superstructure_ Elevator frame enclosure details		*
42	Superstructure_ Escalator Support Beams details		*
Station CONVEYING SYSTEM Drawings			
1	Drawing List	*	*
A. Elevators			
1	Specification	*	*
2	Key Plan, EI – 1, 2, 3, & 4	*	*
3	Hoist Plan, EI – 1, 2, 3, & 4		*
4	Entrance Elevation, EI – 1, 2, 3 & 4		*
5	Machine Room Plan, EI – 1, 2, 3 & 4		*
6	Oil Pipe and Wire duct plan, EI – 1, 2, 3 & 4		*
7	Oil Pipe and Wire duct section, EI – 1, 2, 3 & 4		*
8	Hoistway Section, EI – 1, 2, 3 & 4		*
9	Elevator Assembly		*
10	Elevator Car Assembly		*
11	Elevator Entrance Assembly		*
12	Elevator Car Door Safety Shoe		*
13	Elevator Guide Roller		*

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
14	Elevator Safety Gear		*
15	Elevator governer		*
16	Elevator Buffer and Buffer Footing		*
17	Elevator Landing Door Operator		*
18	Elevator Landing Door Interlock		*
19	Elevator Pulley Assembly		*
20	Elevator Cylinder		*
21	Elevator Power Unit		*
22	Elevator Oil Cooler		*
23	Elevator Position Detector		*
24	Elevator Cable Connection		*
B. ESCALATOR			
1	Specification	*	*
2	Key Plan, ESC# 1, 2, 3, 4, 5, & 6	*	*
3	Escalator plan, ESC #1, 2, 3, 4, 5 & 6		*
4	Escalator Elevation, ESC #1, 2, 3, 4, 5 & 6		*
5	Escalator Assembly		*
6	Escalator Truss		*
7	Escalator Section of Ballustrades		*
8	Escalator Step Assembly		*
9	Escalator Landing plate		*
10	Escalator Step Chain		*
11	Escalator Safety Device		*
12	Escalator Controller		*
STATION MECHANICAL DRAWINGS			
1	Drawing List	*	*
2	Legends, Abbreviations	*	*
3	Toilet sewer, air vent and water supply layout - Concourse Level - Platform Level		* *
4	Storm drainage, water line and gutter drain line - Roof Level	*	*
5	Storm drainage and sewer line - Street Level	*	*
6	Fire protection layout - Pump room		*
7	Fire protection plan, fire hose cabinet, isometric view of fire protection - Concourse Level - Platform Level - Isometric View		* * *

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
8	Water supply line layout - Roof level - Platform level - Concourse level - Ground level	*	* * * *
9	Fire protection line - Ground level - Platform level - Concourse level		* * *
10	Storm drainage line - Concourse level - Platform level		* *
11	Air conditioning and ventilation plan - Concourse level		*
12	Cross and Longitudinal Section - Concourse level		*
13	FCU drain line and details - Concourse level		*
14	Signaling/Telecom RM FR200 Fire suppression system piping layout, piping isometric and standard miscellaneous details - Concourse level		*
15	PAO – FCU drain plan		*
16	Mechanical SCADA layout - Concourse level - Pump room		* *
17	Equipment Schedule		*
STATION ELECTRICAL DRAWINGS			
1	Drawing List	*	*
2	Legends – Abbreviations, General Notes	*	*
3	Equipment Schedule – Fan coil units, Air cooled condensing units, pumps		*
4	Table of Contents		*
5	Power Riser Diagram (Power Single Line Diagram)		*
6	Lightings A. Street Level - Street lighting layout B. Concourse level - Convenience outlet and conduit layout - Lighting and conduit layout C. Platform Level - Convenience outlet and conduit layout		* * * *

No.	Drawing Title	Drawings to be submitted	
		By Participating Bidders	By Winning Bidder
	<ul style="list-style-type: none"> - Lighting and conduit layout - Edge Lighting section and exit stairs lighting elevation - Roof up-lighting layout and section 		* * *
7	Ventilation and Air-conditioning - VAC Equipment power and conduit layout		*
8	Grounding - Layout - Riser Diagram - Isometric	*	* * *
9	Lightening Protection - Lightening protection layout - Elevation, section and details	*	* *
10	Fire protection A. Concourse level - Riser diagram for fire detection and alarm system - Riser diagram for intrusion detection and alarm system B. Platform level - Riser diagram for fire detection and alarm system - Riser diagram for intrusion detection and alarm system		* * * *
11	Lighting Contractor Wiring Diagram		*
12	SCADA wiring diagram		*

*** required and must be submitted**

A. Architectural Drawings

- Title/Signatory Block

The following must be indicated:

- The title and location of the project;
- The full name and designation of recommending officials and their corresponding signatures

- Vicinity Map/Location Plan

The following must be complied with/indicated:

- Within a 2 km radius at any convenient scale
- Prominent landmarks and major thoroughfare/s

- Site Development Plan

The following must be indicated:

- Technical description/boundaries
- Orientation/North Arrow Indication

- Position of proposed building(s) structure(s) with pertinent building tie lines.
- Contour lines at 1.00 m intervals, if any
- Existing/proposed access road and driveways and existing public utilities/services
- Existing building within and adjoining the lot to be hatched, if any
- Distances between the proposed and existing building, if any

Perspective

To be drawn at any convenient scale.

Floor Plan(s)

The following must be complied with/indicated:

- Drawn to scale of not less than 1:100 with pertinent dimensions
- Gridlines (vertical and horizontal)
- Complete Identification of rooms/functional spaces
- Schedule/designation of floor finishes, door and window marks

Elevations, at least four (4)

The following must be complied with/indicated:

- Same scale as floor plan(s)
- Gridlines
- Natural ground to finish grade elevations and floor to floor height
- Door and window marks
- Exterior finishes/materials
- Adjoining existing structures, if any, shown in single hatched lines

Sections, at least two (2)

The following must be complied with/indicated:

- Same scale as floor plan(s)/elevations
- Gridlines
- Natural ground to finish grade elevations and finish floor levels including ceiling heights
- Outline of cut and visible structural parts
- Door and window marks
- Built-in cabinets, etc.
- Identification of rooms and functional spaces cut by section lines
- Interior finishes/materials

Ceiling Plan(s)

The following must be complied with/indicated:

- Same scale as floor plan(s)
- Gridlines
- Its design, materials/finish

- Location of lighting, diffusers, air exhausters/return grilles and nozzles, if any

Roof Plan

The following must be complied with/indicated:

- Same scale as floor plan(s)
- Gridlines
- Its design, materials/finish, gutters, if any etc.

Details, in the form of plans, elevations/sections (min. scale of 1:50)

- Accessible ramp
- Accessible functional spaces
- Type wall/bay sections from ground up to roof
- Stairs (interior and exterior)
- Built-in cabinets
- All types of partitions
- Toilets

Schedule of Doors and Windows

The following shall be indicated;

- Types and materials
- Designations/marks
- Pertinent dimensions
- Number of sets

Schedule of Finishes (in graphic form)

The following shall be complied with/indicated vis-à-vis floor plan(s), ceiling plan(s) elevations and sections:

- Surface finishes specified for floors, ceilings, walls and baseboard trims for all building spaces per floor level.

B. Structural Drawings/Documents

Foundation Plan

The following must be complied with/indicated:

- Same scale as architectural floor plan(s) with pertinent dimensions.
- Designation of columns, footings, footing tie beams, if any, and wall footings slab-on-fill thickness and spacing of reinforcing bars.
- Bored Piles

Floor Framing Plan(s)

The following must be complied with/indicated:

- Same scale as architectural floor plan(s) foundation plan
- Gridlines

- Designation of beams/girders and suspended slabs

Roof Framing Plan

The following must be complied with/indicated:

- Same scale as architectural floor plan(s) foundation plan with pertinent dimensions
- Gridlines
- Designation of roof beams/girders, roof slab(s), if any, trusses/rafters and material specifications/spacing of purlins, cross bracings, sag rods

Schedule/Details of Footings, Columns, Girder/Beams, Slabs

The following must be indicated:

- Pertinent dimensions
- Indication of sizes/numbers/spacing of reinforcing bars, ties/stirrups (as per drawing and per indications)

Details of Trusses/Connections

Details of Shear Walls/ Elevator Shaft

Details of Stair(s)

Structural Design Analysis/Computations

The following must be indicated:

- Design Criteria
- Drawing of Structural Model
- Gravity Load Analysis
- Seismic Analysis
- Wind Analysis
- Bored Piles
- Footings
- Columns
- Beams and Girder
- Suspended Slabs
- Shear Walls
- Trusses
- Stairs
- Other Structures

C. Electrical Drawings

Location Plan And Site Development Plan

The following must be indicated/shown:

- Bordering areas with public or well-known streets, landmarks and/or structures

- Location of service drop, service equipment and nearest pole of the utility company furnishing electrical energy; location of the service kW–hr meter as well as sizes of service entrance wires, conduits and service equipment; and
- Clearance of the path or run of service drops and entrance wires to adjacent existing and/or proposed structures(s)

Legend Or Symbols

All electrical symbols used must be shown:

General Notes and/or Specifications

The following must be indicated:

- Nature of electrical services, numbers of phase, wires, voltage and frequency
- Types wiring for service entrance, feeders, sub–feeders and branch circuit wires for lighting and/or power loads; fire alarm system, if required by Law; signaling and communications
- Special equipment to be installed indicating ratings and classification of service or duty cycle such as rectifier, electrical welding machine, etc.
- System or method of grounding
- Type and rating of main disconnecting means, overcurrent protection and branch circuit wiring
- Clearance of service drop, burial depth for service lateral mounting height and clearance for service equipment and kWh–meter

Plan for Power

The following must be shown:

- Layout and wiring plans for power on floor plan drawn to scale
- Sizes and location of service entrance conductors, raceways, metering equipment, main switchboard, layout of feeders and distribution panels or switches and their sizes, types and ratings
- Complete circuits of motors and other electrical equipment, its controlling devices, its location and ratings
- Complete wiring of emergency power system, if any
- Nature of processes/activities carried out in each room or area.

Plans for Lighting And Receptacle Outlets

The following must be shown:

- Layout and wiring plans for lighting on ceiling plan and receptacle outlet on floor plan drawn to scale.
- Location of lighting fixtures and control switches for each or group of lighting fixtures
- Location of receptacle outlets and appliances to be served and their rating
- Complete circuits of lighting and receptacle outlets

- Complete wiring of emergency lighting system and receptacle outlets, if any.

Plans for Fire Detection And Alarm Circuits

The following must be indicated:

- Layout and wiring plans for fire alarm manual stations, fire alarm bells, fire alarm control panel and other fire alarm devices on floor plans and smoke detectors on ceiling plans drawn to scale.
- Location of outlets, equipment and/or apparatus and controls
- Complete circuit showing number and size or raceway and wire

Fire Alarm Riser Diagram

- *Fire alarm equipment, apparatus, devices and its control, wiring connection and conduit risers with size and type; and numbered must be shown/indicated*

Schedule Of Loads

The tabulated load schedule must be indicated:

- Lighting and receptacle loads, motor loads and other electrical, mechanical and auxiliary loads as numbered or identified in the layouts
- Proper phase distribution and loads distribution
- Sizes and ratings of main and branch overcurrent protective devices and
- Sizes of main and service feeders (conductors and conduit or raceway)

One Line Diagram

The following must be indicated:

- Single line or schematic diagram for lighting and receptacles, panelboards showing mains and branch circuit rating: size of conductors for feeders.
- Motor loads indicating its rating in kilowatt/kilovolt ampere or Horsepower, full load current, locked rotor current, phase connection for 1-phase or 3-phase, rated voltage, numbered consecutively to correspond to its numbers in the power layout.
- Feeders and Sub-feeders shall indicate labelling or identification of said feeders, size and type of wires and raceways; protective devices and controls; and allowable capacity of the conductor over the designed load current expressed as a ratio and indicated alongside of conductor.
- Load Center, Identification and labeling of load center showing type and rating of transformer, switches, circuit breakers and other related devices, incoming and outgoing feeders, type, size and voltage; equipment grounding.

Other Details

The following must be indicated:

- Exposed conductor's means of support, spacing and clearances

- Installation details, dimensions, descriptions or specifications, means of support, separators and attachments where required by Code for auxiliary gutters, wireways, busways, cabinets, boxes metallic raceways, underground installation, other than specified in the Code.
- Construction and installation details and dimensions, pole top wiring details including line hardware and guying details for private pole.
- Details of equipment, wiring, activating mechanism and protective devices, and ventilation whenever necessary for battery installation and/or low voltage or low energy power source.

Plans for Lightning Protection

The following must be shown/indicated:

- Layout, wiring and location for lightning rods/air terminals,
- Main and secondary conductors ground rods or ground plates with type, size and specifications
- Installation details for conductors, air terminals means of support, and grounding rods or ground plate.
- Symbols used and general construction/installation notes and specifications

Plans and Specifications for Indoor or Outdoor Substation, if any:

- Indoor or outdoor substations shall be in compliance with the requirements and provisions of Local Power Utility and Philippine Electrical Code

Title/Signatory Block

The following must be indicated:

- Name and location of installation of project
- Name, signature and address of owner/manager/operator/head of the using agency
- Title of sheet/sheet content
- Name, signature and seal of Professional Electrical Engineer with Professional Regulation Commission professional license number and validity date, Professional Tax Receipt number with date and place issue and Tax Identification Number
- Sheet number

Design Analysis

The following must be indicated:

- Illumination Levels calculations
- Design calculation for Branch circuits, sub-feeders, feeder, busways and service entrance
- Types, ratings and trip settings of overload protective devices
- Short circuit current calculations for overcurrent protection devices;
- Calculation of voltage drops

D. Mechanical Drawings

Legend Or Symbols

All mechanical symbols used must be shown

General Notes and/or Specifications

The scope, description and nature of mechanical works must be indicated

Plans for Air Conditioning and Ventilation Systems

The following must be indicated/shown:

- Layout and location of air conditioning systems
- Layout of ventilation systems

Plans for Water Pumping System

The following must be indicated/shown:

- Layout and location of water pumps, water tanks, piping system, control, and source of water.
- Schematic diagrams for piping system layout and water level controls
- Schedules of Equipment

Plans for Fire Suppression System

The following must be indicated/shown:

- Layout and location of automatic sprinkler heads with its piping, and controls on ceiling plans
- Schematic riser diagram for every floor
- Details of sprinkler system
- Schedule of equipment
- Layout and locations of dry-stand pipe, fire extinguisher with installation details

Plans for Elevator

The following layout and locations and details must be indicated:

- Elevator
- Ventilation systems
- Hoistway elevation
- Brief Specifications
- Schedules of Equipment

Plans for Generating Sets

The following layout and locations and details must be indicated:

- Generating Set
- Schedule of Equipment
- Fuel Tank
- Ventilation details

Other Details

The following must be indicated:

- Ductworks
- Condensing Units
- Piping runs
- Mechanical Equipment

Other Plans

The following must be indicated:

- Gases
- Liquefied Gases
- Others

Title/Signatory Block

The following must be indicated:

- Name and location of installation of project
- Name, signature and address of owner/manager/operator/head of the using agency
- Title of sheet/sheet content
- Name, signature and seal of Professional Mechanical Engineer with Professional Regulation Commission professional license number and validity date, Professional Tax Receipt number with date and place issue and tax Identification Number.
- Sheet number

Design Analysis

The following must be indicated:

- Energy analysis and life cycle analysis
- Cooling and heating loads calculations
- Hydraulic calculations Fire Protection System

E. Electronics Drawings

Location Plan And Site Development Plan

The following must be indicated/shown:

- Bordering areas with public or well-known streets, landmarks and/or structures
- Location of service drop, service equipment and nearest pole of the Local Exchange carrier; location of Service Equipment as well as sizes of service entrance cables and conduits; and
- Clearance of the path or run of service drops and entrance cables to adjacent existing and/or proposed structure(s)

Legend Or Symbols

- Auxiliary/communication symbols used must be shown

General Notes or Specifications

The following should be indicated:

- Nature of communication service, wire/cables, voltage and frequency
- Type of wiring for service entrance, feeders, sub-feeders and branch circuit wires/cables for auxiliary/communication loads
- Special equipment to be installed
- System or method of grounding
- Clearance of service drop, burial depth for service lateral mounting height

Auxiliary/Communications Riser Diagrams

- All the auxiliary/communication equipment, apparatus, devices and its control/ wiring connection and conduit risers with size and type; and numbered as shown/indicated

Other Details

The following must be indicated:

- Exposed cable means of support, spacing and clearances
- Installation details, dimensions, descriptions or specifications, means of supports, separators and attachments where required by Code for auxiliary gutters, cableways, busways, distribution frame, boxes underground installation, other than specified in the Code.
- Construction and installation details and dimensions including line hardware for private pole
- Details of battery installation and/or low voltage or low energy power, equipment, cables, ventilation details whenever necessary.

Title/Signatory Block

The following must be indicated:

- Name and Location of installation of project
- Name, signature and address of owner/manager/operator/head of the using agency
- Title of Sheet/sheet content(s)
- Name, signature and seal of Professional Electronic and Communications Engineer with Professional Regulation Commission professional license number and validity date, Professional Tax Receipt number with date and place issue and tax Identification Number
- Sheet number

Design Analysis

- Shall be in the compliance with the Code and Standards for Electronics

F. Plumbing and Civil Works Drawings

Location Plan and Site Development Plan

The following shall be complied with/indicated:

- Drainage systems layout and its corresponding sizes/specifications, with connections to external systems
- Contours, @ 1.00m intervals, if any

Plumbing Plans

The following shall be indicated:

- Sewage and vent system layout and its corresponding sizes/specifications
- Drainage system layout its corresponding sizes/specifications
- Hot/cold water distribution system layout its corresponding sizes/specifications

Isometric Drawings

The following shall be indicated:

- Sewage and vent system Layout
- Drainage system Layout
- Hot/cold water distribution system layout

Details of Septic Tank, Sedimentation Tank, if any

Details of Catch Basins and Drainage Manholes

Details of Elevated Water Tank, if any

Legend and General Notes

The legends, symbols and abbreviations should be applicable to the project.

Civil Works Plans

The following shall be indicated:

- General layout showing geometry of driveways, lay-bays.
- Drainage system layout and its corresponding sizes/specifications and profile connected to its tapping point.
- Other necessary details.

2.5.2 Technical Specifications

a) General Requirements

“CLEAN and BRIGHT” character of the existing stations shall be maintained in the bidder’s proposed concept design, and to be further developed in the detailed design. To realize this goal, the Technical Specifications of the existing LRT2 stations shall be referred to by the Bidder.

A Technical Specifications is provided as **Appendix 1** to this TOR. This Technical Specifications shall be up-graded to the latest version in the preparation of his Detailed Designs, particularly on the Electro-mechanical design requirements, consistent with the DPWH Standard Specifications (2013 Edition). The up-graded version of this Technical Specification shall be submitted by the Contractor to the Engineer for its

review during execution of the Works, and shall be approved by the Engineer prior to the Contractor's finalization of Detailed Design Plans of the Stations.

b) Other Requirements

The following sub-sections of the DPWH Standard Specifications (2013 Edition) is replaced and revised as follows:

Part A – Facilities for the Engineer

A.1.1 (a) 2 Construction of Combined Field Office and Laboratory Building for the Engineer (Completed under Package 1)

Amended Sub-item No. 2 as follows:

The Contractor shall provide qualified and experienced laboratory staff to carry out all the materials quality control and all the tests required by the Engineer. The personnel appointed by the Contractor shall be well experienced in the type of work to be undertaken and shall be subject to the approval of the Engineer. They shall work full-time and shall be responsible to the Engineer's Materials Supervisor for all works carried out in the Laboratory.

All tests shall normally be carried out on the Site, except that, certain special tests may, 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 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.

Delete Sub-item No.5 and modified as follows:

By way of maintenance, the Contractor shall provide all the necessary personnel to maintain 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.1.3 Assistance to the Engineer

a) Provision of Survey Equipment

Instrument	Unit	Number
Electronic Total Station, complete set (w/ tripod, 2 prism), 30X telescope magnification with 2x plug-in camcorder NIMH GEB 111, GKL 111 charger, RS 232 interface cable for date transfer, GDF 111 Tribrach, laser plummet	sets	2

incorporation		
Automatic Level complete with tripod 3x magnification, +/- 0.80mm standard deviation, erect image telescope, 0.50m shortest focusing distance, with built-in compensator of less than 0.3" setting accuracy, fully waterproof and dust resistant with a horizontal circle that can be in grads or degrees and aluminum tripod.	sets	2
Leveling rod (5m ht.) aluminum	each	4

b) Added the following to Sub-Section:

The Contractor shall supply, within seven (7) days before the start of construction activities, and maintain for the entire duration of the construction, qualified personnel as follows: Two (2) Instrument man and four (4) Survey Aides for measuring the Works, and four (4) Civil/Structural Inspectors for inspecting the works during night shifts and weekends.

2.6 Project Cost Estimates

2.6.1 General

The bidder shall prepare the Bill of Quantity and Unit Price on all aspect of the Works to be carried-out based on the required engineering surveys and investigations, and the submitted Preliminary Drawings.

The cost of the Preliminary/Detailed Architectural and Engineering Design shall be in accordance with the NEDA guidelines.

The cost of each work item shall be prepared for each station as indicated in the Price Schedule/Bill of Quantities, in accordance with DPWH Department Order No. 22 series of 2015 dated 18 February 2015.

The unit price of each of the main work pay items shall include:

2.6.2 Direct Cost

a) Materials

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

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

b) Labor:

- i. Salaries and wages as authorized by the Department of Labor and Employment

- ii. Fringe benefits, such as vacation and sick leaves, benefits under the Workmen's Compensation Act, PAGIBIG Fund contribution, Philippine Health Insurance and SSS contributions, allowances, 13 month pay, bonuses etc.
- c) Equipment:
- i. Rental of equipment which shall be based on the prevailing "Associated Construction Equipment Lessors, Inc." (ACEL) rental rates approved for use by the DPWH (Presently it is the 2009 ACEL Rates). Rental rates of equipment not indicated in the ACEL booklet shall be taken from the rental rates prepared by the DPWH 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.
 - ii. 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. In no case shall mobilization and demobilization exceed 1% of the Estimated Direct Cost (EDC) of the civil works items.

2.6.3 Indirect Cost

- a) Overhead Expenses – ranges from 5–8 % of the EDC, which includes the following:
 - i. Engineering and Administrative Supervision.
 - ii. Transportation allowances.
 - iii. Office Expenses, e.g., for office equipment and supplies, power and water consumption, communication and maintenance.
 - iv. Premium on Contractor's All Risk Insurance (CARI) and Third Party Liability Insurance.
 - v. Financing Cost
 - 1. Premium on Bid Security
 - 2. Premium on Performance Security
 - 3. Premium on Surety for Advance Payment
 - 4. Premium on Third Party Liability Insurance
 - 5. Premium on Warranty Bond (one year)
- b) Contingencies – ranges from 0.5–3% of the EDC. These include 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
- c) Miscellaneous Expenses – ranges from 0.5–1% of the EDC. These include laboratory tests for quality control and plan preparation.
- d) Contractor's Profit Margin – shall be 8% of EDC for projects above Php 150 Million.
- e) VAT Component – shall be 12% of the sum of the EDC, OCM and Profit.
- f) The following items shall not be subjected to OCM and Profit mark-up:

- i. Mobilization and Demobilization
 - ii. Provision of Service Vehicles
- g) The following non-civil works items shall not be subjected to OCM mark-up:
- i. Field/Laboratory Office & Living Quarters (Rental Basis)
 - ii. Furnishing of Furniture, Laboratory Equipment, Survey Equipment and Consumables
 - iii. Assistance to the Engineers
 - iv. Photographs
 - v. Health and Safety Program
 - vi. Traffic Management During Construction
 - vii. Environmental Monitoring
 - viii. Communication Equipment, etc.

2.6.4 Bill of Quantity (BOQ) and Payment Schedule

The Bill of Quantities are estimate and provisional. Upon completion of detailed design, the submitted BOQ based on Preliminary Design may be updated by the Contractor to serve as basis of the Contractor's Progress Payment. The updated/revised BOQ however shall have the same Total Bid Price indicated in his Letter of Tender. Items not included in the BOQ but are necessary to complete the Project are deemed considered and included in other Pay Items.

Contractor's payment schedule can be derived from the procedure enumerated hereunder:

No.	Description	Duration (Months)																		
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Issuance of NTP	▼																		
2	Advance Payment (request/payment)	■																		
3	Detailed Engineering Design	Duration : 6 months ■																		
3a	Preparation and approval for the DED	Sub-structure: 1st - 4th Month Superstructure: 1st - 5th Month ■																		
3a	Updated BOQ	Preparation of Updated BOQ as a basis of Contractor's progress payment. ■																		
3b	Review and approval for the DED and Updated BOQ	Updated BOQ shall be submitted to the Engineer for its review and approval as per Section VI, Clause 1.4 - Submittals. ■																		
4	Progress Payment Schedule																			
4a	Detailed Design	Upon completion of detailed design, 3% of contract amount shall be released as per GCC Clause 40 - Progress Payment. ■																		
4b	Temporary and Permanent works	Updated BOQ, which were prepared by the Contractor and approved by the Engineer shall be the basis of the Contractor's progress payment per GCC Clause 40 - Progress Payment. ■																		