Section IV.

General Conditions of Contract

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1. Definitions

For purposes of this Clause, boldface type is used to identify defined terms.

1.1. The **Arbiter** is the person appointed jointly by the Procuring Entity and the Contractor to resolve disputes in the first instance, as provided for in **GCC** Clause 210.

1.2. **Bill of Quantities** refers to a list of the specific items of the Work and their corresponding unit prices, lump sums, and/or provisional sums.

1.3. The **Completion Date** is the date of completion of the Works as certified by the Procuring Entity's Representative, in accordance with **GCC** Clause 498.

1.4. The **Contract** is the contract between the Procuring Entity and the Contractor to execute, complete, and maintain the Works.

1.5. The **Contract Price** is the price stated in the Letter of Acceptance and thereafter to be paid by the Procuring Entity to the Contractor for the execution of the Works in accordance with this Contract.

1.6. **Contract Time Extension** is the allowable period for the Contractor to complete the Works in addition to the original Completion Date stated in this Contract.

1.7. The **Contractor** is the juridical entity whose proposal has been accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded.

1.8. The **Contractor's Bid** is the signed offer or proposal submitted by the Contractor to the Procuring Entity in response to the Bidding Documents.

1.9. **Days** are calendar days; months are calendar months.

1.10. **Dayworks** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.

1.11. A **Defect** is any part of the Works not completed in accordance with the Contract.

1.12. The **Defects Liability Certificate** is the certificate issued by Procuring Entity's Representative upon correction of defects by the Contractor.

1.13. The **Defects Liability Period** is the one year period between project completion and final acceptance within which the Contractor assumes the responsibility to undertake the repair of any damage to the Works at his own expense.

1.14. **Drawings** are graphical presentations of the Works. They include all supplementary details, shop drawings, calculations, and other information provided or approved for the execution of this Contract.

1.15. **Equipment** refers to all facilities, supplies, appliances, materials or things required for the execution and completion of the Work provided by the Contractor and which shall not form or are not intended to form part of the Permanent Works.

1.16. The **Intended Completion Date** refers to the date specified in the **SCC** when the Contractor is expected to have completed the Works. The Intended Completion Date may be revised only by the Procuring Entity's Representative by issuing an extension of time or an acceleration order.

1.17. **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.

1.18. The **Notice to Proceed** is a written notice issued by the Procuring Entity or the Procuring Entity's Representative to the Contractor requiring the latter to begin the commencement of the work not later than a specified or determinable date.

1.19. **Permanent Works** all permanent structures and all other project features and facilities required to be constructed and completed in accordance with this Contract which shall be delivered to the Procuring Entity and which shall remain at the Site after the removal of all Temporary Works.

1.20. **Plant** refers to the machinery, apparatus, and the like intended to form an integral part of the Permanent Works.

1.21. The **Procuring Entity** is the party who employs the Contractor to carry out the Works stated in the **SCC**.

1.22. The **Procuring Entity's Representative** refers to the Head of the Procuring Entity or his duly authorized representative, identified in the **SCC**, who shall be responsible for supervising the execution of the Works and administering this Contract.

1.23. The **Site** is the place provided by the Procuring Entity where the Works shall be executed and any other place or places which may be designated in the **SCC**, or notified to the Contractor by the Procuring Entity's Representative as forming part of the Site.

1.24. **Site Investigation Reports** are those that were included in the Bidding Documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

1.25. **Slippage** is a delay in work execution occurring when actual accomplishment falls below the target as measured by the difference between the scheduled and actual accomplishment of the Work by the Contractor as established from the work schedule. This is actually described as a percentage of the whole Works.

1.26. **Specifications** means the description of Works to be done and the qualities of materials to be used, the equipment to be installed and the mode of construction.

1.27. The **Start Date**, as specified in the **SCC**, is the date when the Contractor is obliged to commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

1.28. A **Subcontractor** is any person or organization to whom a part of the Works has been subcontracted by the Contractor, as allowed by the Procuring Entity, but not any assignee of such person.

1.29. **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Permanent Works.

1.30. **Work(s)** refer to the Permanent Works and Temporary Works to be executed by the Contractor in accordance with this Contract, including (i) the furnishing of all labor, materials, equipment and others incidental, necessary or convenient to the complete execution of the Works; (ii) the passing of any tests before acceptance by the Procuring Entity's Representative; (iii) and the carrying out of all duties and obligations of the Contractor imposed by this Contract as described in the **SCC.**

2. Interpretation

2.1. In interpreting the Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of this Contract unless specifically defined. The Procuring Entity's Representative will provide instructions clarifying queries about the Conditions of Contract.

2.2. If sectional completion is specified in the **SCC**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

3. Governing Language and Law

3.1. This Contract has been executed in the English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract. All correspondence and other documents pertaining to this Contract which are exchanged by the parties shall be written in English.

3.2. This Contract shall be interpreted in accordance with the laws of the Republic of the Philippines.

4. Communications

Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is received by the concerned party.

5. Possession of Site

5.1. On the date specified in the **SCC**, the Procuring Entity shall grant the Contractor possession of so much of the Site as may be required to enable it to proceed with the execution of the Works. If the Contractor suffers delay or incurs cost from failure on the part of the Procuring Entity to give possession in accordance with the terms of this clause, the Procuring Entity's Representative shall give the Contractor a Contract Time Extension and certify such sum as fair to cover the cost incurred, which sum shall be paid by Procuring Entity.

5.2. If possession of a portion is not given by the date stated in the **SCC** Clause 5.1, the Procuring Entity will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contact time to address such delay shall be in accordance with **GCC** Clause 47.

5.3. The Contractor shall bear all costs and charges for special or temporary right-of-way required by it in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by it for purposes of the Works.

5.4. The Contractor shall allow the Procuring Entity's Representative and any person authorized by the Procuring Entity's Representative access to the Site and to any place where work in connection with this Contract is being carried out or is intended to be carried out.

6. The Contractor's Obligations

6.1. The Contractor shall carry out the Works properly and in accordance with this Contract. The Contractor shall provide all supervision, labor, Materials, Plant and Contractor's Equipment, which may be required. All Materials and Plant on Site shall be deemed to be the property of the Procuring Entity.

6.2. The Contractor shall commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program of Work submitted by the Contractor, as updated with the approval of the Procuring Entity's Representative, and complete them by the Intended Completion Date.

6.3. The Contractor shall be responsible for the safety of all activities on the Site.

6.4. The Contractor shall carry out all instructions of the Procuring Entity's Representative that comply with the applicable laws where the Site is located.

6.5. The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the **SCC**, to carry out the supervision of the Works. The Procuring Entity will approve any proposed

replacement of key personnel only if their relevant qualifications and abilities are equal to or better than those of the personnel listed in the Schedule.

6.6. If the Procuring Entity's Representative asks the Contractor to remove a member of the Contractor's staff or work force, for justifiable cause, the Contractor shall ensure that the person leaves the Site within seven (7) days and has no further connection with the Work in this Contract.

6.7. During Contract implementation, the Contractor and his subcontractors shall abide at all times by all labor laws, including child labor related enactments, and other relevant rules.

6.8. The Contractor shall submit to the Procuring Entity for consent the name and particulars of the person authorized to receive instructions on behalf of the Contractor.

6.9. The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Procuring Entity between the dates given in the schedule of other contractors particularly when they shall require access to the Site. The Contractor shall also provide facilities and services for them during this period. The Procuring Entity may modify the schedule of other contractors, and shall notify the Contractor of any such modification thereto.

6.10. Should anything of historical or other interest or of significant value be unexpectedly discovered on the Site, it shall be the property of the Procuring Entity. The Contractor shall notify the Procuring Entity's Representative of such discoveries and carry out the Procuring Entity's Representative's instructions in dealing with them.

7. Performance Security

7.1. Unless otherwise specified in the **SCC,** within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the Contractor shall furnish the performance security in any the forms prescribed in **ITB** Clause 32.2.

7.2. The performance security posted in favor of the Procuring Entity shall be forfeited in the event it is established that the Contractor is in default in any of its obligations under the Contract.

7.3. The performance security shall remain valid until issuance by the Procuring Entity of the Certificate of Final Acceptance.

7.4. The performance security may be released by the Procuring Entity and returned to the Contractor after the issuance of the Certificate of Final Acceptance subject to the following conditions:

(a) There are no pending claims against the Contractor or the surety company filed by the Procuring Entity;

(b) The Contractor has no pending claims for labor and materials filed against it; and

(c) Other terms specified in the **SCC**.

7.5. The Contractor shall post an additional performance security following the amount and form specified in **ITB** Clause 32.2 to cover any cumulative increase of more than ten percent (10%) over the original value of the contract as a result of amendments to order or change orders, extra work orders and supplemental agreements, as the case may be. The Contractor shall cause the extension of the validity of the performance security to cover approved contract time extensions.

7.6. In case of a reduction in the contract value or for partially completed Works under the contract which are usable and accepted by the Procuring Entity the use of which, in the judgment of the implementing agency or the Procuring Entity, will not affect the structural integrity of the entire project, the Procuring Entity shall allow a proportional reduction in the original performance security, provided that any such

reduction is more than ten percent (10%) and that the aggregate of such reductions is not more than fifty percent (50%) of the original performance security.

7.7. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to Act 3688 against any subcontractor be they an individual, firm, partnership, corporation, or association supplying the Contractor with labor, materials and/or equipment for the performance of this Contract.

8. Subcontracting

8.1. Unless otherwise indicated in the **SCC**, the Contractor cannot subcontract Works more than the percentage specified in **ITB** Clause 8.1.

8.2. Subcontracting of any portion of the Works does not relieve the Contractor of any liability or obligation under this Contract. The Contractor will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants or workmen as fully as if these were the Contractor's own acts, defaults, or negligence, or those of its agents, servants or workmen.

8.3. Subcontractors disclosed and identified during the bidding may be changed during the implementation of this Contract, subject to compliance with the required qualifications and the approval of the Procuring Entity.

9. Liquidated Damages

9.1. The Contractor shall pay liquidated damages to the Procuring Entity at the rate per day stated in the **SCC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the **SCC**. The Procuring Entity may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor. Once the cumulative amount of liquidated damages reaches ten percent (10%) of the amount of this Contract, the Procuring Entity shall rescind this Contract, without prejudice to other courses of action and remedies open to it.

9.2. If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer of the Procuring Entity shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in **GCC** Clause 40.1.

10. Site Investigation Reports

The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the **SCC** supplemented by any information obtained by the Contractor.

11. The Procuring Entity, Licenses and Permits

The Procuring Entity shall, if requested by the Contractor, assist him in applying for permits, licenses or approvals, which are required for the Works.

12. Contractor's Risk and Warranty Security

12.1. The Contractor shall assume full responsibility for the Works from the time project construction commenced up to final acceptance by the Procuring Entity and shall be held responsible for any damage or destruction of the Works except those occasioned by *force majeure*. The Contractor shall be fully responsible for the safety, protection, security, and convenience of his personnel, third parties, and the public at large, as well as the Works, Equipment, installation, and the like to be affected by his construction work.

12.2. The defects liability period for infrastructure projects shall be one year from project completion up to final acceptance by the Procuring Entity. During this period, the Contractor shall undertake the repair works, at his own expense, of any damage to the Works on account of the use of materials of inferior quality within ninety (90) days from the time the Head of the Procuring Entity has issued an order to undertake repair. In case of failure or refusal to comply with this mandate, the Procuring Entity shall undertake such repair works and shall be entitled to full reimbursement of expenses incurred therein upon demand.

12.3. In case the Contractor fails to comply with the preceding paragraph, the Procuring Entity shall forfeit its performance security, subject its property (ies) to attachment or garnishment proceedings, and perpetually disqualify it from participating in any public bidding. All payables of the GOP in his favor shall be offset to recover the costs.

12.4. After final acceptance of the Works by the Procuring Entity, the Contractor shall be held responsible for "Structural Defects", *i.e.*, major faults/flaws/deficiencies in one or more key structural elements of the project which may lead to structural failure of the completed elements or structure, or "Structural Failures", *i.e.*, where one or more key structural elements in an infrastructure facility fails or collapses, thereby rendering the facility or part thereof incapable of withstanding the design loads, and/or endangering the safety of the users or the general public:

(a) Contractor – Where Structural Defects/Failures arise due to faults attributable to improper construction, use of inferior quality/substandard materials, and any violation of the contract plans and specifications, the contractor shall be held liable;

(b) Consultants – Where Structural Defects/Failures arise due to faulty and/or inadequate design and specifications as well as construction supervision, then the consultant who prepared the design or undertook construction supervision for the project shall be held liable;

(c) Procuring Entity's Representatives/Project Manager/Construction Managers and Supervisors – The project owner's representative(s), project manager, construction manager, and supervisor(s) shall be held liable in cases where the Structural Defects/Failures are due to his/their willful intervention in altering the designs and other specifications; negligence or omission in not approving or acting on proposed changes to noted defects or deficiencies in the design and/or specifications; and the use of substandard construction materials in the project;

(d) Third Parties - Third Parties shall be held liable in cases where Structural Defects/Failures are caused by work undertaken by them such as leaking pipes, diggings or excavations, underground cables and electrical wires, underground tunnel, mining shaft and the like, in which case the applicable warranty to such structure should be levied to third parties for their construction or restoration works.

(e) Users - In cases where Structural Defects/Failures are due to abuse/misuse by the end user of the constructed facility and/or non–compliance by a user with the technical design limits and/or intended purpose of the same, then the user concerned shall be held liable.

12.5. The warranty against Structural Defects/Failures, except those occasioned on force majeure, shall cover the period specified in the **SCC** reckoned from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity.

12.6. The Contractor shall be required to put up a warranty security in the form of cash, bank guarantee, letter of credit, GSIS or surety bond callable on demand, in accordance with the following schedule:

Form of Warranty	Minimum Amount in Percentage (%) of Total Contract Price

(a) Cash or letter of credit issued by Universal or Commercial bank: provided, however, that the letter of credit shall be confirmed or authenticated by a Universal or Commercial bank, if issued by a foreign bank	Five Percent (5%)
(b) Bank guarantee confirmed by Universal or Commercial bank: provided, however, that the letter of credit shall be confirmed or authenticated by a Universal or Commercial bank, if issued by a foreign bank	Ten Percent (10%)
(c) Surety bond callable upon demand issued by GSIS or any surety or insurance company duly certified by the Insurance Commission	Thirty Percent (30%)

12.7. The warranty security shall be stated in Philippine Pesos and shall remain effective for one year from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity, and returned only after the lapse of said one year period.

12.8. In case of structural defects/failure occurring during the applicable warranty period provided in **GCC** Clause 12.5, the Procuring Entity shall undertake the necessary restoration or reconstruction works and shall be entitled to full reimbursement by the parties found to be liable for expenses incurred therein upon demand, without prejudice to the filing of appropriate administrative, civil, and/or criminal charges against the responsible persons as well as the forfeiture of the warranty security posted in favor of the Procuring Entity.

13. Liability of the Contractor

Subject to additional provisions, if any, set forth in the **SCC**, the Contractor's liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

14. Procuring Entity's Risk

14.1. From the Start Date until the Certificate of Final Acceptance has been issued, the following are risks of the Procuring Entity:

(a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to:

(i) any type of use or occupation of the Site authorized by the Procuring Entity after the official acceptance of the works; or

(ii) negligence, breach of statutory duty, or interference with any legal right by the Procuring Entity or by any person employed by or contracted to him except the Contractor.

(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Procuring Entity or in the Procuring Entity's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

15. Insurance

15.1. The Contractor shall, under his name and at his own expense, obtain and maintain, for the duration of this Contract, the following insurance coverage:

(a) Contractor's All Risk Insurance;

(b) Transportation to the project Site of Equipment, Machinery, and Supplies owned by the Contractor;

(c) Personal injury or death of Contractor's employees; and

(d) Comprehensive insurance for third party liability to Contractor's direct or indirect act or omission causing damage to third persons.

15.2. The Contractor shall provide evidence to the Procuring Entity's Representative that the insurances required under this Contract have been effected and shall, within a reasonable time, provide copies of the insurance policies to the Procuring Entity's Representative. Such evidence and such policies shall be provided to the Procuring Entity's through the Procuring Entity's Representative.

15.3. The Contractor shall notify the insurers of changes in the nature, extent, or program for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of this Contract and shall produce to the Procuring Entity's Representative the insurance policies in force including the receipts for payment of the current premiums.

The above insurance policies shall be obtained from any reputable insurance company approved by the Procuring Entity's Representative.

15.4. If the Contractor fails to obtain and keep in force the insurances referred to herein or any other insurance which he may be required to obtain under the terms of this Contract, the Procuring Entity may obtain and keep in force any such insurances and pay such premiums as may be necessary for the purpose. From time to time, the Procuring Entity may deduct the amount it shall pay for said premiums including twenty five percent (25%) therein from any monies due, or which may become due, to the Contractor, without prejudice to the Procuring Entity exercising its right to impose other sanctions against the Contractor pursuant to the provisions of this Contract.

15.5. In the event the Contractor fails to observe the above safeguards, the Procuring Entity may, at the Contractor's expense, take whatever measure is deemed necessary for its protection and that of the Contractor's personnel and third parties, and/or order the interruption of dangerous Works. In addition, the Procuring Entity may refuse to make the payments under **GCC** Clause 40 until the Contractor complies with this Clause.

15.6. The Contractor shall immediately replace the insurance policy obtained as required in this Contract, without need of the Procuring Entity's demand, with a new policy issued by a new insurance company acceptable to the Procuring Entity for any of the following grounds:

(a) The issuer of the insurance policy to be replaced has:

(i) become bankrupt;

(ii) been placed under receivership or under a management committee;

(iii) been sued for suspension of payment; or

(iv) been suspended by the Insurance Commission and its license to engage in business or its authority to issue insurance policies cancelled; or

(v) Where reasonable grounds exist that the insurer may not be able, fully and promptly, to fulfill its obligation under the insurance policy.

16. Termination for Default of Contractor

16.1. The Procuring Entity shall terminate this Contract for default when any of the following conditions attend its implementation:

16.2. Due to the Contractor's fault and while the project is on-going, it has incurred negative slippage of fifteen percent (15%) or more in accordance with Presidential Decree 1870, regardless of whether or not previous warnings and notices have been issued for the Contractor to improve his performance;

16.3. Due to its own fault and after this Contract time has expired, the Contractor incurs delay in the completion of the Work after this Contract has expired; or

16.4. The Contractor:

(a) abandons the contract Works, refuses or fails to comply with a valid instruction of the Procuring Entity or fails to proceed expeditiously and without delay despite a written notice by the Procuring Entity;

(b) does not actually have on the project Site the minimum essential equipment listed on the Bid necessary to prosecute the Works in accordance with the approved Program of Work and equipment deployment schedule as required for the project;

(c) does not execute the Works in accordance with this Contract or persistently or flagrantly neglects to carry out its obligations under this Contract;

(d) neglects or refuses to remove materials or to perform a new Work that has been rejected as defective or unsuitable; or

(e) sub-lets any part of this Contract without approval by the Procuring Entity.

16.5. All materials on the Site, Plant, Equipment, and Works shall be deemed to be the property of the Procuring Entity if this Contract is rescinded because of the Contractor's default.

17. Termination for Default of Procuring Entity

17.1. The Contractor may terminate this Contract with the Procuring Entity if the works are completely stopped for a continuous period of at least sixty (60) calendar days through no fault of its own, due to any of the following reasons:

(a) Failure of the Procuring Entity to deliver, within a reasonable time, supplies, materials, right-of-way, or other items it is obligated to furnish under the terms of this Contract; or

(b) The prosecution of the Work is disrupted by the adverse peace and order situation, as certified by the Armed Forces of the Philippines Provincial Commander and approved by the Secretary of National Defense.

18. Termination for Other Causes

18.1. The Procuring Entity may terminate this Contract, in whole or in part, at any time for its convenience. The Head of the Procuring Entity may terminate this Contract for the convenience of the Procuring Entity if he has determined the existence of conditions that make Project Implementation economically, financially or technically impractical and/or unnecessary, such as, but not limited to, fortuitous event(s) or changes in law and National Government policies.

18.2. The Procuring Entity or the Contractor may terminate this Contract if the other party causes a fundamental breach of this Contract.

18.3. Fundamental breaches of Contract shall include, but shall not be limited to, the following:

(a) The Contractor stops work for twenty eight (28) days when no stoppage of work is shown on the current Program of Work and the stoppage has not been authorized by the Procuring Entity's Representative;

(b) The Procuring Entity's Representative instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within twenty eight (28) days;

(c) The Procuring Entity shall terminate this Contract if the Contractor is declared bankrupt or insolvent as determined with finality by a court of competent jurisdiction. In this event, termination will be without compensation to the Contractor, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Procuring Entity and/or the Contractor. In the case of the Contractor's insolvency, any Contractor's Equipment which the Procuring Entity instructs in the notice is to be used until the completion of the Works;

(d) A payment certified by the Procuring Entity's Representative is not paid by the Procuring Entity to the Contractor within eighty four (84) days from the date of the Procuring Entity's Representative's certificate;

(e) The Procuring Entity's Representative gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Procuring Entity's Representative;

(f) The Contractor does not maintain a Security, which is required;

(g) The Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the **GCC** Clause 9; and

(h) In case it is determined prima facie by the Procuring Entity that the Contractor has engaged, before or during the implementation of the contract, in unlawful deeds and behaviors relative to contract acquisition and implementation, such as, but not limited to, the following:

(i) corrupt, fraudulent, collusive and coercive practices as defined in **ITB** Clause 3.1a;

(ii) drawing up or using forged documents;

(iii) using adulterated materials, means or methods, or engaging in production contrary to rules of science or the trade; and

(iv) any other act analogous to the foregoing.

18.4. The Funding Source or the Procuring Entity, as appropriate, will seek to impose the maximum civil, administrative and/or criminal penalties available under the applicable law on individuals and organizations deemed to be involved with corrupt, fraudulent, or coercive practices.

18.5. When persons from either party to this Contract gives notice of a fundamental breach to the Procuring Entity's Representative in order to terminate the existing contract for a cause other than those listed under **GCC** Clause 18.3, the Procuring Entity's Representative shall decide whether the breach is fundamental or not.

18.6. If this Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

19. Procedures for Termination of Contracts

19.1. The following provisions shall govern the procedures for the termination of this Contract:

(a) Upon receipt of a written report of acts or causes which may constitute ground(s) for termination as aforementioned, or upon its own initiative, the Implementing Unit shall, within a period of seven (7) calendar days, verify the existence of such ground(s) and cause the execution of a Verified Report, with all relevant evidence attached;

(b) Upon recommendation by the Implementing Unit, the Head of the Procuring Entity shall terminate this Contract only by a written notice to the Contractor conveying the termination of this Contract. The notice shall state:

(i) that this Contract is being terminated for any of the ground(s) afore-mentioned, and a statement of the acts that constitute the ground(s) constituting the same;

(ii) the extent of termination, whether in whole or in part;

(iii) an instruction to the Contractor to show cause as to why this Contract should not be terminated; and

(iv) special instructions of the Procuring Entity, if any.

The Notice to Terminate shall be accompanied by a copy of the Verified Report;

(c) Within a period of seven (7) calendar days from receipt of the Notice of Termination, the Contractor shall submit to the Head of the Procuring Entity a verified position paper stating why the contract should not be terminated. If the Contractor fails to show cause after the lapse of the seven (7) day period, either by inaction or by default, the Head of the Procuring Entity shall issue an order terminating the contract;

(d) The Procuring Entity may, at anytime before receipt of the Bidder's verified position paper to withdraw the Notice to Terminate if it is determined that certain items or works subject of the notice had been completed, delivered, or performed before the Contractor's receipt of the notice;

(e) Within a non-extendible period of ten (10) calendar days from receipt of the verified position paper, the Head of the Procuring Entity shall decide whether or not to terminate this Contract. It shall serve a written notice to the Contractor of its decision and, unless otherwise provided in the said notice, this Contract is deemed terminated from receipt of the Contractor of the notice of decision. The termination shall only be based on the ground(s) stated in the Notice to Terminate; and

(f) The Head of the Procuring Entity may create a Contract Termination Review Committee (CTRC) to assist him in the discharge of this function. All decisions recommended by the CTRC shall be subject to the approval of the Head of the Procuring Entity.

19.2. Pursuant to Section 69(f) of RA 9184 and without prejudice to the imposition of additional administrative sanctions as the internal rules of the agency may provide and/or further criminal prosecution as provided by applicable laws, the procuring entity shall impose on contractors after the termination of the contract the penalty of suspension for one (1) year for the first offense, suspension for two (2) years for the second offense from participating in the public bidding process, for violations committed during the contract implementation stage, which include but not limited to the following:

(a) Failure of the contractor, due solely to his fault or negligence, to mobilize and start work or performance within the specified period in the Notice to Proceed ("NTP");

(b) Failure by the contractor to fully and faithfully comply with its contractual obligations without valid cause, or failure by the contractor to comply with any written lawful instruction of the procuring entity or its representative(s) pursuant to the implementation of the contract. For the

procurement of infrastructure projects or consultancy contracts, lawful instructions include but are not limited *to* the following:

(i) Employment of competent technical personnel, competent engineers and/or work supervisors;

(ii) Provision of warning signs and barricades in accordance with approved plans and specifications and contract provisions;

(iii) Stockpiling in proper places of all materials and removal from the project site of waste and excess materials**,** including broken pavement and excavated debris in accordance with approved plans and specifications and contract provisions;

(iv) Deployment of committed equipment, facilities, support staff and manpower; and

(v) Renewal of the effectivity dates of the performance security after its expiration during the course of contract implementation.

(c) Assignment and subcontracting of the contract or any part thereof or substitution of key personnel named in the proposal without prior written approval by the procuring entity.

(d) Poor performance by the contractor or unsatisfactory quality and/or progress of work arising from his fault or negligence as reflected in the Constructor's Performance Evaluation System ("CPES") rating sheet. In the absence of the CPES rating sheet, the existing performance monitoring system of the procuring entity shall be applied. Any of the following acts by the constructor shall be construed as poor performance:

(i) Negative slippage of 15% and above within the critical path of the project due entirely to the fault or negligence of the contractor; and

(ii) Quality of materials and workmanship not complying with the approved specifications arising from the contractor's fault or negligence.

(e) Willful or deliberate abandonment or non-performance of the project or contract by the contractor resulting to substantial breach thereof without lawful and/or just cause.

In addition to the penalty of suspension, the performance security posted by the contractor shall also be forfeited.

20. Force Majeure, Release From Performance

20.1. For purposes of this Contract the terms "*force majeure*" and "fortuitous event" may be used interchangeably. In this regard, a fortuitous event or *force majeure* shall be interpreted to mean an event which the Contractor could not have foreseen, or which though foreseen, was inevitable. It shall not include ordinary unfavorable weather conditions; and any other cause the effects of which could have been avoided with the exercise of reasonable diligence by the Contractor.

20.2. If this Contract is discontinued by an outbreak of war or by any other event entirely outside the control of either the Procuring Entity or the Contractor, the Procuring Entity's Representative shall certify that this Contract has been discontinued. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all works carried out before receiving it and for any Work carried out afterwards to which a commitment was made.

20.3. If the event continues for a period of eighty four (84) days, either party may then give notice of termination, which shall take effect twenty eight (28) days after the giving of the notice.

20.4. After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the materials and Plant reasonably delivered to the Site, adjusted by the following:

(a) any sum to which the Contractor is entitled under **GCC** Clause 28;

(b) the cost of his suspension and demobilization;

(c) any sum to which the Procuring Entity is entitled.

20.5. The net balance due shall be paid or repaid within a reasonable time period from the time of the notice of termination.

21. Resolution of Disputes

21.1. If any dispute or difference of any kind whatsoever shall arise between the parties in connection with the implementation of the contract covered by the Act and this IRR, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation.

21.2. If the Contractor believes that a decision taken by the PROCURING ENTITY's Representative was either outside the authority given to the PROCURING ENTITY's Representative by this Contract or that the decision was wrongly taken, the decision shall be referred to the Arbiter indicated in the **SCC** within fourteen (14) days of the notification of the PROCURING ENTITY's Representative's decision.

21.3. Any and all disputes arising from the implementation of this Contract covered by the R.A. 9184 and its IRR shall be submitted to arbitration in the Philippines according to the provisions of Republic Act No. 876, otherwise known as the " Arbitration Law" and Republic Act 9285, otherwise known as the "Alternative Dispute Resolution Act of 2004": *Provided, however*, That, disputes that are within the competence of the Construction Industry Arbitration Commission to resolve shall be referred thereto. The process of arbitration shall be incorporated as a provision in this Contract that will be executed pursuant to the provisions of the Act and its IRR-A: *Provided, further,* That, by mutual agreement, the parties may agree in writing to resort to other alternative modes of dispute resolution. Additional instructions on resolution of disputes, if any, shall be indicated in the **SCC**.

22. Suspension of Loan, Credit, Grant, or Appropriation

In the event that the Funding Source suspends the Loan, Credit, Grant, or Appropriation to the Procuring Entity, from which part of the payments to the Contractor are being made:

(a) The Procuring Entity is obligated to notify the Contractor of such suspension within seven (7) days of having received the suspension notice.

(b) If the Contractor has not received sums due it for work already done within forty five (45) days from the time the Contractor's claim for payment has been certified by the Procuring Entity's Representative, the Contractor may immediately issue a suspension of work notice in accordance with **SCC** Clause 45.2.

23. Procuring Entity's Representative's Decisions

23.1. Except where otherwise specifically stated, the Procuring Entity's Representative will decide contractual matters between the Procuring Entity and the Contractor in the role representing the Procuring Entity's

23.2. The Procuring Entity's Representative may delegate any of his duties and responsibilities to other people, except to the Arbiter, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

24. Approval of Drawings and Temporary Works by the Procuring Entity's Representative

24.1. All Drawings prepared by the Contractor for the execution of the Temporary Works, are subject to prior approval by the Procuring Entity's Representative before its use.

24.2. The Contractor shall be responsible for design of Temporary Works.

24.3. The Procuring Entity's Representative's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

24.4. The Contractor shall obtain approval of third parties to the design of the Temporary Works, when required by the Procuring Entity.

25. Acceleration and Delays Ordered by the Procuring Entity's Representative

25.1. When the Procuring Entity wants the Contractor to finish before the Intended Completion Date, the Procuring Entity's Representative will obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Procuring Entity accepts these proposals, the Intended Completion Date will be adjusted accordingly and confirmed by both the Procuring Entity and the Contractor.

25.2. If the Contractor's Financial Proposals for an acceleration are accepted by the Procuring Entity, they are incorporated in the Contract Price and treated as a Variation.

26. Extension of the Intended Completion Date

26.1. The Procuring Entity's Representative shall extend the Intended Completion Date if a Variation is issued which makes it impossible for the Intended Completion Date to be achieved by the Contractor without taking steps to accelerate the remaining work, which would cause the Contractor to incur additional costs. Unless specified in the **SCC**, no payment shall be made for any event which may warrant the extension of the Intended Completion Date.

26.2. The Procuring Entity's Representative shall decide whether and by how much to extend the Intended Completion Date within twenty one (21) days of the Contractor asking the Procuring Entity's Representative for a decision thereto after fully submitting all supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

27. Right to Vary

27.1. The Procuring Entity's Representative with the prior approval of the Procuring Entity may instruct Variations, up to a maximum cumulative amount of ten percent (10%) of the original contract cost.

27.2. Variations shall be valued as follows:

(a) At a lump sum price agreed between the parties;

(b) where appropriate, at rates in this Contract;

(c) in the absence of appropriate rates, the rates in this Contract shall be used as the basis for valuation; or failing which

(d) at appropriate new rates, equal to or lower than current industry rates and to be agreed upon by both parties and approved by the Head of the Procuring Entity.

28. Contractors Right to Claim

If the Contractor incurs cost as a result of any of the events under **GCC** Clause 13, the Contractor shall be entitled to the amount of such cost. If as a result of any of the said events, it is necessary to change the Works, this shall be dealt with as a Variation.

29. Dayworks

29.1. Subject to **GCC** Clause 43 on Variation Order, and if applicable as indicated in the **SCC**, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the Procuring Entity's Representative has given written instructions in advance for additional work to be paid for in that way.

29.2. All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Procuring Entity's Representative. Each completed form shall be verified and signed by the Procuring Entity's Representative within two days of the work being done.

29.3. The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.

30. Early Warning

30.1. The Contractor shall warn the Procuring Entity's Representative at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Procuring Entity's Representative may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

30.2. The Contractor shall cooperate with the Procuring Entity's Representative in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Procuring Entity's Representative.

31. Program of Work

31.1. Within the time stated in the **SCC**, the Contractor shall submit to the Procuring Entity's Representative for approval a Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works.

31.2. An update of the Program of Work shall the show the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.

31.3. The Contractor shall submit to the Procuring Entity's Representative for approval an updated Program of Work at intervals no longer than the period stated in the **SCC.** If the Contractor does not submit an updated Program of Work within this period, the PROCURING ENTITY's Representative may withhold the amount stated in the **SCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program of Work has been submitted.

31.4. The Procuring Entity's Representative's approval of the Program of Work shall not alter the Contractor's obligations. The Contractor may revise the Program of Work and submit it to the Procuring Entity's Representative again at any time. A revised Program of Work shall show the effect of any approved Variations; and if allowed, any Compensation Event.

31.5. When the Program of Work is updated, the Contractor shall provide the Procuring Entity's Representative with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

31.6. All Variations shall be included in updated Program of Work produced by the Contractor.

32. Management Conferences

32.1. Either the Procuring Entity's Representative or the Contractor may require the other to attend a Management Conference. The Management Conference shall review the plans for remaining work and deal with matters raised in accordance with the early warning procedure.

32.2. The Procuring Entity's Representative shall record the business of Management Conferences and provide copies of the record to those attending the Conference and to the Procuring Entity . The responsibility of the parties for actions to be taken shall be decided by the PROCURING ENTITY's Representative either at the Management Conference or after the Management Conference and stated in writing to all who attended the Conference.

33. Bill of Quantities

33.1. The Bill of Quantities shall contain items of work for the construction, installation, testing, and commissioning of work to be done by the Contractor.

33.2. The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

33.3. If the final quantity of any work done differs from the quantity in the Bill of Quantities for the particular item and is not more than twenty five percent (25%) of the original quantity, provided the aggregate changes for all items do not exceed ten percent (10%) of the Contract price, the Procuring Entity's Representative shall make the necessary adjustments to allow for the changes subject to applicable laws, rules, and regulations.

33.4. If requested by the Procuring Entity's Representative, the Contractor shall provide the Procuring Entity's Representative with a detailed cost breakdown of any rate in the Bill of Quantities.

34. Instructions, Inspections and Audits

34.1. The Procuring Entity's personnel shall at all reasonable times during construction of the Work be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of the construction.

34.2. If the Procuring Entity's Representative instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect, the test shall be a Compensation Event.

34.3. The Contractor shall permit the Funding Source named in the **SCC** to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Funding Source, if so required by the Funding Source.

35. Identifying Defects

The Procuring Entity's Representative shall check the Contractor's work and notify the Contractor of any defects that are found. Such checking shall not affect the Contractor's responsibilities. The Procuring Entity's Representative may instruct the Contractor to search uncover defects and test any work that the Procuring Entity's Representative considers below standards and defective.

36. Cost of Repairs

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Liability Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

37. Correction of Defects

37.1. The Procuring Entity's Representative shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion Date up to final acceptance by the Procuring Entity's unless otherwise specified in the **SCC**. The Defects Liability Period shall be extended for as long as defects remain to be corrected.

37.2. Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified in the Procuring Entity's Representative's notice.

37.3. The Contractor shall correct the defects which he notices himself before the end of the Defects Liability Period.

37.4. The Procuring Entity shall certify that all defects have been corrected. If the Procuring Entity considers that correction of a defect is not essential, he can request the Contractor to submit a quotation for the corresponding reduction in the Contract Price. If the Procuring Entity accepts the quotation, the corresponding change in the SCC is a Variation.

38. Uncorrected Defects

38.1. The Procuring Entity shall give the Contractor at least fourteen (14) days notice of his intention to use a third party to correct a Defect. If the Contractor does not correct the Defect himself within the period, the Procuring Entity may have the Defect corrected by the third party. The cost of the correction will be deducted from the Contract Price.

38.2. The use of a third party to correct defects that are uncorrected by the Contractor will in no way relieve the Contractor of its liabilities and warranties under the Contract.

39. Advance Payment

39.1. The Procuring Entity shall, upon a written request of the contractor which shall be submitted as a contract document, make an advance payment to the contractor in an amount not exceeding fifteen percent (15%) of the total contract price, to be made in lump sum or, at the most two, installments according to a schedule specified in the **SCC**.

39.2. The advance payment shall be made only upon the submission to and acceptance by the Procuring Entity of an irrevocable standby letter of credit of equivalent value from a commercial bank, a bank guarantee or a surety bond callable upon demand, issued by a surety or insurance company duly licensed by the Insurance Commission and confirmed by the Procuring Entity.

39.3. The advance payment shall be repaid by the Contractor by an amount equal to the percentage of the total contract price used for the advance payment.

39.4. The contractor may reduce his standby letter of credit or guarantee instrument by the amounts refunded by the Monthly Certificates in the advance payment.

39.5. The Procuring Entity will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to the maximum amount stated in **SCC** Clause 39.1.

40. Progress Payments

40.1. The Contractor may submit a request for payment for Work accomplished. Such request for payment shall be verified and certified by the Procuring Entity's Representative/Project Engineer. Except as otherwise stipulated in the **SCC**, materials and equipment delivered on the site but not completely put in place shall not be included for payment.

40.2. The Procuring Entity shall deduct the following from the certified gross amounts to be paid to the contractor as progress payment:

(a) Cumulative value of the work previously certified and paid for.

(b) Portion of the advance payment to be recouped for the month.

(c) Retention money in accordance with the condition of contract.

(d) Amount to cover third party liabilities.

(e) Amount to cover uncorrected discovered defects in the works.

40.3. Payments shall be adjusted by deducting therefrom the amounts for advance payments and retention. The Procuring Entity shall pay the Contractor the amounts certified by the Procuring Entity's Representative within twenty eight (28) days from the date each certificate was issued. Unless otherwise indicated in the **SCC**, no payment of interest for delayed payments and adjustments shall be made by the Procuring Entity.

40.4. The first progress payment may be paid by the Procuring Entity to the Contractor provided that at least twenty percent (20%) of the work has been accomplished as certified by the Procuring Entity's Representative.

40.5. Items of the Works for which a price of "0" (zero) has been entered will not be paid for by the Procuring Entity and shall be deemed covered by other rates and prices in the Contract.

41. Payment Certificates

41.1. The Contractor shall submit to the Procuring Entity's Representative monthly statements of the estimated value of the work executed less the cumulative amount certified previously.

41.2. The Procuring Entity's Representative shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.

41.3. The value of Work executed shall:

(a) be determined by the Procuring Entity's Representative;

(b) comprise the value of the quantities of the items in the Bill of Quantities completed; and

(c) include the valuations of approved variations.

41.4. The Procuring Entity's Representative may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

42. Retention

42.1. The Procuring Entity shall retain from each payment due to the Contractor an amount equal to a percentage thereof using the rate as specified in **SCC** Clause 42.2.

42.2. Progress payments are subject to retention of ten percent (10%), unless otherwise specified in the **SCC**, referred to as the "retention money." Such retention shall be based on the total amount due to the Contractor prior to any deduction and shall be retained from every progress payment until fifty percent (50%) of the value of Works, as determined by the Procuring Entity, are completed. If, after fifty percent (50%) completion, the Work is satisfactorily done and on schedule, no additional retention shall be made; otherwise, the ten percent (10%) retention shall again be imposed using the rate specified therefor.

42.3. The total "retention money" shall be due for release upon final acceptance of the Works. The Contractor may, however, request the substitution of the retention money for each progress billing with irrevocable standby letters of credit from a commercial bank, bank guarantees or surety bonds callable on demand, of amounts equivalent to the retention money substituted for and acceptable to the Procuring Entity, provided that the project is on schedule and is satisfactorily undertaken. Otherwise, the ten (10%) percent retention shall be made. Said irrevocable standby letters of credit, bank guarantees and/or surety bonds, to be posted in favor of the Government shall be valid for a duration to be determined by the concerned implementing office/agency or Procuring Entity and will answer for the purpose for which the ten (10%) percent retention is intended, *i.e.*, to cover uncorrected discovered defects and third party liabilities.

42.4. On completion of the whole Works, the Contractor may substitute retention money with an "on demand" Bank guarantee in a form acceptable to the Procuring Entity.

43. Variation Orders

43.1. Variation Orders may be issued by the Procuring Entity to cover any increase/decrease in quantities, including the introduction of new work items that are not included in the original contract or reclassification of work items that are either due to change of plans, design or alignment to suit actual field conditions resulting in disparity between the preconstruction plans used for purposes of bidding and the "as staked plans" or construction drawings prepared after a joint survey by the Contractor and the Procuring Entity after award of the contract, provided that the cumulative amount of the Variation Order does not exceed ten percent (10%) of the original project cost. The addition/deletion of Works should be within the general scope of the project as bid and awarded. The scope of works shall not be reduced so as to accommodate a positive Variation Order. A Variation Order may either be in the form of a Change Order or Extra Work Order.

43.2. A Change Order may be issued by the implementing official to cover any increase/decrease in quantities of original Work items in the contract.

43.3. An Extra Work Order may be issued by the implementing official to cover the introduction of new work necessary for the completion, improvement or protection of the project which were not included as items of Work in the original contract, such as, where there are subsurface or latent physical conditions at the site differing materially from those indicated in the contract, or where there are duly unknown physical conditions at the site of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in the Work or character provided for in the contract.

43.4. Any cumulative Variation Order beyond ten percent (10%) shall be subject of another contract to be bid out if the works are separable from the original contract. In exceptional cases where it is urgently necessary to complete the original scope of work, the Head of the Procuring Entity may authorize a positive Variation Order go beyond ten percent (10%) but not more than twenty percent (20%) of the original contract price, subject to the guidelines to be determined by the GPPB: *Provided, however,* That appropriate sanctions shall be imposed on the designer, consultant or official responsible for the original detailed engineering design which failed to consider the Variation Order beyond ten percent (10%).

43.5. In claiming for any Variation Order, the Contractor shall, within seven (7) calendar days after such work has been commenced or after the circumstances leading to such condition(s) leading to the extra cost, and within twenty-eight (28) calendar days deliver a written communication giving full and detailed

particulars of any extra cost in order that it may be investigated at that time. Failure to provide either of such notices in the time stipulated shall constitute a waiver by the contractor for any claim. The preparation and submission of Variation Orders are as follows:

(a) If the Procuring Entity's representative/Project Engineer believes that a Change Order or Extra Work Order should be issued, he shall prepare the proposed Order accompanied with the notices submitted by the Contractor, the plans therefore, his computations as to the quantities of the additional works involved per item indicating the specific stations where such works are needed, the date of his inspections and investigations thereon, and the log book thereof, and a detailed estimate of the unit cost of such items of work, together with his justifications for the need of such Change Order or Extra Work Order, and shall submit the same to the Head of the Procuring Entity for approval.

(b) The Head of the Procuring Entity or his duly authorized representative, upon receipt of the proposed Change Order or Extra Work Order shall immediately instruct the technical staff of the Procuring Entity's to conduct an on-the-spot investigation to verify the need for the Work to be prosecuted. A report of such verification shall be submitted directly to the Head of the Procuring Entity or his duly authorized representative.

(c) The, Head of the Procuring Entity or his duly authorized representative, after being satisfied that such Change Order or Extra Work Order is justified and necessary, shall review the estimated quantities and prices and forward the proposal with the supporting documentation to the Head of Procuring Entity for consideration.

(d) If, after review of the plans, quantities and estimated unit cost of the items of work involved, the proper office of the procuring entity empowered to review and evaluate Change Orders or Extra Work Orders recommends approval thereof, Head of the Procuring Entity or his duly authorized representative, believing the Change Order or Extra Work Order to be in order, shall approve the same.

(e) The timeframe for the processing of Variation Orders from the preparation up to the approval by the Head of the Procuring Entity concerned shall not exceed thirty (30) calendar days.

44. Contract Completion

Once the project reaches an accomplishment of ninety five (95%) of the total contract amount, the Procuring Entity may create an inspectorate team to make preliminary inspection and submit a punch-list to the Contractor in preparation for the final turnover of the project. Said punch-list will contain, among others, the remaining Works, Work deficiencies for necessary corrections, and the specific duration/time to fully complete the project considering the approved remaining contract time. This, however, shall not preclude the claim of the Procuring Entity for liquidated damages.

45. Suspension of Work

45.1. The Procuring Entity shall have the authority to suspend the work wholly or partly by written order for such period as may be deemed necessary, due to *force majeure* or any fortuitous events or for failure on the part of the Contractor to correct bad conditions which are unsafe for workers or for the general public, to carry out valid orders given by the Procuring Entity or to perform any provisions of the contract, or due to adjustment of plans to suit field conditions as found necessary during construction. The Contractor shall immediately comply with such order to suspend the work wholly or partly.

45.2. The Contractor or its duly authorized representative shall have the right to suspend work operation on any or all projects/activities along the critical path of activities after fifteen (15) calendar days from date of receipt of written notice from the Contractor to the district engineer/regional director/consultant or equivalent official, as the case may be, due to the following:

(a) There exist right-of-way problems which prohibit the Contractor from performing work in accordance with the approved construction schedule.

(b) Requisite construction plans which must be owner-furnished are not issued to the contractor precluding any work called for by such plans.

(c) Peace and order conditions make it extremely dangerous, if not possible, to work. However, this condition must be certified in writing by the Philippine National Police (PNP) station which has responsibility over the affected area and confirmed by the Department of Interior and Local Government (DILG) Regional Director.

(d) There is failure on the part of the Procuring Entity to deliver government-furnished materials and equipment as stipulated in the contract.

(e) Delay in the payment of Contractor's claim for progress billing beyond forty-five (45) calendar days from the time the Contractor's claim has been certified to by the procuring entity's authorized representative that the documents are complete unless there are justifiable reasons thereof which shall be communicated in writing to the Contractor.

45.3. In case of total suspension, or suspension of activities along the critical path, which is not due to any fault of the Contractor, the elapsed time between the effective order of suspending operation and the order to resume work shall be allowed the Contractor by adjusting the contract time accordingly.

46. Payment on Termination

46.1. If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Procuring Entity's Representative shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the SCC. Additional Liquidated Damages shall not apply. If the total amount due to the Procuring Entity exceeds any payment due to the Contractor, the difference shall be a debt payable to the Procuring Entity.

46.2. If the Contract is terminated for the Procuring Entity's convenience or because of a fundamental breach of Contract by the Procuring Entity, the Procuring Entity's Representative shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

46.3. The net balance due shall be paid or repaid within twenty eight (28) days from the notice of termination.

46.4. If the Contractor has terminated the Contract under **GCC** Clauses 17 or 18, the Procuring Entity shall promptly return the Performance Security to the Contractor.

47. Extension of Contract Time

47.1. Should the amount of additional work of any kind or other special circumstances of any kind whatsoever occur such as to fairly entitle the contractor to an extension of contract time, the Procuring Entity shall determine the amount of such extension; provided that the Procuring Entity is not bound to take into account any claim for an extension of time unless the Contractor has, prior to the expiration of the contract time and within thirty (30) calendar days after such work has been commenced or after the circumstances leading to such claim have arisen, delivered to the Procuring Entity notices in order that it could have investigated them at that time. Failure to provide such notice shall constitute a waiver by the Contractor of any claim. Upon receipt of full and detailed particulars, the Procuring Entity shall examine the facts and extent of the delay and shall extend the contract time completing the contract work when, in the Procuring Entity's opinion, the findings of facts justify an extension.

47.2. No extension of contract time shall be granted the Contractor due to (a) ordinary unfavorable weather conditions and (b) inexcusable failure or negligence of Contractor to provide the required equipment, supplies or materials.

47.3. Extension of contract time may be granted only when the affected activities fall within the critical path of the PERT/CPM network.

47.4. No extension of contract time shall be granted when the reason given to support the request for extension was already considered in the determination of the original contract time during the conduct of detailed engineering and in the preparation of the contract documents as agreed upon by the parties before contract perfection.

47.5. Extension of contract time shall be granted for rainy/unworkable days considered unfavorable for the prosecution of the works at the site, based on the actual conditions obtained at the site, in excess of the number of rainy/unworkable days pre-determined by the Procuring Entity in relation to the original contract time during the conduct of detailed engineering and in the preparation of the contract documents as agreed upon by the parties before contract perfection, and/or for equivalent period of delay due to major calamities such as exceptionally destructive typhoons, floods and earthquakes, and epidemics, and for causes such as non-delivery on time of materials, working drawings, or written information to be furnished by the Procuring Entity, non-acquisition of permit to enter private properties within the right-of-way resulting in complete paralyzation of construction activities, and other meritorious causes as determined by the Procuring Entity's Representative and approved by the Head of the Procuring Entity. Shortage of construction materials, general labor strikes, and peace and order problems that disrupt construction operations through no fault of the Contractor may be considered as additional grounds for extension of contract time provided they are publicly felt and certified by appropriate government agencies such as DTI, DOLE, DILG, and DND, among others. The written consent of bondsmen must be attached to any request of the Contractor for extension of contract time and submitted to the Procuring Entity for consideration and the validity of the Performance Security shall be correspondingly extended.

48. Price Adjustment

Except for extraordinary circumstances as determined by NEDA and approved by the GPPB, no price adjustment shall be allowed unless otherwise specified in the **SCC**.

49. Completion

The Contractor shall request the Procuring Entity's Representative to issue a certificate of Completion of the Works, and the Procuring Entity's Representative will do so upon deciding that the work is completed.

50. Taking Over

The Procuring Entity shall take over the Site and the Works within seven (7) days from the date the Procuring Entity's Representative issues a certificate of Completion.

51. Operating and Maintenance Manuals

51.1. If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the **SCC**.

51.2. If the Contractor does not supply the Drawings and/or manuals by the dates stated in the **SCC**, or they do not receive the Procuring Entity's Representative's approval, the Procuring Entity's Representative shall withhold the amount stated in the **SCC** from payments due to the Contractor.

Section V.

Special Conditions of Contract

Special Conditions of Contract

GCC Clause	
1.16	The **Intended Completion Date** is: ***150 Calendar Days*** *from commencement of work*
1.21	The **Procuring Entity** is: *Philippine Ports Authority, PMO-NCR South, Admin Bldg, SH, Port Area, Manila*
1.22	The **Procuring Entity's Representative** is **ATTY. OLIVER S. RODULFO, JR.** Manager, MICT PMO-NCR South 2nd Floor, Admin Bldg., South Harbor, Port Area, Manila
1.23	The **Site** is located at: *At North and South Banks of Pasig River, SH, Manila* and is defined in drawings No.
1.27	The **Start Date** is: *Within seven (7) Calendar Days from the issuance of the Notice to Proceed.*
1.30	The **Works** consist of: I. GENERAL EXPENSES II. REPAIR OF WHARFFINGER OFFICE III. REPAIR OF DAMAGED CONCRETE CURBS IV. REPLACEMENT AND INSTALLATION OF RUBBER TIRE FENDERS V. APPLICATION OF SPECIALIZED COATING MATERIALS VI. COVERED WALKWAY VII. REPAIR OF RORO RAMP AND WORKING APRON
2.2	*None*
5.1	The **Procuring Entity** shall give possession of all parts of the Site to the Contractor upon commencement of the project.
6.5	The Contractor shall employ the following **Key Personnel:** a. Project Manager: b. Project Engineer: c. Materials Engineer d. Construction Safety and Health Officer: e. General Foreman: f. Other Positions:

7.4(c)	*No further instructions*
8.1	*No further instructions*
10	None
12.5	*N / A*
13	*"*No additional provision*." or, if the Contractor is a joint venture, "*All partners to the joint venture shall be jointly and severally liable to the Procuring Entity."
21.2	The Arbiter is: *(To be appointed)*
21.3	*No further instructions*
26.1	*No further instructions*
29.1	No dayworks are applicable to the contract.
31.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within _____days of delivery of the Notice of Award.
31.3	The period between Program of Work updates is _____ days. The amount to be withheld for late submission of an updated Program of Work is _____.
34.3	The Funding Source is the *Philippine Ports Authority's Corporate Budget for* ***CY 2019***
37.1	*No further instructions*
39.1	No advance payment or mobilization be extended or paid in accordance with DOTr Memorandum dated 10 July 2018.
40.1	*No further instructions*
40.3	*No further instructions*
42.2	*No further instructions*
48	*No further instructions*
51.1	The date by which operating and maintenance manuals are required is _____. The date by which "as built" drawings are required is _____.
51.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is _____

Section VI.

Standard/Technical Specifications

General Conditions:

These specifications cover the requirements for the construction/completion of the subject project mentioned above. It shall supplement the plans and shall govern over the plans in case of conflict.

All drawings are intended to cooperate with the specifications to form part thereof. When figures are given, they are to be followed in the preference to measurements by scale. Anything in the drawings but not mentioned in the specifications or vice versa or anything not expressly set forth in either but which is reasonably implied shall be furnished as though specifically shown and mentioned in both.

The work of the contractor stipulated in the contract includes the furnishing of labor, materials, tools, equipment and supervision necessary to complete all phases of work in accordance with the plans and specifications.

All phases of work stipulated hereunder will be done in good workmanship to the satisfaction of the owner or his duly authorized representative determined during the progress of work or before the acceptance date. The construction work in this project includes all preliminary works related to the preparation of the construction site, safety devices, construction and cleaning of the site as required in the contract.

SAFETY

During the course of survey and clearing, any obstacles which are recognized and seemed to be explosive or hazardous to workers shall be removed from the site by the proper Authority.

At the end of each day's work, the Contractor shall keep the workplace in safe condition, so that no part is in danger of falling or creating hazard to personnel or equipment.

\SECTION 5 – TECHNICAL SPECIFICATIONS – BUILDING

5.2 Site of works

5.2.1 Demolition Works

A. Demolish and remove from site existing structures and other obstructions which are in the project area and are not being reused. Where existing concrete on ground is to be demolished, remove all existing concrete and obstructions to a depth of 600mm (24") below grade.

B. Removal and storing of salvageable materials: Special care should be done in removing reusable materials resulting from the premises and dumped at the sites provided by the Contractor in a manner approved by the Architect.

5.2.2 Clearing and Preparation of the Site

A. Clearing and disposal of resulting trash, waste on the site of the structure and within the limits of grading.

B. Repair damages done to property of any person or persons on or off the premises, by reason of the required work for Demolition and Clearing. The Contractor shall be liable and hereby assumes full responsibility for, and shall hold the Owner free and harmless from any injury or damage that may be sustained by any person or property in connection with the performance of the works contracted for under this Agreement.

5.2.3 Excavation

A. Excavation to the dimensions and elevations indicated on the drawings. Carry excavation to depths directed by the Architect should unsuitable bearing be encountered at elevations indicated. Contract price shall be adjusted according to the Owner and the Contractor.
B. Precautions shall be taken such that excavations do not extend below the exact lines of bottoms of footings and other soil bearing foundations. Otherwise, Contractor shall fill to the level for bearing with concrete specified for footings at Contractor's expense.
C. Bottoms of excavation shall be level, free from loose materials, and brought to indicated or required levels in undisturbed earth or in compacted fill.
D. All footings subgrade shall be approved by the Architect before proceeding with the Construction of the footings.
E. Unauthorized Excavation: In case of suitable bearing soil is encountered at the sub-grade elevation shown in the drawings and the excavation has been made greater depth, the concrete fill shall be installed by the Contractor as directed by the Architect and /or Engineer at Contractor's expenses.
F. If the grade does not meet the above requirements (or if unsatisfactory materials as determined by the testing laboratory is encountered), the sub-grade shall be compacted or unsatisfactory materials shall be removed and replaced with materials approved by the testing laboratory and the Architect and/or Engineer before proceeding with the work.
G. Pump water or remove water by other approved method out of excavated areas throughout the construction. Water shall not be conducted into adjacent develop property and shall be discharge at a safe distance from the excavation.

5.2.4 Backfilling

A. Prior to backfilling around structures, backfilling materials shall be free from large voids of earth or stones larger than 75mm (3") in longest dimension, remove all forms of rubbish and organic matters including roots, weeds, leaves and grasses, trash, debris and other unsatisfactory materials. Use only approved backfill material and place symmetrically on all sides in layers, compacted in accordance with Item 5.2.5 of this Section.
   1. Minimum depth from the bottom of column footing shall be as indicated in the Structural drawings.
   2. Minimum depth from the bottom of wall footing shall be 600mm (24") from the Natural Grade Line (NGL).
   3. All footings and tie beams shall rest on solid natural ground or engineered fill consisting of granular materials, preferably sand and gravel mixture with binder. Submit compaction test results for three (3) specimen samples prior to complete excavation.
   4. Engineered fill shall be placed in 200mm lifts, moisture conditioned and compacted to at least 95% of the Maximum Dry Density prescribed by ASTM D1557.
   5. Backfill around structures only after the concrete has sustained sufficient strength to resist lateral pressure resulting from the backfill.
   6. 19mm (3/4") crushed base course for slab on fill shall be wetted and compacted to desired thickness.

B. Construct earthfill of satisfactory fill materials free from organic material, or rock with maximum dimensions not greater than 75mm (3"). Place fill material not more than 250mm (9") in depth. Filling shall be made in layers 200mm (8") in thickness and each layer shall be thoroughly wet and compacted to 95% optimum moisture content. Each layer shall be spread uniformly on prepared and plowed.

5.2.5 Compaction

A. All disturbed materials shall be compacted at optimum moisture content by rolling with approved tamping rollers, vibrator rollers, pneumatic tires rollers, three wheel power rollers, or other approved equipment well suited to the particular soil being compacted.

B. Materials shall be moistened or aerated as necessary to provide the moisture content that will facilitate the desired compaction with the equipment utilized.

C. Each layer shall be compacted to not less than the percentage of maximum density specified below as determined in accordance with ASTM D1557 Method:

Embankments, Backfill and Sub-grade Soil Preparation	Cohesioness Soil (% Compaction)	Cohesive Soil (% Compaction)
Under Proposed Structures & Building Slabs	100	95
Under Paved Areas Top 300mm (12”)	100	95
Under Paved Areas	95	90
Under Sidewalk	95	90
Under Sidewalk Below 300mm (12”)	95	90
Backfill Adjacent To Structure	90	90

5.2.6 Grading and Soil Poisoning

A. Batterboards: Second class, pest free lumber, assembled and rendered secure for proper delineation of building lines and grades.

B. Soil Treatment: To reduce the risk of subterranean termite attack, all roots that have been exposed during excavation shall be removed from the area. Similarly, the sub-floor areas beneath steps, patios and verandas shall be kept free from all debris, such as lumber cut-offs and abandoned framework, which can encourage termite activity.

1. Site Preparation: To ensure uniform distribution of the soil treatment solution and to permit percolation into the soil to a sufficient depth to prevent termite penetration through the barrier, the site shall be prepared as follows:
   a. Heavy Soils, Sloping Sites: On clays and other heavy soils, where penetration is likely to be slow, and on sloping where run-off of the emulsion is likely to occur, the surface of the soil shall be scarified along the contours to form furrows which will hold the solution where it is applied.

b. Sandy or Porous Soils: Loose, sandy or porous soils shall be moistened with water immediately before treatment to prevent loss of solution through piping or excessive percolation.
c. Impervious Surfaces: Surface such as rock or concrete shall not receive direct applications of termiticide. Treatment shall be limited to cracks, faults or joints in such surfaces and to the soil in contact with their perimeter. Alternative measures may be necessary to provide an effective barrier.
d. Leveling, Excavations and Filling: All cuttings, trenches and excavations shall be completed and all pipes, wastes or conduits in position before finally levelling and grading the subfloor. Where fill is to be used, the grade level shall be treated to provide a bed of treated soil. Fill shall be free from wooden debris and well compacted. These conditions are necessary to avoid later supplementary treatment.
e. Concrete Formwork: All unused concrete formwork, levelling pegs, lumber off-cuts and other building debris shall be removed from the area to be treated. Where framework is left in place at the time of the initial treatment, a supplementary treatment shall be given after its removal.
f. Drains: Extra caution shall be observed to ensure that run-off or seepage from treated sites does not contaminate storm water or sewerage systems.

2. Soil Poisoning: Product and application shall be equal to "Dursban Premium TC" or by Owner's accredited termites and pest control Contractor. During soil treatment, the soil to be treated must have sufficient low moisture content to allow uniform distribution and proper penetration into the soil. No application should be done during after heavy rain. Termiticides or soil poison materials should be applied as a coarse spray so as to provide a uniform distribution on the soil surface. Soil poison shall be applied at last 2-hours prior to pouring of concrete. Treated soil or fill materials are distributed after treatment. It should be re-treated as specified. Apply solution in accordance to the following:

a. Foundation:

(1). Apply soil poison solution at the rate of 7-liters per three linear meters per 30 cm. depth.

(2). 1/3 of application is made near the level of bottom of trench or near the top of footing before backfill is placed.

(3). 1/3 when half of the backfill is placed.

(4). The rest of the solution should be applied when the trench is almost finished.

b. Soil Treatment before Pouring of Flooring:

(1). For overall treatment, apply 4-liters of solution per square meter of floor slab.

(2). If fill is a coarse material, apply 7-liters of soil poison per square meter.

(3). Spraying must be done when the foundation bed has been completed and ready for pouring of concrete.

(4). In critical areas such as openings for utility pipes, ducts, conduits, etc, apply additional 5-liters of the solution per linear meter.

(5). For exterior perimeter of foundation bed or at the side of the wall, additional 5-liters of the solution shall be applied per linear meter.

e. Other Areas

(1). Treat all voids of masonry walls such as in concrete blocks and to all surfaces before veneer finishes are placed with 4-liters soil poison per 3-linear meters starting from the footing up and every third layer of concrete block thereafter.

f. Wood Drenching

(1). All lumbers that will be used permanently into the structure must be drenched thoroughly upon delivery and after installation.

(2). Rate of drenching must be observed on wooden boards to avoid being deformed or twisted.

(3). Kiln dried lumber must be treated only after installation.

g. Treatment of Hollow Blocks before Plastering

(1). Concrete hollow blocks, 3-layers above finish grade must be thoroughly sprayed before plastering at the rate enough to penetrate crevices. This is done on both sides of the wall.

5.2.7 Gravel bed

A. Provide 100mm (4") thick crushed gravelbed on compacted subgrade prior to installation of all footing/slab-on-fill reinforcing bars and concrete pouring.

5.3 Concrete and Masonry Works

5.3.1 Steel Bars and Tie-works

A. Standards: Use reinforcing steel conforming with ASTM Standards, deformed for concrete and masonry reinforcements.

B. Hand Grade Deformed Bars: 414 MPa, FY=60,000psi for 16mm diameter and above. Intermediate Grade Deformed Bars: 275 MPa, FY=40,000psi for 12mm dia. and below. All reinforcement bars shall be deformed or otherwise specified. If distances are specified in the plans/drawings do not use undersize reinforcing bars. Use only the size of the ASTM (10mm, 12mm, 16mm, 20mm and 25mm diameters, etc.).

C. Tie Wires: Use Ga. #14 G.I. tie wires, double strands at joints or laps of place reinforcement as indicated in the plans.

5.3.2 Cast-in-Place Concrete

A. Cement: Shall be as per ASTM Standard Specifications for Portland Cement (ASTM Designation C-150 latest revision) Type 1. Use one (1) brand for the whole structural and masonry works. 27.5 MPa (4,000psi) shall be used for all reinforced concrete slabs, columns, beams, column footings, wall footings, reinforced concrete slab of septic vault. Use 20.9MPa (3,000psi) for reinforced concrete slab-on-fill.

B. Aggregates: Gravel-crushed gravel hard uncoated grain, strong, and durable reasonably clean stones. Use 25mmø (1") maximum for footing, 19mmø (3/4") for all beams, slabs, columns and 25mmø (1") for compacted gravel bed for slab on fill.

C. Sand: clean, washed sand. Sand from salt water is not allowed.

D. Water: Fresh and fit for drinking, free from injurious amount of oil, acids, alkali, organic materials, and other deleterious substances.

5.3.3 C-Joist

5.3.4 Masonry

A. Concrete Hollow blocks (CHB): Use 150mm (6") thick for exterior wall and 100mm (4") thick for interior wall, 700 psi for load bearing capacity and 450psi for non-load bearing capacity as indicated in the plans.
B. All concrete hollow blocks shall be laid out with cement mortar as specified with vertical joints breaking half-way over course below unless otherwise shown on plans. Bed joints (horizontal) and joints (vertical) must be filled with mortar thoroughly to avoid leakage or moisture.
C. All concrete hollow block walls shall be built plumbed, true to the given dimension with blocks always set to bond and breaking joints.
D. Class B- 1:3, 17.24 MPa (2,500psi) as concrete mortar works with mix texture as required. Cement mortar shall be one (1) part Portland Cement and shall be done in one (1) part lime putty and four and one-half (4 ½) parts sand by volume, but not more than one (1) part Portland Cement. No cement shall be used for exceeding one hour. Mortar which shows tendency to become dry before this time shall have added to it and be mixed.

5.3.5 Concrete Formworks

A. Check all forms to conform to the shape, lines and dimensions of the members as called for in the plans. The forms shall be substantial and designed to resist the pressure and weight of the concrete, and be properly tied and braced or shored so as to maintain position and shape. They shall be sufficiently tight to prevent leakage of mortar.
B. Check all formwork for the plumbness and correct alignment.
C. Provide openings in column form for cleaning and inspection preferably at lowest point of pour lifts immediately before depositing concrete.
D. Provide camber for cantilever and long span beams or as indicated in construction notes.
E. Always provide continuous vertical supports for framework directly below any pour line. All exposed corners shall be square.
F. Remove form only upon approval of the Engineer in such manner and at such time as to insure the complete safety of the structure. In no case shall the supporting forms and shorings be removed until the members have attained sufficient strength to support safety their weight and load thereon.
G. Exercise due care while stripping forms and protect corners subsequently against shipping or other damage by approved means.

5.4 Metals

5.4.1 Structural Steel

A. All structural steel shall conform to ASTM A-36 steel.
B. All are-welding electrodes shall conform to AWS Specification for Iron and Steel Arc Welding Electrodes latest edition. Electrodes for arc-welding shall be E-60 and E-70 series.
C. All bolts, nuts and washers shall conform to ASTM A-370 and ASTM A-325 specifications.

5.4.2 Miscellaneous

A. Miscellaneous materials or accessories not listed above shall be provided as specified hereinafter the various itself of work and/or indicated on the plans/drawings.

5.5 Wood

5.5.1 Lumber: All lumber shall be of approved quality of the respective kinds required for the various parts of the works and shall be well-seasoned, free from large saps, loose knots, shakes or other imperfections impairing its strength and durability. All exposed surfaces shall smoothly dressed and dried.

A. *Apitong:* Sound and thoroughly seasoned, warp free, pressure treated with approved preservatives smooth and level on one side or wherever in contact with paneling.

B. *Tanguile:* Kiln dried, S4S sound, hard and free from lumber defects. Use one color or shade for assembly framing which are exposed. Use Tanguile KD for wood not specified elsewhere, and other interior or finishing carpentry work.
C. *Frames:* Doors, or other openings where so indicated on plans, shall have frames and sills of the dimensions shown or as indicated on door schedule. Frames in contact with concrete shall be

enclosed by 20d nails, spaced not more than 200mm (8”) on center around the contact surfaces and paint with two (2) coats of mop asphalt.

D. *Fastening:* Fastening shall be common nails flathead wood screws (R.H.W.S), bolts or lag screws where specifically called for. Conceal fastenings as far as possible, locate them in inconspicuous place. Where nailing is permitted through woodwork face, conceal nail heads.

E. *Hardware and Fasteners:* Use metal nails, screws, bolts, miscellaneous fasteners or anchorage concealed or countersunk whenever called for, with size, shape and type to members in place. Use “*Stickwel”* or other approved water-resistant glue for cabinet framing joints.

F. *Coco Lumber Trunk (for back stop)*

5.5.2 Plywood

A. 6mm (¼ “) thk. Class-A Marine Plywood: For woodworks requirements.

B. 19mm (3/4”) thk. Plywood with solid edging: For cabinet requirements.

5.5.3 Built-in Cabinet and Shelves: Fabricate cabinets in accordance with details shown.

A. Make all wood finish, and millwork true to details, clean and sharply defined. Erect cabinets straight, level and plumb and securely anchor in place. Set panels to allow for free movement in case of shrinkage or swelling. Conceal means fastening various parts together. Separate with 6mm (¼ “) stone-cut joints all interior trims set against concrete, masonry or wood. Make mill molding perfectly smooth on exposed surfaces and true to profile. Make joints tight and in a manner to conceal shrinkage. Secure trim with fine finishing nails, screws, or glue where required. Set nails for putty stopping. Install cabinets and closets with complete hardwares.

5.6 MOISTURE AND THERMAL PROTECTION

5.6.1 Damp proofing: Provide 6 mil thick polyethylene sheets as vapor barrier for slab on fill.

5.6.2 Caulking

A. Polyurethane or Silicone sealant, equal to “Bostik, GE, DAP, Dow Corning” or approved equivalent, for all joint gaps between steel/metal and concrete, for joint gaps between lavatory and countertop and where indicated. Provide sealant in accordance with the manufacturer’s recommendations. Apply sealant in continuous manner so as to fill entire width and required depth of joint without voids or air pockets.

5.6.3 Waterproofing: Provide electrometric type, fluid applied waterproofing equal to “Specserv’s Finflex” or “ERN’s Hyflex” or “Weatherguard products” or approved equivalent; for Mezzanine Floor-Balcony and where indicated. Apply waterproofing in accordance to manufacturer’s standard instructions or applications.

5.6.4 G.I. Sheet Roofing

A. Roofing Material: Provide Ga.24, G.I. roofing sheets, equal to or approved equivalent, complete with accessories and necessary fasteners. Provide compatible ridge cap, and flashing, as and where needed.

Color shall be selected from manufacturer’s standard procedure.

B. Provide other materials, not specifically described but required for a complete and proper installation such as wire ties or wind clips, as shown in the detail drawings.

C. Fasteners and Fixations: Use appropriate connectors as recommended by the Manufacturer and approved by the Architect. Paint the same color as to the roof and fascia all exposed fixation and fastening devices. Apply fastener in a neat, consistent, even and standard manner. Apply strip of

butyl rubber based caulking compound/silicone sealant along end lap joints and passing over pre-drilled fixation holes.

5.6.5 Insulation

A. Thermal Batt Insulation: Equal to "CSR" Glasswool Roofing Blanket", lightweight, compressible, insulation manufactured from felted mat of glasswool, bonded with a thermosetting resin; reinforced with factory applied aluminum foil or polypropylene facings adhered on both sides or faces of the blanket; conforming to ASTM C665, and with other requirements indicated below:
   1. Nominal density of 16kg/cu.m.
   2. Nominal thickness of 50mm.
   3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50mm, respectively, conforming to ASTM E-84 and AS1530: Part 3-1989.

5.7 DOORS AND WINDOWS

5.7.1 Doors

A. Provide and install all doors with complete locksets, hinges, and accessories. Use KD for door jambs of locally fabricated panel and plywood flush wooden doors, while aluminum doors shall be supplied complete with aluminum door jambs, standard to manufacturers.
B. Set door frames plumb and level brace until built-in floor.
C. Anchor frames to masonry with approved metal anchors on each side or jamb. Place top and bottom anchors 200mm (8") from head and floor.
D. All lumber for wooden doors including door jambs, and all wood work of similar nature, shall be kiln-dried with not more than 12% moisture content.
E. All wooden doors shall be manufactured with wood stiffener, and of the lumber specified herein, the plywood edge projection shall consist in rabbeting it around into the outside frame of the door in order to prevent "peeling-off" of the plywood at the edges.
F. All wood doors must be guaranteed against warping, twisting or crackling, while aluminum doors must be guaranteed against twisting or denting. This obligates the Contractor to make good such defects and/or replace entirely any and all such defective door (see Door Schedules).
G. Panel and Plywood Flush Type Doors: Panel doors shall be use KD wood while plywood flush doors shall be fabricated from 6mm thick ordinary or marine plywood on S4S wood frame and provided with louvers or fabricated in accordance with the designs shown on the drawings and standard to Wood Door Manufacturer equal to "Pateo", "Mastercraft", or "Luxacraft" or approved equivalent. Provide complete with KD wood door jambs and hardware.
H. Aluminum Framed Glass Doors: Frame members shall be designed as shown in the drawings and as per manufacturer's standard sections. Aluminum frame shall be fluorocarbon or pvdf finish with color to be selected or as indicated. Provide complete with hardware such as door lock, hinges, etc. Aluminum Framed Glass door manufacturers/fabricators shall be equal to "Wall Vision Corp.", "Glass Asia Corp." or "Pacific Glass Corp.".

5.7.2 Windows

A. Aluminum Framed Glass Sliding, Awning, and Fixed Glass type Windows Frame members shall be designed as shown in the drawings and as per manufacturer's standard profiles/sections. Aluminum frame shall be fluorocarbon or pvdf finish, with color to be selected. Provide appropriate thickness of tinted or clear, tempered and annealed type glass panels or as indicated on the drawings. Aluminum Framed Glass window manufacturers/fabricators shall be equal to "Wall Vision Corp.", or "Glass Asia Corp." or "Pacific Glass Corp.".

5.7.3 Finish Hardware

A. *Locksets:* Equal to "Yale" or "Schlage" brands, cylindrical bored type for all Wooden doors, keyed entry function, stainless steel finish or as directed by the Architect.

B. *Hinges:* Equal to "Yale" or Stanley" brands, 3 ½" x 3 ½" ball bearing type, loose pin, stainless steel finish, three pieces for Wooden doors.
C. *Door Closer:* Shall be equal to "Yale" brand, aluminum finish, to be provided on areas identified.

5.8 PAINTING

A. Painting materials shall be "Boysen" or "Davies" or "Dutch Boy". Use one (1) brand only for the whole structures. All exposed finish hardware, lighting fixtures and accessories, plumbing fixtures and accessories, glass works and the like shall be protected so as not to stain with paint and other painting materials prior to painting works. All other surfaces which would be endangered by stains and paint marks should be taped and covered with craft paper or equal and as specified hereunder or as per manufacturer's direction.

5.8.1 Metal Surfaces

A. Steel and Galvanized Steel Surfaces
1st coat – Epoxy Paint Primer
2nd coat – Epoxy Paint
3rd coat – Epoxy Paint

5.8.2 Concrete and Plastered Masonry

A. Plain Finish
1st coat – Concrete Primer and Sealer
Intermediate coat – Acrylic Latex Paint, Semi-gloss
2nd coat - Acrylic Latex Paint, Semi-gloss

5.9.3 Wood Surfaces

A. Enamel semi-gloss finish
1st coat – Alkyd Flatwall Enamel
2nd coat – Semi-gloss Enamel
3rd coat – Semi –gloss Enamel

B. Stain finish for other stain requirements:
1st coat – "Xyladecor"
2nd coat – "Xyladecor"

C. Duco finish for wood door, jambs, etc.
1st coat – Lacquer Primer Surfaces

Intermediate coat – Spot Putty

2nd coat – Lacquer Primer Surfaces

3rd coat – Automotive Lacquer (2 coats)

5.9.4 Plywood Surfaces

A. Enamel semi-gloss finish for all gypsum board ceiling finishes.

1st coat – Alkyd Flatwall enamel

2nd coat – Glazing Putty

3rd coat – Semi-gloss Enamel

5.9.5 PLUMBING FIXTURES & ACCESSORIES

A. All rough-in pipes and fixtures shall be laid simultaneously with the construction of the masonry and concrete slabs. Hence, no sanitary and plumbing pipes shall be exposed. Provide and install at all Toilets color and model as approved by the Architect. All fixtures shall be equal to "American

Standard" or "SMT" or approved equivalent. Include necessary accessories such as seat and cover, p-traps, angle valve, etc. to complete the requirements of the toilet/plumbing fixtures.

5.10.1 For Toilets

A. Water Closets: Vitreous China, flush valve type, elongated front, equal to "American Standard New Cadet II 101-3159" color to be selected: For all Toilets.
B. Urinals: Vitreous China, flush valve type, equal to "American Standard Washbrook Junior 101-6507, color to be selected: For all Made Toilets.
C. Lavatories: Vitreous China, under-the-counter type, equal to "American Standard Ovalyn 201.1470", color to be selected: For all Toilets.

Provide necessary angle control valve and p-trap and other accessories to complete the lavatory system.

5.10.2 Fittings

A. Lavatory Faucets: Chrome finish, single tap, single hole lavatory faucet, equal to "American Standard Cool Tap Metered 302-8001-00-9410" for all lavatories.
B. Flushing System: Equal to "American Standard" or "Toto" or "Sloan" brands: For flush valve type waterclosets and urinals.

5.10.3 Accessories

A. Framed mirror: 6mm thick plate glass mirror electrolytically copper plated; with Type 304 stainless steel angle frame with stain finish; furnish with mounting brackets and screws; equal to "ASI 0620"; size of which shall be 600mm high and length to be determined as to agree with countertop configuration.
B. Soap Dispenser: Shall be wall mounted of chrome plated brass bracket, interval valve parts ABS and acetal plastic white polyethylene; dispenses antiseptic solutions and soaps; 16 ounce capacity; equal to "ASI 0350": For all Toilets.
C. Grab Bars: Shall be surface mounted 18 gauge, type 304 stainless steel with penned non-slip gripping surface, stain finish flange and end of bar, with concealed mounting; horizontal two-wall toilet compartment, tub/shower bar; equal to "ASI 3000P Series, Type 60": For Handicapped Toilet.
D. Electric Hand Dryer: Shall be surface mounted; ¼" thick cast iron cover with exposed surface of acid resistant porcelain enamel; chrome plated die cast nozzle; 1/8 HP motor, 3200 RPM, thematically protected; 2300 watts; no-touch operation; equal to "ASI 0153" or "American Standard A15-S003".
E. Toilet Paper Holder: Shall be provided by the Toilet Partition manufacturers/supplier.

5.10.4 Toilet Partitions

A. Partitions, doors and plasters shall be fabricated from double faced, autoclaved high density cellulose fiber cement or wood particle board core or solid compact laminated panels, equal to "G.S. Go's Willy", "Jebsen's Bescube" or locally produced high pressure laminate-glass smooth sheet, equal to "Hubert De Joya's Crystallinus" wall hung type, of dimension as shown in the drawings. Provide toilet partition system complete with stainless steel fittings, accessories and anchorage. Robe hooks and toilet paper holder shall be provided as a standard to toilet partition manufacturer/supplier. Install at all Male and Female Toilets.

PART – 6 LABOR

6.0 It is understood that the work shall be done and executed in accordance to the good engineering methods and practices.

6.1 The Contractor shall and thereby warrants all work performed by him directly and for which guarantee are required. The Contractor shall and hereby warrants and/or guarantees for a period of one year, or for longer periods where so provided in this Specifications, evidenced by date of final certificate issued

by the Architect, all materials and workmanship installed under Contract to be of good quality in every respect and to remains so for periods described herein.

6.2 Such any defects develop in aforesaid work, within the specified periods, due to faults in material and/or workmanship, the Contractor thereby agrees to make all repairs and do all necessary work to correct defective work to the Architect's satisfaction. Such repairs and corrective works shall be done without cost to the Owner and at entire cost and expense of the Contractor.

PART – 7 ALTERATION

7.0 Any alterations and revisions from the Plans/Drawings and Specifications done without the knowledge of the Engineer/Architect, that may impair the strength and/or the aesthetic of the project is not the liability of the Architect, but shall be borne by the General Contractor instead.

SECTION 42A – ELECTRICAL WORKS (BUILDING) Page EW- 40 / 9

01 SCOPE OF WORK

The Contractor shall provide all materials and equipment and perform all the works necessary for the complete execution of all the electrical plans as shown on the Electrical Drawings, and as herein specified, or both, except as otherwise excluded and which, without excluding the generality of the foregoing shall include but not limited to the following principal items of work:

a. Supply and installation of complete electrical conduit and wiring for light and power.
b. Supply and installation of lighting fixtures, outlets and wiring devices;
c. Supply and installation of electrical panels;
d. Supply and installation of complete fire alarm system;
e. Supply installation of BGM/Paging alarm system.
f. Supply and installation of telephone system, terminal cabinets, station wiring and cables.
g. Supply and Installation of cable TV (CATV)
h. Termination of all electrical system and the complete grounding system;
i. Complete testing and commissioning of all electrical and auxiliary works; and
j. If anything has been omitted for any item of work or materials usually furnished which are necessary for the completion of the entire work as outlined herein before, then such items must be and hereon included in this division of work.

42.02 EXECUTION AND INSTALLATION WORKS

The work under this contract shall be in accordance with the provisions of the latest edition of the Philippine Electrical Code and in compliance with the requirements of the local utility company.

42.03 CODES, INSPECTION, PERMITS AND FEES

All permits and electrical fees required for this work shall be obtained at the expense of the Contractor. The contractor shall furnish the Engineer final Certificates of Inspections and approval from the proper government authorities after the completion of work. The Contractor shall prepare all as built plans and all other paper works as required by the enforcing authorities.

42.04 GUARANTEE

The Contractor shall guarantee that electrical system are free from all grounds and from all defective workmanship and materials and will remain so for a period of one year from the date of acceptance of

the work. Any defects, appearing within the aforesaid period, shall be remedied by the Contractor at his own expense.

42.05 RECORD DRAWING

The Contractor shall, during the progress of the work, keep a careful record of all changes where the actual installation differs from that shown on the Contract Drawings. Upon completion, the Engineer will be furnished at no cost a complete set of sepia prints on which the Contractor shall, in a neat and accurate manner make a complete record of all changes and revisions to the original design, as installed in the completed work. This drawing shall be submitted to the Engineer for approval. After approval they shall become the property of the Authority. Final payment may be withheld until receipt of the approved record drawings.

42.06 SHOP DRAWINGS AND SAMPLES

Prior to any installation works, prepare and submit for approval shop drawings and cuts of all equipment, appliances and fixtures to be furnished. After final approval by the Engineer, a sufficient number of copies as directed shall be furnished for distribution. Fixture and device cuts and/or catalogues shall be clearly marked to indicate the items furnished.

Submit to the Engineer for approval, samples of conduit, wire, wiring device, and finished plates and of any items as may be requested by the Engineer.

42.07 APPROVALS, SUBSTITUTION, etc.

Wherever, hereinafter the words “for approval” or approved (make type, size, arrangement, etc.) are used, specially in regard to manufactured specialties, etc. or wherever it is decided to be substituted by a different make or type of apparatus for which it is specified, all information pertinent to the adequacy and adaptability of the proposed apparatus, shall be submitted to the Engineer for approval.

42.08 WORKMANSHIP

The work throughout shall be executed in the best and most through manner under the direction of and to the satisfaction of the Architect who will interpret the meaning of the Drawings and Specifications and shall have power to reject any work and materials which in his judgment, are not in full accordance therewith.

42.09 STANDARD OF MATERIALS

All materials shall be new and shall conform to the standards of Underwriter’s Laboratories, Inc., IEEE, NEMA and Philippine Standard Agency (PSA) for every case where such a standard has been established for the particular type of materials in question.

All materials on all systems shall comply with the specifications, unless specially accepted and all material where not specified shall be of the best of their respective kind.

42.10 APPROVAL OF MATERIALS

All electrical materials shall be new and shall meet the requirements and shall bear the inspection label wherever standards have been established. Before any materials or equipment are ordered, the Contractor shall submit to the Engineer for approval, a complete list of the materials, apparatus, and equipment, in triplicate, giving the manufacture’s name, address, descriptive data, trade name of item,

rated capacities, certified analysis, catalogue numbers, etc., and when called upon to do so, complete specifications and cut of drawing of each item, of whole or portion of list, as required by the Engineer which he proposed to use and install.

42.11 GROUND TEST

The entire installation shall be free from improper grounds and from short circuits. Tests shall be made in the presence of the Engineer. Each panel shall be tested with mains connected to the feeder and branches, all fixtures in place and permanently connected, lamps removed or omitted from the sockets and all switches closed. Each individual power and intended operation. In no case shall the resistance be less than that allowed by Article 2.3 of the Philippine Electrical Code. Failure shall be corrected in a manner satisfactory to the Engineer.

42.12 PERFORMANCE TEST

It shall be the responsibility of the Contractor to test all system, of the entire electrical installation for proper operational condition. This condition shall apply to the power and lighting installation as well as low voltage and alarm control, signal and communication systems. Where sequence operation is required, the Contractor shall test for proper sequence of the entire electrical installation for satisfactory working condition as approved by the Engineer.

42.13 SUPERVISION OF ELECTRICAL WORK

Equipment: Furnish services of manufacturer's representative or other especially qualified persons as necessary to supervise equipment installation when regular full-time supervisors are not otherwise fully familiar thereof.

Supervisory Personnel: Maintain at premises of work for as long as necessary to continuously supervise all of various phases of work required, including installations and for instruction of Engineer operations and for instruction of operating personnel.

42.14 COMPLETION REQUIREMENT

Remove waste and debris resulting from this work, as progress and upon completion. Service and adjust moving of mechanical parts for smooth, quiet and proper operating condition. Touch-up abraded or damaged prime painting or galvanizing and leave clean and ready for finishing work required.

42.15 TRADE/BRAND NAMES

Trade/brand names of equipment are intended only to show the required degree of standardization on which the design of the particular work is based and also to avoid ambiguous description of the equipment. The indication of the trade/brand names, thereof shall in no way be considered to limit the acceptability of other products of equal or better performances, functions, reliability and durability.

42.16 LIGHTING SYSTEM

The Contractor shall provide labor and materials for the installation of lighting systems to be included but no limited to the following.

a. A system of exterior and interior lighting including all feeders, branch circuits and connections to all lighting outlets and fixtures.
b. All distribution and lighting panels complete.

. c. If anything has been omitted in any item of work or material usually furnished which are necessary for the completion of the lighting system work as outlined hereunder, then such item must be and hereby included in this section of the work.

d. The Contractor shall provide and install all lighting fixtures of the size and type as indicated in the drawings.

e. All fixtures shall be wired and installed completely including all lamps and/or tubes, transformers, ballasts, support, brackets, canopies, globes, and other parts and devices necessary for the complete installation and operation.

42.17 FLUORESCENT FIXTURES AND LAMPS

All fluorescent fixture units shall be complete with lamps, daylight, pre-heat, 15 to 40 watt tubes, high power factor type ballasts, and heavy duty type lampholders.

Ballasts shall be high power factor, not less than 0.85, pre-heat type as manufactured by General Electric Company, Philips or equivalent.

Fixtures with disturbing noise level shall be removed and replaced as directed by the Engineer.

42.18 LIGHTING SYSTEM EXECUTION

The lighting shall be complete in every respect, all as indicated in the plans or specified. Fixtures in general shall be supported by means of heavy factory formed steel straps attached to the outlet boxes, attached by means of threaded stem with locknuts or by means of machine screws to formed straps.

Each lighting outlet shall have standard deep 100 mm. octagonal or square box for each ceiling and bracket fixture installation. Each box shall finish flush against concrete and plaster walls or ceiling, except for exposed work. All materials shall be as indicated.

42.19 RELAMPING

The Contractor shall furnish and install all lamps for entire lighting fixture installations and shall replaced all broken or burned out lamps up to the time that Owner takes final acceptance of the work.

42.20 WALL SWITCHES

Wall switches shall be rated at 10 amperes, 250 volts, one-way or three-way as required. The type of switch shall be tumbler or snap-on as required. National brand or equivalent. Where switches are installed surface mounted, they shall be installed in type FS conduit fittings and provided with surface mounting covers. Switches shall not are during switching operations. Wall switches shall be mounted 1400 mm from finish floor.

42.21 RECEPTACLES

Receptacles outlets shall be for flush mounting, duplex rated at 15 Amperes, 125/250 volt connection, National or equivalent. Type and color or receptacle outlet plates shall be as selected by the Engineer and appropriate samples of outlet and plates shall be submitted prior to purchase of device. Weatherproof outlet shall be National or Eagle brand. Wall receptacles shall be mounted 300 mm from floor finish unless otherwise indicated in the plan.

42.22 OUTLET AND SWITCH BOXES

At all outlets or whatever kind of all systems there shall be provided suitable outlet boxes or other fittings specially designed to receive the type of devices to be mounted thereon.

All outlet boxes shall be pressed metal boxes with metal thickness not less than gauge 18.

All metal parts of outlet boxes shall be galvanized and shall have covers having thickness as the box with screws attached.

Boxes installed in damp or wet locations shall be specially approved for the purpose and shall be placed and constructed as to prevent moisture from entering or accumulating within the box.

In walls or ceiling constructed of wood, concrete or other similar, boxes and covers shall be flushed with finished surfaces. Number of wires and devices contained in the box shall be in accordance with the Code. Where necessary flush square outlet boxes shall be fitted with extension rings or raised coverlets.

Boxes shall be securely and rigidly fastened to surface upon which they are mounted or embedded in concrete or masonry, and shall be supported from a structural member or building either directly or by using substantial and approved metal braces.

Outlet boxes installed exposed other than in wet locations shall have thickness not less than gauge 16 while boxes concealed above closed ceiling and those embedded in masonry shall have a thickness of gauge 18, hot dipped galvanized.

Standard outlet boxes shall be of the octagonal, square or rectangular shapes and only deep types no less than 54 mm. depth shall be used for all installation.

42.23 CONDUITS

Unplasticized Polyvinyl Chloride (PVC) conduits shall be schedule 40, uniform thickness. It shall be compression and impact resistant, non corrosive, weatherproof as manufactured by Emerald or equivalent. The material shall not deteriorate when exposed to sunlight, rain and other elements.

Liquidtight flexible metallic conduit shall be raintight suitable for wet and damp locations complete with special fittings and connectors approved for the purpose.

42.24 INSTALLATION OF CONDUIT SYSTEM

Conduit shall be installed and supported in a rigid and satisfactory manner.

No conduit shall be used in any system smaller than 15 mm. (1/2 inch.) diameter trade size, nor shall have more than four quarter bends in any one run between outlets and/or fittings. When necessary pullboxes shall be provided as directed by the Engineer.

All cut ends of conduit shall be reamed to remove rough edges. Where a conduit enters a box or fitting, bushing shall be provided to protect wire from abrasion, unless design of box or fittings is such as to afford equivalent protections.

Raceways shall be installed at right angles or parallel to building lines. Conduit shall be firmly fastened within 0.3m. of each outlet box fitting or cabinet by means of standard clamps and intermediately spaced no more than 1.0 meter. All clamps, bolts, straps, etc. shall be galvanized and painted metal.

Support and braces may be welded to structural steel after specific approval by the Engineer. When running over concrete surfaces, the screws shall be held in place by expansion sleeves.

42.25 WIRES AND CABLES

600 volt grade wire shall be copper, hard drawn and annealed and shall be of 98% conductivity.

Wire or cable for lighting and power systems shall be plastic insulated type TW, THW or THHN as noted on plans or as specified. All wires 3.5 sq.mm. and larger shall be stranded unless noted on plans.

No wire smaller than 3.5 sq.mm. shall be used except where otherwise specified. Control leads for motors shall be type THW, unless otherwise indicated.

All wires shall be color coded (Black, Red, Yellow, Green) wires and cables shall be as manufactured by Phelp Dodge, Phil flex or equivalent.

Undergrounded conductors shall have distinct insulation color from grounded and grounding wires. Grounding wires and cables shall be colored green or white or as approved by the Engineer.

42.26 CABLE CONNECTORS

The connection of conductors from size 8 sq.mm. and larger shall be made with copper, solderless, pressure type connectors. Connection shall be done without damaging the individual cable strands. Connectors shall be provided where required, with high impact phenolic insulators or fish paperboards separators.

42.27 INSTALLATION OF WIRE AND CABLE

Conductors or cable shall not be installed in conduits, raceway until such systems has been completed, nor it be installed until the inside of conduit has been cleaned.

The Contractor shall exercise due care to prevent damage to conductors, insulation or sheeting when pulling wires and cables.

All feeder cables installed shall be continuous from origin to panel or equipment terminations without running splices in handhole or pullbox except where taps and splices are approved by the Engineer using suitable connectors.

Wires and cables for power and lighting shall be in separate conduit from any wires or cables for communication and signal systems.

Where cable passes through building exterior walls and underground identification tags of non-corrosive materials shall be stamped on each end and every route. Wires and cables inside panelboards and control boxes shall be binded by means of plastic straps in a heat and orderly manner.

42.28 GROUNDING SYSTEM

The following electrical systems and equipment shall be grounded:

a) Enclosures, casing and metallic bases of all electrical equipment including transformer cases and neutrals, electric motors, electric generators, water heaters, and others.

b) All powernpanel from Main Distribution Panel to Lighting Power Panels shall have suitable and effective grounding.

Each and every panel shall be provided on the side of the door, with directory frame protected by a transparent plastic window, containing typed card indicating from member and designation of the circuits.

All panels and switchboard shall have grounding bus or lugs with pressure type terminals of sufficient quantity and size and so located inside as to permit easy termination of cables.

Panels, switchboard and MCC's shall be painted with coat of antirust primer and finish coat of baking enamel paint preferably colored gray.

42.32 CIRCUIT BREAKERS

Circuit breakers shall consist of quick-make, quick break operating mechanism, thermal magnetic trip unit on each pole and enclosed in a molded phenolic case. The thermal magnetic trip unit shall provide time delay overload protection in case of overload and instantaneous trip for short circuit condition in any one pole.

Rating of circuit breaker shall be suitable for each service application and shall be specified as to rated voltage, current type, frame, size and frequency as manufactured by Westinghouse or equivalent.

42.33 INSPECTION TESTS

Inspection and tests shall be conducted by the Contractor in the presence of the Engineer. These tests shall be for the normal operation of the entire electrical system of the project. the decision made by the Engineer for correction on any item of work, alteration of incorrect installation, or replacement of defective materials, or any other defects as found by him shall be final and must be complied by the Contractor within forty-eight(48) hours after receipt of the official written communication before final acceptance can be made.

42.34 TEMPORARY LIGHT AND POWER

The Contractor shall provide, install and maintain adequate incoming service transformer, light feeders, branch circuits, outlets, lamps and fixtures, as required for performance of the work by all trades engaged in the construction of the building structures and installation.

SECTION 24 – ROADS AND PAVEMENTS Page RAP-46

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24.01 SCOPE OF WORK

The works include the furnishing of all labor, materials and equipment required for the preparation of subgrade, construction of subbase course, base course, asphalt pavement and concrete pavement together with concrete curb and gutter and sidewalks. The works shall be accordance with the lines and grades shown on the Drawings or as directed by the Engineer and in conformity with these Specifications.

24.02 MATERIALS REQUIREMENTS

24.02.1 Subgrade

Unless otherwise stated in the Contract and except when the Subgrade is in rock cut, all materials below subgrade level to a depth of 150 mm or to such greater depth as may be specified shall meet the requirements of Clause 8.2.2.

24.02.2 Aggregate Subbase Course

Aggregates for subbase shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed or natural gravel and filler of natural or crushed sand or other finely divided mineral matter. The composite materials shall be free from vegetable matter and lumps or balls of clay, and shall be of such nature that can be compacted readily to form a firm, stable base.

The subbase material shall conform to the grading requirements given in Table 24.1.

Table 24.1 Subbase Grading Requirements

Sieve Designation		
Standard	Alternative	
MM	US Standard	Mass Percent Passing
50.0	2”	100
25.0	1”	55-85
9.5	3/8”	40-75
0.075	No.200	0-12

The fraction passing the 0.075 mm (No.200) sieve shall not be greater than 0.67 (two-thirds) of the fraction passing the 0.425 mm (No.40) sieve.

The fraction passing the 0.425 mm (No. 40) sieve shall have a liquid limit not greater than 25 and plasticity index not greater than 6 as determined by AASHTO T 89 and 90, respectively.

The coarse portion retained on a 2.0 mm (No. 10) sieve, shall have a mass percent of wear not exceeding 50 by the Los Angeles Abrasion Test as determined by ASSHTO T 96.

The material shall have a soaked CBR value of not less than 25% as determined by AASHTO T 193. The CBR value shall be obtained at the maximum dry density as determined by AASHTO T 180, method D.

24.02.3 Crushed Aggregate Base Course

It shall consist of hard, durable particles or fragments of stone or gravel crushed to the size and of the quality requirements of this Clause. It shall be clean and free from vegetable matters, lumps or balls of clay and other deleterious substances. The material shall be of such nature that it can be compacted readily to form a firm, stable base.

The base material shall conform to the grading requirements of Table 24.2 whichever is called for in the Bill of Qualities.

Table 24.2 Base Course Grading Requirements

Sieve Designation		Mass Percent Passing	
Standard	Alternative	Grading	Grading
MM	US Standard	A	B
37.5	1-1/2”	100	-
25.0	1”	-	100
19.0	3/4”	60 - 85	-
12.5	½”	-	60 - 90
4.75	No.4	30 - 55	35 - 65
0.425	No.40	8 - 25	10 - 30
0.075	No.200	2 - 14	5 - 15

The portion of the material passing the 0.75 mm (No. 200) sieve shall not be greater than 0.067 (two/thirds) of the fraction passing the 0.425 mm (No. 40) sieve.

The portion of the material passing the 0.425 mm (No.40) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 6 as determined by AASHTO and 90, respectively.

The coarse aggregate retained on a 2.00 mm (No.10) sieve shall have a mass percent of wear not exceeding 45 by the Los Angeles Abrasion Test as determined by AASHTO T 96, and not less than 50 mass percent shall have at least one (1) fractured face.

The material shall have a loss of less than 12 percent when subject to five cycles of the Sodium Sulfate Soundness Test according to AASHTO T 104.

The material passing the 19 mm (3/4 inch) sieve shall have a minimum soaked CBR- value of 80% tested according to AASHTO T 193. The CBR-value shall be obtained at the maximum dry density determined according to AASHTO T 180, Method D.

If filler, in addition to that naturally present, is necessary to meet the grading requirements or for satisfactory bonding, it shall be uniformly blended with the crushed base course material on the road or in a pugmill unless otherwise specified or approved. Filler shall be obtained from sources approved by the Engineer, free from hard lumps and shall not contain more than 15 percent of material retained on the 4.75 mm (No. 4) sieve.

24.02.4 Portland Cement Concrete Pavement

1. Cement

Portland cement shall conform to the requirement of Section 21 “Reinforced Concrete”

2. Fine Aggregate

The fine aggregate shall be well-graded from the course to fine and shall conform to the requirements of Section 21.

3. Coarse Aggregate

Coarse aggregate shall conform to the requirements of Section 21

4. Water

Clean, fresh potable water shall be used for the mixing of all concrete and mortar shall be from a source approved by the Engineer. Sea water or brackish water shall not be used.

5. Admixture

Admixture shall only be used with the written permission of the Engineer.If air-entraining agents, water reducing agents, set retarders or strength accelerators are permitted to be used, they shall not be used in greater dosages than those recommended by the manufacturer, or as permitted by the Engineer. The cost shall be considered as already in the Contractor's unit cost bid for concrete.

6. Tie Bars and Dowels

Tie bars for joints shall be deformed steel bars conforming to the requirements specified in AASHTO M 31 or equivalent, sizes as indicated on the Drawings or as approved by the Engineer. The deformed steel bars shall be Grade 40 and shall be shipped in standard bundles, tagged and marked in accordance with the Code of Standard practice of the Concrete Reinforced Steel Institute.

Dowel bars shall be plain steel bars conforming to the requirements specified in AASHTO M 31 or equivalent.

7. Joint Filler

Poured filler for joint shall conform to the requirements of AASHTO M173.

Preformed fillers for joints shall conform to the requirements of AASHTO M33, AASSHTO M 153, AASHTO M 213 or AASHTO M 220 whichever is specified in the Drawings or ordered by the Engineer. The filler for each joint shall be furnished in single piece for the depth and width required for the joint unless otherwise authorized by the Engineer.

24.02.5 Curb and Gutter

1. Class of Concrete

Concrete material shall conform with the requirements of Section 21 "Reinforced Concrete"Minimum 28 days comprehensive strength : 24 MPA

Maximum Aggregate size : 25 mm.

Maximum Water-Cement Ratio : 0.52

2. Mortar Base

Cement mortar shall be composed of one (1) part Portland cement and three (3) parts fine aggregate by volume and sufficient water to make the mortar of such consistency that can be handled easily and spread with a trowel.

3. Base Course Material

Base course material shall be crushed aggregate conforming to Clause 24.02.3.

4. Join Filler

Expansion joint filler shall be preformed conforming to the requirements of AASHTO M 153 or M 213.

24.02.6 Concrete Sidewalk

1. Class of Concrete

Concrete materials shall conform with the requirements of Section 21 "Reinforced Concrete"

Minimum 28 days comprehensive strength	:	24 MPA
Maximum Aggregate size	:	25 mm.
Maximum Water-Cement Ratio	:	0.52

2. Expansion Joint Filler

Unless otherwise ordered, the performed joint filler shall have a thickness as indicated on the Drawings or as approved by the Engineer and shall conform with the requirements prescribed under Sub-clause 24.2.5.4.

3. Forms

Forms shall be wood or metals as approved by the Engineer and shall extend to the full depth of the concrete. All forms shall be straight, free from warp and of adequate strength to resist distortion.

4. Base Course

Base Course Material shall be crushed aggregate conforming with the requirements in Sub-clause 21.2.2.3

24.02.7 Asphalt Pavement

Material specifications for asphalt pavement shall be based on Item 310.Bituminous concrete surface course, hot laid of the DPWH Standard Specifications for highways, bridges and airports.

24.03 METHOD OF CONSTRUCTION

24.03.1 Subgrade Preparation

24.03.1.1 Prior Works

The Contractor shall clear all areas for roads and surfacing of all trees, stumps, bush, roots vegetation and other objectionable materials. All culverts cross drains, ducts (including their fully

compacted backfill), ditches, drains and drainage outlets shall be completed before commencing the preparation of subgrade.

24.03.1.2 Subgrade in Cutting of Common Material

Unless otherwise specified, all materials below subgrade level in earth cuttings to a depth of 150 mm or other depth shown on the Drawings or as directed by the Engineer shall be excavated. The materials, if suitable, shall be placed to one side for future use. Unsuitable filling materials shall be disposed of properly outside the area of work.

When material has been removed from subgrade level, the base of the resulting cut shall be compacted to a depth of 150 mm to a uniform density of not less than 95 mass percent of the maximum as determined by AASHTO T 99 Method C.

24.03.1.3 Subgrade on Fill

After the fill has been completed, the full width shall be conditioned by removing any soft or other unstable material that will not be compacted properly. The resulting areas and all other low sections, holes or depressions shall be brought to grade with suitable materials. The entire roadbed shall be then shaped and compacted in accordance with the requirements of Sub-clause 24.3.1.2 scarifying, blading, dragging, rolling or other methods of works shall be performed or used as necessary to provide a thoroughly compacted roadbed shaped to the cross section shown on the Drawings.

24.03.1.4 Subgrade of Existing Pavement

Where the new pavement is to be constructed immediately after removal of an existing concrete pavement and if so specified in the contract, the slab shall be broken into pieces with greatest dimensions not more than 500 mm and the existing pavement material recompacted or disposed of as directed by the Engineer.

The resulting subgrade level shall, as part of pavement construction be shaped to conform to the required tolerances as stated in Sub-clause 24.3.1.7 by placing and compacting where necessary a leveling course comprising of materials of the pavement course to be placed immediately above.

Where the new pavement is to be constructed immediately over an existing asphalt or concrete pavement and if so specified in the Drawings, the pavement shall be broken-up, scarified, thoroughly loosened, reshaped and recompacted in accordance with the requirement of Sub-clause 24.3.1.2. The resulting subgrade level shall conform to the allowable tolerance prescribed in Sub-clause 24.3.1.7.

24.03.1.5 Proof Rolling

Unless otherwise ordered by the Engineer, a variable-load pneumatic tired roller shall be used to proof roll the subgrade. The roller shall have a load variable within the range of (at least) from 10 to 45 tonnes, on an overall width not greater than 3.2 m and shall have tires whose pressures are variable up to less than 620 KN per square meter. The wheels shall be in one row and shall be capable of considerable vertical movement relative to each other without appreciable variation in loading either by each supporting a separate ballast unit, or by virtue of an efficient interconnecting suspension system. The ballast shall be in a form which permits rapid adjustment of load.

The total loaded weight and tire pressure used at any time shall be as directed by the Engineer. The pneumatic tired roller shall not be towed over completed subbase or surfacing without prior approval of the Engineer on each occasion. The proof rolling shall consist of one pass of the roller along the center of each lane of the travel way.

24.03.1.6 Protection of Completed Works

Any part of the subgrade that has been completed shall be protected and any damage resulting from negligence on the part of the Contractor shall be repaired by him as directed by the Engineer without additional payment.

The Contractor shall be responsible for all the consequence of traffic being admitted to the subgrade. He shall repair any ruts or ridges occasioned by his own traffic or that of others by reshaping and recompacting. He shall limit the amount of subgrade preparation to an area that can be maintained with the equipment available. He shall arrange for subgrade preparation and subbase placing to follow each other closely.

The subgrade when prepared too soon in relation to the laying of the subbase, is liable to deteriorate, and in such case, the Contractor shall, without additional payment, repair, reroll or re-compact the subgrade as may be necessary to restore it to the state specified herein.

24.03.1.7 Templates and Straightedges

The Contractor shall provide for the use of the Engineer, satisfactory templates and straightedges in sufficient numbers to check the accuracy of the works, as provided in Specification.

24.03.1.8 Subgrade Tolerance

The finished compacted surface of the subgrade shall conform to the allowable tolerance as specified hereunder:

a) Permitted variation from design	20mm
level of surface	30mm
b) Permitted surface irregularity	30mm
measured by 3m straightedge	
c) Permitted variation from design	1- 0.5%
crossfall or camber	
d) Permitted variation from design	1- 0.1%
longitudinal grade over 25mm length	

24.03.2 Aggregate Subbase Course

24.03.2.1 Preparation of Existing Surface

The existing surface shall be graded and finished as provided under Clause 24.3.1 “Subgrade Preparation” before placing the subbase material.

24.03.2.2 Placing

The aggregate subbase material shall be placed as a uniform mixture on a prepared subgrade in a quantity which will provide the required compacted thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

Placing of material shall begin at the point designated by the Engineer. Placing shall be from vehicles especially equipped to distribute the material in a continuous uniform layer or window. The layer or window shall be such size that when spread and compacted the finished layer shall be reasonably in close conformity to the nominal thickness shown on the Drawings.

When hauling is done over previously placed material, hauling equipment shall be dispersed uniformly over the entire surface of the previously constructed layer to minimize rutting or uneven compaction.

24.3.2.3 Spreading and Compacting

When uniformly mixed, the mixture shall be spread to the plan thickness for compaction. When the required thickness is 150 mm or less, the material may be spread and compacted in one layer. Where the required thickness is more than 150 mm, the aggregate subbase shall be spread and compacted in two or more layers of approximately equal thickness and the maximum compacted thickness of any one layer shall not exceed 150 mm. All subsequent layers shall be spread and compacted in similar manner.

The moisture content of subbase material shall be adjusted prior to compaction by watering with approved sprinklers mounted on trunks or by drying out, as required in order to obtain the required density.

Immediately following final spreading and leveling, each layer shall be compacted to the full width by means of approved compacted equipment. Rolling shall progress gradually from the sides to the center, parallel to the centerline of the road and shall continue until the whole surface has been rolled. Any irregularities or depressions that develop shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform. Along curbs, headers and walls and at all places not accessible to the roller, the subbase material shall be compacted thoroughly with approved mechanical tampers or compactors.

If the layer of subbase material or part thereof, does not conform to the required finish, in the opinion of the Engineer, the Contractor shall, at his own expense, make the necessary corrections.

Compaction of each layer shall continue until field density of at least 100 percent of the maximum dry density determined in accordance with AASHTO 180, Method D has been achieved. In-place density determination shall be made in accordance with AASHTO T 191for every 300 square meters.

24.03.2.4 Trial Sections

Before subbase construction is started, the Contractor shall spread and compact trial section directed by the Engineer. The purpose of the trial section is to check the suitability of the material and the efficiency of the equipment and construction method which is proposed to be used by the Contractor. Therefore, the Contractor must use the same for the same material, equipment and procedures that he proposed to use for the main work. One trial section of about 500 sq.m shall be made for every type of material and/or construction equipment/procedure proposed for use.

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

If a trial section that the proposed materials, equipment or procedures, in the Engineer's opinion, are not suitable for subbase, the material shall be removed at the Contractor's expense and a new section shall be constructed.

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

24.03.2.5 Tolerance

Aggregate subbase shall be spread with equipment that will provide a uniform layer which when compacted will conform to the designed level and transverse slopes as shown on the Drawings. The allowable tolerance shall be as specified hereunder:

a)	Permitted variation from	+	
	Thickness of layer	-	20mm
b)	Permitted variation from	+	10mm
	Design level of surface	-	20mm
c)	Permitted surface irregularity	+	
	Measured by 3-m straight-edge	-	20mm
d)	Permitted variation from	+	
	Design crossfall or camber	-	0.3%
e)	Permitted variation from		
	Design longitudinal grade	+	
	Over 25 m length	-	0.1%

24.03.3 Crushed Aggregate Base Course

24.03.3.1 Prior work

Crushed aggregate base course shall be placed on top of completed and accepted subbase course.

24.03.3.2 Placing

It shall be placed in accordance with all the requirements of Sub-Clause 24.3.2.2.

24.03.3.3 Spreading and Compacting

It shall be in accordance with all the requirements of Sub-Clause 24.3.2.3 and that the field density required for each layer is not less than 100 % of the maximum dry density as determined in accordance with AASHTO 180 Method D. The field density be determined in accordance with AASHTO T 191 every 300 sq.m of compacted base course.

24.03.3.4 Trial Section

Trial section shall conform in all respect to the requirements specified Sub-Clause 24.3.2.4.

24.03.3.5 Tolerance

The crushed aggregate base course shall be laid to the designed level and transverse slopes shown on the Drawing. The allowable tolerance shall be in accordance with the following:

a)	Permitted variation from	+		
	Thickness of layer		-	10 mm
b)	Permitted variation from	+	5 mm	
	design level of surface	-	10 mm	
c)	Permitted surface irregularity		+	
	measured by 3-m straight-edge	-	5 mm	
d)	Permitted variation from	+		
	design crossfall or camber	-	0.2%	
e)	Permitted variation from			
	Design longitudinal grade	+		
	Over 25 m length	-	0.1%	

24.03.4 Portland Cement Concrete Pavement

24.03.4.1 Concrete Class

The concrete for pavement shall satisfy the following requirements:

Minimum 28-day comprehensive strength	-	24MPA
Maximum aggregate size	-	38mm
Maximum water cement ratio	-	0.45

24.03.4.2 Proportioning, Consistency and Mixing of Concrete

The proportioning, consistency and mixing of concrete shall conform to the requirements of Section 21 “Reinforced Concrete”

24.03.4.3 Preparation

The base shall be watered and thoroughly moistened prior to placing of the concrete.

24.03.4.4 Formwork Construction

Formwork shall comply with the requirements of Section21. Forms shall be of steel, of an approved section and shall be straight and of a depth equal to thickness of the pavement at the edge. The base of the forms shall be of sufficient width to provide necessary stability in all directions. The flange braces must extend outward on the base not less than 2/3 the height of the form.

All forms shall be rigidly supported on a bed of thoroughly compacted material during the entire operation of placing and finishing the concrete. They shall be set with their faces vertical so as to procedure a surface complying with the required tolerance.

Adjacent lanes may be used in lieu of forms of supporting finishing equipment provided that proper protection is afforded to the concrete of the adjacent lanes to prevent damage, and provided further that the surface of the concrete carrying the finishing equipment does not vary by more than 3 mm in each meter length. Adjacent lanes in lieu of forms may not be used until the concrete is at least seven (7) days old. Flanged wheels of the finishing equipment shall not be operated on the concrete surface. The inside edge of supporting wheels of the finishing machine shall not operate closer than 100 mm from the edge of the concrete lane.

Alternative to placing forms, slip-forming may be used. Slip-form paving equipment shall be equipped with the traveling side forms of sufficient dimensions, shape and strength to support the concrete laterally for a sufficient length of time during placement to produce pavement of the required cross section. No abrupt changes in longitudinal alignment of the pavement will be permitted. The horizontal deviation shall not exceed 20 mm from the proper alignment established by the Engineer.

24.03.4.5 Joints

All joints, longitudinal, transverse, etc., shall be constructed as shown on the Drawings and shall be clean and free of all foreign material after completion of shoulder work prior to acceptance of the work and in accordance with the following provisions:

a) Longitudinal and Transverse Contact Joints

Longitudinal contact joints are joints formed between lanes that are poured separately. Transverse contact joints are joints formed between segments of a lane that are poured separately. Transverse contact joints shall be formed perpendicular to pavement centerline at the end of each day of concrete placing, or where concreting has been stopped for 30 minutes or longer but no nearer than 1.5 meters from sawed contraction joints. All contact joints shall have faces perpendicular to the surface of the pavement. Tie bars of the size, length and spacing shown on the Drawings shall be placed across longitudinal and transverse contact joints.

b) Contraction Joints

Contraction joints shall be formed by cutting a groove in the pavement with a power driven saw at the locations shown on the Drawings. The grooves shall be cut to a minimum width possible with the type of saw being used, but in no case shall the width exceed 5 mm. Every fourth planned transverse weakened plane joint in the initial lane of concrete and also the first joint immediately after the transverse contact joint, shall be sawed within 24 hours after the concrete has been placed, the exact time to be determined by the Engineer.

Every second planed transverse contraction joint shall be sawed within 48 hours after placing the concrete, the exact time to be determined by the Engineer.

The remaining longitudinal transverse contraction joints may be sawed at such time, after 24 hours, as the Contraction may elect, except that they shall be completed before placing concrete in succeeding adjacent lanes and before permitting the Contractor's traffic or public to use the pavement.

In succeeding lanes of concrete pavement, the transverse joints opposite those which have opened in the initial lane shall be sawed within 24 hours after the concrete has been place, the exact time to be determined by the Engineer, but in all cases not more than 3 consecutive planed transverse contraction joints shall be omitted.

No sawing shall be done where volunteer transverse crack exist. If a transverse crack falls within 1.5 meter of the location of a proposed sawed joint, the sawed joint shall be omitted.

At the option of the Contractor, transverse contraction joints may be formed by placing a continuous strip of plastic or other material which will not react adversely with the chemical constituents of the concrete or bond with the concrete. The strip shall have a minimum thickness of 0.4 mm and a width of not less than 50 mm nor more than 55 mm. After placement, the vertical axis of the joint material shall be within 10 degrees of a plane normal to the surface of the pavement. The top of the strip shall not be above or more than 5 mm below the finished pavement surface. Final alignment of the strip shall conform to that shown on the transverse contraction joints and shall not vary more than 20 mm from the edge of a 3mm straightedge. The strip shall be placed by means of a mechanical installation device which shall vibrate the plastic sufficiently to cause an even flow of concrete about the joint material.

After installation of the joint material, the concrete shall be free of segregation, rock pockets or voids and the finished concrete surface on each side of the joint shall be in the same plane. Splices in the joint material shall not be permitted.

The Contractor shall maintain in a standby multiple-bladed power joint saw, in operating condition, at the project site at all times while concrete paving operation are underway, regardless of the type of contraction joint being constructed.

At the option of the Contractor, longitudinal contraction joints at traffic lanes in multi-lane monolithic concrete pavement may be formed by placing a continuous strip of plastic or other material which will not react adversely with the chemical constituents of the concrete. The joint insert material shall be of such width and character that when placed vertically in the concrete it will not bond with the concrete and will form an effective contraction joint of 50 mm. minimum depth. The joint material shall be inserted with a mechanical device that places the material in a continuous strip, except where intervening structure break the continuity of paving. Splices in the joint material will be permitted provided that they are effective in maintaining the continuity of the joint material as placed. The joint material shall be placed in such manner that the top of the strip is not more than 3 mm below the finished surface of the concrete.

The joint material shall not be deformed from the vertical position, either in the installation or in subsequent finishing operations performed on the concrete.

The alignment of the finished joint shall be uniformly parallel with the center line of the pavement and shall be free of any local irregularity which exceeds 10 mm. The mechanical installation device shall vibrate the concrete during placing of the strip sufficiently to cause the concrete to flow evenly about the joint materials producing homogeneous concrete free of segregation and rocks pockets or voids.

c) Transverse Expansion Joints

Transverse expansion joints shall be formed at structure approaches as shown in the Drawings.

Transverse expansion joints shall be formed by means of premolded expansion joint filler. The joint strips shall be firmly supported in position by metal holders and end supports. The support shall be held firmly in position and shall remain in place after completion of the pavement.

The metal holders shall be fabricated of steel sheet not less than 2 mm thick. They shall be in the form of deep channel, extending down on both sides of the joint strip to depth of not less than 100 mm. They shall be slotted and cut away as necessary, to allow the concrete to make contact with the joint strip at close intervals. The ends of the holders shall be spread to admit the end supports. During placing and compacting the concrete, the joint holder and end supports shall be secured so as to ensure against movement of the joint strip and to keep the top edge of the joint strip approximately 10 mm below the surface of the finished pavement.

After the concrete has been placed and compacted, the metal holder may be removed and suitable shallow metal channel substituted therefore which shall fit snugly over the top edge of the joint strip and shall remain until the joint is edged. Filler shall extend the full width of the concrete being placed less 10 mm and after the side forms have been removed, any concrete which has flowed around the ends of the joint filler shall be removed.

24.03.4.6 Placing Concrete

The concrete shall be deposited and spread in order that segregation will not occur and place a uniform layer of concrete whose thickness is approximately 20 mm grater than that required for the finished pavement is placed. Rakes shall not be used for handling.

In order to prevent the introduction into the concrete of earth and other foreign materials, the men whose duties require them to work in the concrete, shall in general, confine their movements to the area already covered with fresh concrete. Whenever it becomes necessary for these men to step out of the concrete, their footwear shall be washed or otherwise thoroughly cleaned before returning to the concrete. Repeated carelessness with regard to this detail will be cleaned sufficient cause for removing and replacing such worker.

During the operation of striking off the concrete, a uniform ridge of concrete at least 70 mm in height shall be maintained ahead of the strike-off screed for its entire length. Except when making a construction joint, the finishing machine shall at no time be operated beyond that point where this surplus can be maintained in front of the strike-off screed.

After the first operation of the finishing machine, additional concrete shall be added to all low places and honeycombed spots and the concrete rescreeded. In any rescreeding, a uniform head of concrete shall be maintained ahead of the strike-off for its entire length. Honeycombed spots shall not be eliminated by tamping or grouting.

Workers on the job shall have mobile footbridges at their disposal so that they need not walk on the wet concrete.

In conjunction with the placing and spreading, the concrete shall be thoroughly spaded and vibrated along the forms, bulkhead, and joints.

The internal vibrators shall be of pneumatic, gas-driven, or electric type, and shall operate at a frequency of not less than 3,200 pulsation per minute.

Whenever the placing of the concrete is stopped or suspended for any reason, for a period of 30 minutes or longer, a suitable bulkhead shall be placed so as to produce a vertical transverse joint. If an emergency stop occurs within 2.5 meters of the contraction or an expansion joint the concrete shall be removed back to the joint. When the placing of the concrete is resumed, the bulkhead shall be removed and a new concrete placed and vibrated evenly and solidly against the face of previously deposited concrete. Any concrete in excess of the amount needed to complete a given section or that has been deposited outside the forms shall not be used in the work.

The Contractor shall provide suitable equipment for protecting the fresh concrete in case of rain, such as screens which will cause the rain water to run off beyond the edges of the paving, rain proof tarpaulins or other methods approved by the Engineer. The equipment shall be sufficient to shelter from rain all areas equal to that paved in two hours of work.

24.03.4.6 Finishing Concrete

The concrete shall be compacted and finished by a mechanical, self-propelled finishing machine of approved type, having two independently operated screeds. If a machine possessing only one screed is

approved, the screed will not be less than 450 mm wide and shall be equipped with compensating springs to minimize the effect of the momentum of the screed on the side forms. The number of driving wheels, the weight of the machine and the power of the motor shall be so coordinated as to prevent slippage. The top of the forms and the surface of the finishing machine wheels shall be kept free from concrete or dirt.

The machine shall at all times be in first-class mechanical condition and shall be capable of compacting and finishing the concrete are herein described. Any machine which causes displacement of the side forms from the line or grade to which they have been properly set, or causes undue delay due to mechanical difficulties, shall be removed from the work and replaced by a machine meeting the Specifications.

The finishing machine shall be operated over each section of pavement two or more times and at such intervals as will produce the desired results. Generally, two passes of the finishing machine are considered the maximum desirable.

The concrete shall be vibrated, compacted, and finished by a vibratory finishing machine. The vibratory machine shall meet the requirements for ordinary finishing, and shall be one of the following types:

a) The machine shall have two independently operated screeds, the front

screed shall be equipped with vibratory units with a frequency of not less than 3,500 pulsations per minute. There shall be not less than one vibratory unit foe each 2.5 meters length or portion thereof, of vibratory screed surface. The front screed shall not be less than 300 mm wide and shall be equipped with a “bull nose” front edge built on a radius of not less than 50 mm. This type of vibratory finishing machine shall be operated in such manner that each section of pavement will receive at least one vibratory pass, but not more than two passes, unless otherwise directed, or;

b) The machine shall be equipped with an independently operated vibratory “pan” (or pans) and two (2) independently operated screeds, the “pan” shall be mounted in a manner that will permit it to come in contact with the forms and will permit vibration of the full width of lane simultaneously.

That shall be not less than one vibratory unit for each 2 m. length or portion thereof, of vibrating pan surface. The vibratory units in any individual pan shall be synchronized and have a frequency of not less than 3,500 pulsations per minute.

The front screed shall be capable of operating in a position that will strike off the concrete at a sufficient height above the top of the forms to allow for proper compaction with the vibrating pan. This type of vibratory finishing machine shall be operated in such manner than each section of pavement will receive at least one vibratory pass but not more than passes, unless otherwise directed.

After the final pass of the finishing machine and when the concrete has started to dry, the surface of the pavement shall be finished with an approved longitudinal float. The float may be operated either manually or by mechanical means. The float may either of wood or metal, shall be straight and smooth or light in weight so as not to displace or sink into the concrete surface.

To be effective, the float shall be at least 300mm wide and 3m long. When manually operated, the float shall be moved from edge to edge with a wiping motion and advance one (1) meter or more.

The succeeding trip shall overlap the previous trip. A light smoothing lute at least 3 meters long may be used provided approved by the Engineer.

The surface of the pavement shall be tested by the Contractor, before the final belting, with an approved standard straightedge 3 meter in length. Irregularities so detected shall be corrected immediately.

Special attention shall be given to the concrete adjacent to transverse joints to insure that the edges thereof are not above the grade specified or the adjacent concrete below grade. All depressions or projections shall be corrected before any initial set has developed in the concrete.

After the concrete has been brought to the required grade, contour and smoothness, it shall be finished by passing over the concrete a drag of one or two burlap clothes, which give the surface the required roughness. The vehicles used to carry these cloths may be independent of the concrete laying machine or may be incorporated with it and may be operated either by hand or mechanically.

Hand finishing will be permitted only on variable width sections of the pavement and other places where the use of the finishing machine would be impractical. Hand finishing shall be accomplished by means of the hand-operated strike-off template of either steel or steel-shod wood construction. The striking template shall be operated forward with a combined longitudinal and transverse motion and shall be so manipulated that neither end will be raised off the side forms. A similar tamper shall be used for tamping the concrete.

As soon as the concrete has attained its initial set, the edges of the pavement, the longitudinal joints, and the construction dummy and expansion joints not sawn shall be carefully finished with an edging tool having radius of at least 5mm.The tools, the special accessories for cutting impressed joints and methods of workmanship shall be such as will produce a joint whose edges are of the same quality of concrete as the other portion of the pavement. Methods and workmanship which make use of excess mortar or grout in this area shall be eliminated. Unnecessary tool marks shall be eliminated during work, and the edges left smooth and true to line.

24.03.4.8 Striking Forms

Forms shall remain in place at least 12 hours after the concrete has been placed. When working conditions are such that the early strength gain of the concrete is delayed, the forms shall remain in place for a longer period, as directed by the Engineer. Bars or heavy load shall not be used against the concrete when still in the forms. Any damage to concrete resulting from form removal shall be repaired promptly by the Contractor as directed by the Engineer without any additional payment to the Contractor.

24.03.4.9 Curing Concrete

Unless otherwise ordered by the Engineer, curing concrete shall be done by any method specified in Section 21 “Concrete Works”.

24.03.4.10 Cleaning and Sealing Joints

After completion of the required curing and before opening of the pavement to traffic all joints shall be thoroughly cleaned of all concrete aggregate fragments or other materials.

After removal of side forms, the ends at transverse expansion joints at the edges of the pavement shall be carefully cleaned of any concrete within the expansions spaces for the entire depth of slab, care being taken not to injure the ends of the joints. Expansion and contracting joints shall then be poured with a hot joint sealer to the depth as directed on the Drawings Joint sealer shall be poured using approved hand pouring pots, with liquid at a temperature not less than that recommended by the approved manufacturer.

24.03.4.11 Opening to Traffic

The pavement shall be closed to traffic, including the vehicles of the Contractor, for a period of 10 days after the concrete is place or longer if in the opinion of the Engineer, the weather conditions make it necessary to extend this time.

The Contractor shall furnish, place and maintain satisfactory barricades and lights as directed, to exclude all traffic from the pavement.

Any damage to the pavement due to traffic shall be repaired or replaced at the expense of the Contractor. Paving mixers, mechanical concrete spreaders and finishers and other heavy paving equipment shall not be operated on completed concrete lanes in order to construct alternate lanes until after the regular curing period is completed. Even then, planks shall be laid on the finished pavement or other precautions taken to prevent damage to the concrete pavement.

24.03.4.12 Pavement Smoothness, Thickness and Tolerance

Portland cement concrete pavement shall be constructed to the designed level and transverse slope shown on the Drawing. The allowable tolerance shall be as listed hereunder;

a)	Permitted variation from design thickness of layer	+- 5mm
b)	Permitted variation from design level of surface	+- 5mm
c)	Permitted surface irregularity measured by 3m straightedge	+-6mm
d)	Permitted variation from design crossfall or camber	+- 0.2%

24.03.5 Curb and Gutter

Excavation shall be made to the required depth and the base upon which the curb and gutter is to set and shall be compacted to a firm, even surface. All material from soft area shall be removed as directed and replaced with suitable material.

A layer of crushed aggregate as shown in the Drawings shall be placed to form a bed for the curb and gutter.

Forms to hold the concrete shall be built and set in place as described in Section 21. Forms for a least 50 m of curb and gutter shall be in place and checked for alignment and grade before concrete is placed. Curbs constructed on curves shall have forms of either wood or metal and they be accurately shaped to the curvature shown on the Drawings. Mixing, placing curing and testing of concrete shall be as described in Section 21 and in accordance with the required given below.

Concrete may be placed in the curb and gutter to the full depth required. The top of the curb and gutter shall be floated smooth and the edges rounded to the radii shown on the Drawings. Before finishing, the surface of the gutter shall be tested with a 3-meter straightedge and any irregularities of more than 5 mm in 3 meters shall be corrected.

The curb and gutter shall be constructed in uniform sections of not more than 25 m in length except where shorter sections are required to coincide with the location of contraction joints of the concrete pavement or for an emergency stop, but no section shall be less than 2.5 m long. The sections shall be prepared by sheet templates set perpendiculars to the face and top of the curb and drain. The templates shall be approximately 5 mm in thickness, of the same width as that of the curb or curb and gutter, and not less than 50 mm greater than the depth of the curb and drain. Templates shall be set carefully and

held firmly during the placing of the concrete and shall remain in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in shape. The preformed joint filler may be used in place of the sheet template referred to above, upon prior approval of the Engineer. In this event, the fiber board shall be pre-cut to the shape of the curb so that its outer edge will be flushed with the abutting curb.

Expansions joints shall be formed in the curb and drain at intervals of approximately 50 m to coincide with expansion joints of cement concrete pavements or as shown on the Drawings.

The forms may be removed within 24 hours after concrete has been placed. Minor defects shall be repaired with cement mortar. Plastering shall not be permitted on the face of the curb and drains and all rejected curbs or gutter shall be removed and replaced by the Contractor without additional cost. All surfaces which will be exposed in the finished constructed curb and gutter shall be finished, while the concrete is still “green” by wetting a wood block or float and rubbing the surfaces until they are smooth. In finishing concrete, only the mortar normally present in the concrete shall be permitted for finishing. The use of separate mortar finishing coat or the practice of working dry cement into the surface of the concrete will not be permitted.

Immediately upon the completion of the rubbing down operation, the surface shall be moistened and kept moist for 3 days or cured by other approved method.

After the concrete has cured sufficiently so as not to damaged, spaces at the back of the curb and gutter excavated for placing the curb and gutter shall be refilled to the required elevation with suitable earth or

granular material, which shall be tamped in layers of not more than 150mm until firm and solid.

24.03.6 Portland Cement Concrete Sidewalk

Excavation shall be made to the required depth and width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm even surface conforming to the section shown on the Drawings. All material from soft areas shall be removed and replaced with suitable material.

The base course material shall be compacted to the depth, line and levels shown on the Drawings.

All forms shall be staked securely in position at the correct line and level. Preformed joint filler shall be set in the position shown on the Drawings before placing of the concrete is started. The top of the joint filler shall be placed 5 mm below the top surface of the finished sidewalk. Mixing, placing, finishing, curing and testing shall be as specified in Section 21. The concrete shall be placed to the depth shown on the Drawings.

The surface shall be cut through to a depth of 10 mm with a trowel at intervals of 1 m or where required, in straight lines perpendicular to the edge of the sidewalk.

The surface shall then be brushed. The edges of the sidewalk and the transverse cuts shall be shaped with a suitable tool so formed as to round the edges to a radius of 15 mm.

24.03.7 Asphalt Pavement

Construction requirements for asphalt pavement shall be based on item 307.3 of the DPWH Standard Specifications for highways, bridges and airports.

24.04 MEASUREMENT AND PAYMENT

24.04.1 General

Measurement for payment shall be made in accordance with each particular item of words listed in the Bill of Quantities.

Each item listed shall be paid for in the appropriate unit price per quantity measured and accepted. Payments shall constitute full compensation for all labor, materials and equipment and all incidentals to complete the work.

Cost for trial sections and all necessary test to be performed in accordance with this Section shall be included in the unit price for each item listed in the Bill of Quantities.

24.04.2 Subgrade Preparation

The quantity of subgrade preparation to be paid for shall be measured in square meters of area prepared, graded, compacted, tested and accepted by the Engineer.

24.04.3 Aggregate Subbase Course

Aggregate subbase to be paid for shall be measured by the volume in cubic meters of aggregate subbase supplied, placed and compacted as shown on the Drawings and accepted by the Engineer. No payment will be made for materials placed outside the design limits shown on the cross sections.

24.04.4 Crushed Aggregate Base Course

Measurement and payment for crushed aggregate base course shall be made by the volume in cubic meter of crushed aggregate base supplied, placed and compacted as shown on the Drawings and accepted in completed base course. No payment will be made for materials placed outside the design limits shown on the cross sections.

24.04.5 Portland Cement Concrete Pavement

The quantities of Portland cement concrete pavement to be paid shall be measured by the area of the top surface in square meters, calculated from its width and length of the designated thickness as shown on the Drawings.

No separate measurement and payment will be made for miscellaneous item such as dowel bar, joint sealer, and joint filler, etc., cost of such items are deemed included in the cost of Portland cement concrete pavement.

24.04.6 Curb and Gutter

The curb constructed in the manner and of the materials shown on the Drawings shall measure and paid for by the length along its front at the finished grade elevation.

The gutter constructed in the manner and of the material shown on the Drawings shall be measured and paid for by the length in linear maters along its axis.

Crushed aggregate base course shall not be measured and paid for separately but shall be deemed included in the unit price of curb, gutter or combination curb and gutter.

Excavation will not be paid separately as such shall be considered part of and accidental to construction of the curb or gutter depending upon which structure the above item have been undertaken.

No measurement and payment will be made for performed joint filler. It shall be deemed included in the unit cost of curb and/or gutter.

24.04.7 Portland Cement Concrete Sidewalk

The quantity of Portland cement concrete sidewalk to be measured and paid for shall be the area in square meters of the surface of Portland cement concrete sidewalk with thickness shown on the Drawings complete in place and accepted by the Engineer.

Base course shall not be measured and paid for separately but cost shall be deemed included in the unit cost of Portland cement concrete sidewalk.

RORO RAMP

Section 15 - DEMOLITION AND REMOVAL

SECTION 15 – DEMOLITION AND REMOVAL

15.01 SCOPE

The work includes the furnishing of all labor, materials and equipment required to carry out the demolition and removal of obstructions, portions of existing piers including extraction/cutting of timber and R.C piles at required depth and demolition of miscellaneous buildings, pavements, fences, utilities, navigation aids and wrecks etc., as required for the execution of the Contract.

The Contractor shall submit the proposed methodology or procedure of demolition work with detailed drawings and calculations if necessary, to the Engineer for approval, before the execution of the Works.

The Contractor shall keep all pavements and landing areas to and from the site of the disposal area clean and free of mud, dirt and debris during and after the execution of disposal. Disposal of debris and materials shall be as directed by the Engineer.

For off-shore obstruction to pile driving and dredging, survey shall be executed by the Contractor with the Engineer before any demolition and removal of wrecks is commenced and shall be as directed by the Engineer.

15.02 INTERFERENCE WITH PORT OPERATIONS

During the execution of the work, the Contractor shall not interfere with the shipping, navigation and other traffic in the port.

The Contractor shall make arrangements with the operations people on the schedule of demolition and related works to keep port operation activities undisturbed at all times.

Prior to commencement of the demolition works, the Contractor shall inform/announce to port users the schedule of disconnection of utilities.

05.03 EXECUTION

1.) Prior to the commencement of demolition works, the alignments of the new construction works to existing pier shall be checked.

2.) The width and alignment of portion of existing structure to be demolished shall be marked by paint.

3.) With these lines as guides, concrete shall be broken and reinforcing bars cut, such that panels or portions of the structure can be lifted out for disposal elsewhere outside of the operational work area.

4.) Extract concrete piles with care in order not to damage existing or adjacent structures, equipment or materials.

5.) Piles (timber/concrete) for demolition/extraction shall be done with care and/or to the required level indicated in the plan as shown in the drawings.

6.) Rocks removed from existing slope protection shall be stored for re-use in new construction.

7.) Demolish buildings, pavements, curbs, fences, utilities, services, navigation aids and the like as determined in the field for each project and as shown on the drawings or as directed by the Engineer.

8.) Materials coming from the demolish works shall be properly disposed by the Contractor.

15.04 SAFETY

During the course of survey and clearing, any obstacles which are recognized and seemed to be explosive or hazardous to workers shall be removed from the site by the proper Authority.

At the end of each day's work, the Contractor shall keep the workplace in safe condition, so that no part is in danger of falling or creating hazard to personnel or equipment.

SECTION II. BASE PREPARATION

Base preparation – filling materials shall be in accordance with the specifications and in conformity with the lanes, grades and dimensions shown on the plans or established by the Engineer.

The placing and compaction of approved materials within the area where unsuitable materials has been removed and the placing and compacting of filling materials in holes, pits and other depressions within the area.

Filling materials and backfills shall contain no muck, peat, sod, roots and other deleterious matter, broken concrete and other solid. Bulky materials shall not be placed in the area where filling is to be placed or compacted.

MOORING BOLLARDS AND BITS

Supply and apply specialized coating materials (anti-corrosion & abrasive resistant) in accordance with the approved plans and specifications.

FENDERING SYSTEM

It should be "used dump truck tire fenders" and shall be in accordance with the specifications provided in the plans/drawings.

SECTION 21 – REINFORCED CONCRETE

All works falling under this category shall reinforced concrete for all kinds and parts of any reinforced concrete structure.

21.01 MATERIALS

a. Cement

Cement used shall be Type I Portland conforming to the requirements of the latest revision of ASTM C 150 “Standard Specifications for Portland Cement”.

b. Coarse Aggregates

Coarse Aggregates shall be washed, well graded, hard pieces of gravel, crushed gravel or rock conforming to the requirements of ASTM C 33 “Standard Specification for Concrete Aggregates”.

c. Fine Aggregates

Fine Aggregates shall be washed sand, stone screenings or other inert materials of same characteristics, or any combination thereof composed clean, hard, strong, uncoated grains and free from injurious amount of dust, lumps of clay, shale, alkali, and organic matter. It shall conform to the requirements of ASTM C33 “Standard Specifications for Concrete Aggregates”. Beach sand shall not be used unless approved by the Engineer.

d. Admixtures

Unless otherwise required by field conditions admixtures may be used subject to the expressed approval of the Engineer. The cost thereof shall be considered as already included in the unit cost bid of the Contractor for the concrete.

21.02 STORAGE OF MATERIALS

a. Cement shall be stockpiled as closely as possible in weatherproof storage sheds, stacks suitably elevated above ground to prevent cement absorption of moisture

b. Aggregates shall be placed in stockpile in a manner preventing segregation thereof and contamination with foreign materials.

c. Reinforcing steel bars shall be stored properly, covered and protected from humidity to prevent rusting and contamination with oil, dirt or other objectionable matters.

21.03 DESIGNED STRENGTH OF CONCRETE

Concrete for structural parts of members such as bearing piles or columns shall develop a minimum 28-day compressive cylinder strength of 4,500 psi., and for deck or floor slabs, beams and girders of the structure shall develop a minimum 28-day compressive cylinder strength of 3,500 psi., unless otherwise indicated in the drawings.

Concrete for non-structural parts or members such as partition walls and slab on fill shall develop a minimum 28-day cylinder strength of 3,000 psi., unless otherwise indicated in the drawings.

21.04 TRIAL BATCH FOR CONCRETE

Thirty (30) calendar days before the start of concreting works, the Contractor shall submit design mixes and the corresponding test result made on sample thereof. Sampling and testing shall be in accordance with the ASTM Standard procedures for sampling and testing, for the particular design strength(s) required.

The particulars of the mix such as the slump and the proportionate weights of cement, saturated surface dry aggregates and water used shall be stated. Test results shall show 28-day strength(s) fifteen (15%) percent higher than the ultimate strength(s) required.

The design mix for concrete to be used shall be submitted together with at least three (3) standard cylinder samples for approval at least one (1) month prior to the start of each concreting schedule. Such samples shall be prepared in the presence of the Engineer.

Standard laboratory strength tests for the 7, 14, and 28 days period shall be taken to all concrete samples in addition to routine fields tests, at cost to the Contractor. Only design mixes represented by test proving the required strength for 7, 14, and 28 days test shall be allowed.

The cost of sampling, handling and transporting samples from jobsite to the laboratory and the cost of subsequent tests made until the desired mix is attained shall be for the account of the Contractor.

21.05 CONCRETE PROPORTION AND CONSISTENCY

Concrete proportion should produce mix consistencies that will work readily into angles and corners of the forms and around reinforcements irrespective of the method of placing employed, without permitting the materials to segregate or excess water to collect on the surface of the concrete and with separated individual particles of aggregates showing coating of mortar with proportionate amount of sand. The total aggregate in the proportion used shall be such that when sieved, the weight passing the No.4 standard sieve shall be thirty percent (30%) of the total.

The methods used for measuring materials going into the concrete mix shall permit easy checking and control of proportions at any time during the work.

21.07 MIXING OF CONCRETE

All concrete used be machine-mixed at the site. Each batch shall be mixed at the mixer's design speed, for at least 1-1/2 minutes after all concrete materials are simultaneously placed in the mixer. The ideal rotation speed of the mixer shall be between 14 and 20 rpm.

All mix contents of the mixer shall be thoroughly removed before any succeeding batch is placed.

The materials for the first batch shall contain sufficiency excess cement, sand and water to coat the inside walls of the mixer without reducing the required mortar content of the mix.

The mixer shall be provided with devices for accurately measuring and controlling the amount of water used in each batch and for automatically recording the number of revolutions of the mixer.

Hand mixing of concrete will only be allowed in case of mixer breakdown, in which a case it shall be stopped as soon as pouring for the particular section is completed, or at a construction joint as directed by the Engineer.

Re-tempering or re-mixing of partially hardened concrete with the addition of water will not be permitted.

21.08 PLACING OF CONCRETE

1. Concrete shall be place in the presence of the Engineer only after the forms, reinforcing bars and other spaces to receive the concrete have been inspected and approved by him.

2. Concrete shall be placed only when wind and weather conditions will allow proper placement and curing of the concrete. Notice of any concreting operations shall be served to the Engineer at least three (3) days ahead of each schedule.

3. Mixed concrete shall be deposited in its final position within a practicable time. Each succeeding fresh deposit for particular structural member shall be placed at a practicable rate to prevent cold joints. Each successive fresh deposit of concrete shall be vibrated vertically at uniformly spaced points and levels, of such duration and intensity to compact the concrete thoroughly but shall be discontinued the moment segregation of materials is noticed.

4. Where concreting operations involve a fall more than 1.50meters (4.92 feet), the fresh concrete shall be poured through approved sheet metal conduit or pipes. The pipes shall be kept full of concrete and its lower end kept below the surface of concrete throughout the pouring operations.

5. Deposition of concrete shall be in such a way as to prevent segregation of the materials and the displacement of the reinforcement. Placing shall be done preferably with the use of buggies, buckets or wheel-borrows. Troughs, conveyors and pipes and the manner of use of each one shall be with the expressed permission of the Engineer.

6. Each layer of concrete shall be placed approximately normal as possible in uniform layers not exceeding 3.30 meter, unless otherwise ordered. The rate of placing concrete in the forms shall preferably be 0.025 meter (0.082 feet) vertical rise per minute.

21.09 CONSTRUCTION JOINT

During stoppage of concrete pouring operations, when jointing of old concrete becomes necessary, the following point should be observe:

1. Construction joint not indicated in the drawings shall be located as to least affect the strength of the structure. Such locations will be as pointed out by the Engineer.

21.10 FORMS AND FALSEWORK

All forms and falsework to be used in the work must be designed, and constructed by the Contractor for rigidity and adequacy for carrying the loads of the fresh concrete and/or additional superimposed construction loads. The authority may from time to time verify the adequacy and safety such temporary works and may require the Contractor to submit detailed designed drawings of forms and falseworks proposed to be used. Approval of such drawings or design of forms, however, shall not relieve the Contractor of his liability on resulting imperfections or damages to be finished concrete or other damages which may directly result there from.

Forms may be re-used but shall be scrapped by a wire brush of all clinging mortar. Bulges should be planed and realigned prior to its use.

Prior to placing concrete from surfaces should be oiled for easy form removal. However, the oil coating should not be so thick as to stain and soften the concrete surface. Oil coatings should be applied before rebars are placed.

21.11 CURING AND WATERPROOFING

All concrete shall be cured for at least 14 days after the date of placing in accordance with the approved and accepted methods.

21.12 FINISHING OF CONCRETE SURFACES

Concrete surfaces shall conform accurately to the form, alignment, grades and sections shown in the drawings or as prescribed by the Engineer. It shall be free from bulges, ridges, honeycombing or roughness of any kind, and shall be of a reasonably smooth wood float finish.

21.13 TREATMENT OF SURFACE DEFECTS

All irregular concrete surfaces, voids, holes, honeycombs exposed after removal shall be repaired by the Contractor in such a way that the repaired surface will be acceptable under paragraph 21.12 above.

21.14 ARCHITECTURAL FINISH

All exposed concrete exterior surfaces shall be given an architectural finish as directed by the Engineer.

21.15 PLACING OF REINFORCEMENT

Metal reinforcement shall be placed as accurately detailed on drawings and properly secured by approved means.

All bars shall be cold bent unless approved otherwise by the Engineer. Minimum distance between parallel bars shall be one and one half (1 1/2) times the diameter for round bars and twice the side dimension for square bars. The clear distance between bars shall not be less than 2.54 cm. (1 in.) nor less that one and one third (1 1/3) times the maximum size of the coarse aggregate, whichever is bigger.

All reinforcing steel shall be cleaned of all rust or scale and deleterious materials which tend to destroy the bond between the concrete and the steel.

21.16 REINFORCING BAR SPLICES

Generally, splice/s of reinforcements of points of maximum stress especially in slabs, beams and girders shall be avoided. Such splice/s may however be approved by the Engineer in writing provided the lap if bonded or butt welded is sufficient to transfer tensile stress between bars by at least 125% of the specified yield strength of the reinforcing bar. For adjacent bars splices shall be staggered.

21.17 READY-MIXED CONCRETE

Where ready-mixed concrete is used, the requirements specified for batching, mixing and transporting shall be in accordance with the requirements set forth in ASTM C94 Specifications for Ready-Mixed Concrete unless otherwise specified.

1. The Contractor shall notify the Engineer seven (7) days in advanced before any continuous phase of concreting operations is started. Upon notification, the Engineer shall have the right to inspect the ready-mixed concrete supplier's plant/equipment and all materials and/or sources thereof. The Contractor must coordinate with the supplier and must provide safe and adequate guidance for the Engineer or his representative in conducting such examinations.

2. For all ready-mixed concrete delivered to site of work, discharge shall be completed within one hour after the addition of cement to the aggregates or before the drum is revolved 25 times, whichever comes first. Under conditions contributing to the stiffening of concrete especially during hot weather, the time required between the introduction of cement to the aggregates and discharge of the mix may still be reduced by the Engineer.

3. Truck mixers shall be equipped with counters indicating the number of revolutions of the drums which shall be automatically actuated at the time of starting mixers at mixing speed.

4. Each batch or truck delivery of concrete shall be mixed inside the drum for not less than 70 revolutions of the drum at the rate of rotation designated by the equipment manufacturer. Additional mixing if ordered by the Engineer shall be at the speed designated as agitating speed by the manufacturer of the equipment.

5. Concrete for individual batches or deliveries should be of uniform consistency, mix and grading. If slump tests of a minimum 2 samples taken within 15 minutes of each other at approximately 15% and 85% discharge load give values differing more than 2.54 cm. (1 in.) when the specified slump is 76 mm. (3 in.), use of the particular mixer in the work shall be stopped until corrections are made to prevent such conditions, which shall be confirmed by further slump test.

6. Every batch or ready-mixed concrete delivered at the job site shall be accompanied by a ticket furnished in accordance with Section 15 of ASTM 94.The time when the materials were batched shall also be indicated.

7. Non-agitating equipment or combination truck and trailer equipment for transporting concrete will not be permitted.

8. The Authority reserves the right to verify from time to time the quality and quantity of materials used in every cement batch from the batching plant. The Contractor shall be aware of this provision and make the proper arrangement with the concrete supplier.

21.18 TEST ON CONCRETE

Test on concrete shall be in accordance with the following:

a. Concrete samples for tests shall be secured and molded in accordance with ASTM C172 "Method of sampling Concrete", and ASTM C31– "Method of making Curing, Concrete Compression and Flexure Test specimens in the field".

b. Strength test on samples shall be made in accordance with ASTM C39-"Standard Method of Test for Compressive Strength of Molded Concrete Cylinder".

Not less than four (4) cylindrical specimens shall be made for each test of which at least two (2) shall be reserved for 28-day test. Not less than one (1) test shall be made for every fifty (50) cubic meters of concrete but in no case less than one (1) test for each day's concreting.

Samples shall be taken by the Contractor under close supervision of the Engineer; and shall be delivered as soon as practicable for testing, at his expense, to the designated laboratories.

The average strength of test samples representing any definite class of concrete used as well as the average of any five (5) consecutive strength tests representing the class of concrete shall be equal to or greater than the specified strength and not more than one (1) strength test in ten (10) shall have an average values less than 90% of the specified strength.

If the test results indicate strength values less than the required, the Project Manager shall have the right to order a change in the concrete proportion used for the remaining work, or in the procedure of curing the concrete.

21.19 LIQUIDATED DAMAGES (Specific)

For failure to meet the specified strength required for concrete, designed, prepared and laid by him, the Contractor shall pay the AUTHORITY a liquidated damages, not as penalty or forfeiture the following, to be applied only to the quantity of concrete which the particular sample/s represent.

1. Payment of 30 percent contract unit cost per cubic meter of concrete affected, for test resulting to strength between 90 to 100 percent of specified strength;
2. Payment of 50 percent contract unit cost per cubic meter of concrete affected, for test resulting to strength between 80 to 90 percent of that specified strength;
3. Non-payment and removal and replacement at cost to the Contractor of all concrete affected for resulting to strengths below 80 percent of that specified, all in accordance with ACI-318, and at cost to the Contractor.

21.20 FIELD TESTS

Field test as may be deemed necessary to check on the quantity of the materials and mixtures and the manner of construction employed shall be conducted by the Project Engineer assigned to the project. And when such tests result to values less than that tolerated by standards set in applicable provisions of the ASTM Specifications referred to herein, or contrary to accepted good Engineering practice, the Contractor shall comply to any instructions given by the Project Engineer to upgrade the materials used and method of construction employed.

Section 35 – CONCRETE WORKS

35.01 SCOPE OF WORK

The work shall include all labor, materials equipment, plant and other facilities for the satisfactory performance of all works necessary to complete all concrete and reinforced concreted work shown on the Drawing and specified herein.

35.02 MATERIALS

a. Cement - Cement used shall be Type I Portland Cement conforming to the requirements of the latest revision of ASTM C 150 “Standard Specifications for Portland Cement”.

b. Coarse Aggregates - Coarse Aggregates shall be washed, well graded, hard pieces of gravel, crushed gravel, rock or other approved inner materials of similar characteristics, or combination thereof, having hard, strong, durable pieces and free from any adherent coatings. It shall conform to the requirements of ASTM C 33 “Standard Specification for Concrete Aggregates”.

c. Fine Aggregates

Fine Aggregates shall be washed sand, stone screenings or other inert materials with similar characteristics, or any combination thereof having clean, hard, strong, and durable particles, uncoated grains and free from injurious amount of dust, lumps of clay, shale, alkali, and organic matter approved by the Engineer. It shall conform to the requirements of ASTM C33 “Standard Specifications for Concrete Aggregates”. Beach sand shall not be used unless approved by the Engineer. Fine aggregates from different sources of supply shall not be mixed or stored in the same pile nor used alternately in the same class of concrete without the approval of the Engineer.

d) Admixtures – Air-entraining admixtures shall conform to the requirements of AASHTO M154.Chemical admixtures, if specified or permitted, shall conform to the requirements of AASHTO M194. Unless otherwise required by field conditions admixtures may be used subject to the expressed approval of the Engineer. The cost thereof shall be considered as already included in the unit cost bid of the Contractor for the concrete.

e) Water – Water used in mixing, curing and other designated application shall be reasonably clean and free of oil, salt, acid, alkali or other substance which would adversely affect the concrete. Water will be tested in accordance with, and shall meet the suggested requirements of ASSHTO T26.

f. Reinforcing Bars – It shall be standard commercial deformed steel bars and must conform to the requirements of ASTM A 615, grade 40 and/or ASSHTO M42, M31 and M53.

g. Tie Wire – It shall be commercial G.I wires, gauge 16 and must be in accordance with ASTM A 615 and/or ASSHTO M31 and M42.

h. Forms – It shall be of well-seasoned, quality lumber and well-graded plywood. All forms shall be straight, free from warps and of adequate strength to resist distortion. Formwork shall be coated with form oil of approved make.

i. Storage of Materials – Cement shall be stored on weatherproof building or watertight shed, and on platform off ground. The Contractor shall handle and store fine and coarse aggregates separately in a manner to provide good drainage, and to prevent segregation or inclusion of foreign materials. All reinforcing bars shall be protected from mechanical injury and surface deterioration caused by exposure to conditions producing rust until used.

35.03 TRIAL BATCH FOR CONCRETE

Thirty (30) calendar days before the start of concreting works, the Contractor shall submit design mixes and the corresponding test result made on sample thereof. Sampling and testing shall be in accordance with the ASTM Standard procedures for sampling and testing, for the particular design strength(s) required.

The particulars of the mix such as the slump and the proportionate weights of cement, saturated surface dry aggregates and water used shall be stated. Test results shall show 28-day strength(s) fifteen (15) percent higher than the ultimate strength(s) required.

35.04 CONCRETE PROPORTION AND CONSISTENCY

Concrete proportion should produce mix consistencies that will work readily into angles and corners of the forms and around reinforcements irrespective of the method of placing employed, without permitting the materials to segregate or excess water to collect on the surface of the concrete and with separated individual particles of aggregates showing coating of mortar with proportionate amount of sand. The total aggregate in the proportion used shall be such that when sieved, the weight passing the No.4 standard sieve shall be thirty percent (30%) of the total.

The methods used for measuring materials going into the concrete mix shall permit easy checking and control of proportions at any time during the work.

35.05 MIXING OF CONCRETE

All concrete used be machine-mixed at the site. Each batch shall be mixed at the mixer's design speed, for at least 1-1/2 minutes after all concrete materials are simultaneously placed in the mixer. The ideal rotation speed of the mixer shall be between 14 and 20 rpm.

All mix contents of the mixer shall be thoroughly removed before any succeeding batch is placed.

The materials for the first batch shall contain sufficiency excess cement, sand and water to coat the inside walls of the mixer without reducing the required mortar content of the mix.

The mixer shall be provided with devices for accurately measuring and controlling the amount of water used in each batch and for automatically recording the number of revolutions of the mixer.

Hand mixing of concrete will only be allowed in case of mixer breakdown, in which a case it shall be stopped as soon as pouring for the particular section is completed, or at a construction joint as directed by the Engineer.

Re-tempering or re-mixing of partially hardened concrete with the addition of water will not be permitted.

Inserts, sleeves, anchors, blots and all other materials in connection with concrete construction shall be placed and secured in position before concrete is placed.

35.06 JOINTS

No reinforcement, corner protection angles or other fixed metal items shall be run continuous through joints containing expansion- joint filler, through crack- control joints in slabs on grade and vertical surfaces.

Joints with Joint Sealant: At expansion joints in concrete slabs to be exposed, and at other joints indicated to receive joint sealant, pre-molded expansion joint filler strips shall be installed at the proper level below the elevation with a slightly tampered, dressed and wood strip temporarily secured to the top thereof to form a groove, when surface dry, shall be cleaned of foreign matter, loosed particles, and concrete protrusions, there filled approximately flush with joint sealant so as to be slightly concave after drying.

Finish of concrete at joints: Edges of exposed concrete slabs along expansion joints shall be nearly finished with a slightly rounded edging tools.

Construction Joints: Unless otherwise specified herein, all construction joints shall be subject to the approval of the Owner. Concrete shall be placed continuously so that the unit will be monolithic in construction. Fresh concrete may be placed against adjoining units, provided the set concrete is sufficiently hard to be injured thereby. Joints not indicated shall be made and located in a manner not to impair strength and appearance of the structure.

Placement of concrete shall be at such rate that surfaces of concrete not carried to joint levels will not have attained initial set before additional concrete is placed thereon. Lifts shall terminate at such levels as indicated or as to conform to structural requirements as directed. If horizontal construction joints are required, a strip of 254 mm square-edge lumber, leveled to facilitate removal shall be taken to the inside of the forms at the construction joints. Concrete shall be placed to a pint 25 mm above the underside of the strip. The strip shall be removed 1 hour after the concrete has been, any irregularities in the joint lines shall be leveled off with a wood float, and all laitance removed. Prior to placing additional concrete, horizontal constructed joints shall be prepared as specified in “Bonding”.

35.07 FORMS AND FALSEWORK

All forms and falsework to be used in the work must be designed, and constructed by the Contractor for rigidity and adequacy for carrying the loads of the fresh concrete and/or additional superimposed construction loads. The authority may from time to time verify the adequacy and safety such temporary works and may require the Contractor to submit detailed designed drawings of forms and falseworks

proposed to be used. Approval of such drawings or design of forms, however, shall not relieve the Contractor of his liability on resulting imperfections or damages to be finished concrete or other damages which may directly result there from.

Forms may be re-used but shall be scrapped by a wire brush of all clinging mortar. Bulges should be planed and realigned prior to its use.

Prior to placing concrete from surfaces should be oiled for easy form removal. However, the oil coating should not be so thick as to stain and soften the concrete surface. Oil coatings should be applied before rebars are placed.

35.08 PLACING REINFORCEMENT

Metal reinforcement shall be placed as accurately detailed on drawings and properly secured by approved means.

All bars shall be cold bent unless approved otherwise by the Engineer. Minimum distance between parallel bars shall be one and one half (1 1/2) times the diameter for round bars and twice the side dimension for square bars. The clear distance between bars shall not be less than 2.54 cm. (1 in.) nor less that one and one third (1 1/3) times the maximum size of the coarse aggregate, whichever is bigger.

All reinforcing steel shall be cleaned of all rust or scale and deleterious materials which tend to destroy the bond between the concrete and the steel.

Generally, splice/s of reinforcement at points of maximum stress especially in slabs, beams and girders shall be avoided. Such splice/s may however be approved by the Engineer in writing provided the lap if bonded or butt welded is sufficient to transfer tensile stress between bars by at least 125% of the specified yield strength of the reinforcing bar. For adjacent bars splices shall be staggered.

35.09 PLACING CONCRETE

Concrete shall be handled from mixer to transport to place of final deposit in a continuous manner, as rapidly as practicable, and without segregation or loss of ingredient until the approved unit of work is completed. Placing will not be permitted when the sun, heat wind or, limitations of facilities furnished by the Contractor prevent proper finishing and curing of the concrete. Concrete shall be placed in the forms, as closed as possible in the final position, in uniform approximately horizontal layers not over 30 mm deep. Forms splashed with concrete and reinforcement splashed with concrete of form coating shall be cleaned in advance of placing subsequent lifts. Concrete shall not be allowed to drop freely more than 10 meters in unexposed work nor shall more than 1 meter in exposed work; where greater drops are required, tremie or other approved means be employed. The discharge of the tremies shall be controlled so that the concrete may be effectively compacted into horizontal layers not more than 300 mm thick, and the spacing of the tremies shall be such that segregation does not occur. Concrete to receive other construction shall be screeded to the proper level to avoid excessive skimming or grouting. Conduits and pipes shall not be embedded in concrete unless specifically indicated or as directed by the Owner.

Time Interval between Mixing and Placing: Concrete mixed in stationary mixers and transported by non-agitating equipment shall be placed in the forms within 45 minutes from time to time ingredients are charged into the mixing drum. Concrete transported in truck mixers or truck agitators shall be delivered to the site of work discharge in the forms within 45 minutes from time to time that the ingredients are discharge

into the mixing drum. Concrete shall be placed in the forms within 45 minutes after discharge from the mixer at the jobsite.

Earth-foundation placement: Leveling concrete for concrete foundations, exterior slabs and exterior foundations receiving equipment or machinery shall be placed upon undisturbed surfaces. The surfaces shall be clean and free from mud and water. The concrete foundations may be placed over the leveling concrete surfaces.

Conveying Concrete by Chute, Conveyor or Pump: Concrete may be conveyed by chute, conveyor, or pump if approved in writing. In requesting approval, the contractor shall submit his entire plan of operation from time of discharge of concrete from the mixer to final placement in the forms, and steps to be taken to prevent the formation of cold joints, in case the transporting of concrete by chute, conveyor or pump is disrupted. Conveyor and pump shall be capable of expeditiously placing concrete at the rate most advantageous requiring changes in the concrete materials or design mix for efficient operation.

a. Chutes and Conveyors: chutes shall be of steel or steel line wood, rounded in cross section rigid in construction, and protected from overflow. Conveyors shall be designed and operated and chute sections shall be set, to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients loss of mortar, or change in slump. The discharge portion of each chute or conveyor shall be provided with advice to prevent segregation. The chute and conveyor shall be thoroughly cleaned before and after each run. Waste material and flushing water shall be discharge outside the forms. When using titled chutes, the inclination should not be flatter than one (1) vertical and (2) horizontal. From the outlet/mouth of the chute to the concrete surface, the maximum allowable height shall be 1.50 meters.

b. Pumps shall be operated and maintained so that a continuous stream of concrete is delivered into the forms without air pocket, segregation of change in slump. When pumping is completed, concrete remaining in the pipeline shall be ejected, wasted without contamination of concrete already placed.

After each operation, equipment shall be thoroughly cleaned and the flushing water shall be splashed outside the forms.

Placing concrete reinforcement: Where congestion of the steel or other conditions will make placing or compaction of concrete difficult, a layer of mortar shall be first deposited in forms to a depth of approximately 25 cm. Mortar proportions shall be the same as the concrete minus the coarse aggregate.

35.10 COMPACTIOIN

Immediately after placing, each layer of concrete shall be compacted by internal concrete vibrators supplemented by land spading, rodding, and tamping or other external vibration of forms will not be permitted unless specifically approved by the Owner. Vibrators shall not be used to transport concrete inside forms. Internal vibrators submerged in concrete shall maintain a speed of not less than 7000 impulses per minute. The vibrating equipment shall at all times be adequate in number of units and power to properly consolidate all concrete.

Spare units shall be on hand as necessary to insure such adequacy. Duration of vibrating equipment shall be limited to time necessary to produce satisfactory consolidation without causing objectionable segregation. The vibrators shall not be inserted into lower courses that have begun to set.

Vibrators shall be applied at uniformity spaced points not further apart than the visible effectiveness of the machine.

35.11 BONDING

Bonding/depositing new concrete on or against concrete that has set. The surfaces of the set concrete shall be thoroughly cleaned sop as to expose the coarse aggregates and be free of laitance, coatings, foreign matter and loose particles. Forms shall be retightened. The cleaned surfaces shall be moistened, but shall be without free flowing water when concrete is placed.

35.12 SLABS ON GRADE

Concrete shall be compacted, screeded to grade, and prepared for the specified finish. Concrete shall be placed in alternate checkboard pattern terminating at crack-control joints or construction joints or may be placed in alternative paving lanes as limited by expansion, and contraction joints. Crack-control joints shall be expansion, contraction, or construction joints. Joints not shown shall be lifted at column center lines and at intermediate intervals so that such panel shall not be more than 55 sq.m. in area. Panels shall be remain in place for at least 12 hours after complete placement.

Construction joints may be formed by the insertion of hard pressed fiberboard strips inserted in the plastic concrete or may be cut with an approved sawing machine after the concrete has set. Unless otherwise indicated or directed, the joints shall be 3 mm wide and depth equal to approximately 1/4 of the slab thickness of the maximum size of the coarse aggregate whichever is greater.

Sampling: Concrete joints, where sawed or formed, shall be filled with joints sealants except where a floor covering is required.

35.13 FINISHES OF CONCRETE

Within 12 hours after forms are removed, surface defects shall be remedied as specified herein. Fine and loose material shall be removed.

Honeycomb, aggregate pockets voids over 13 mm in diameter, and holes left by the rods or bolts shall be cut out to solid concrete, reamed, thoroughly wetted, brush-coated with neat cement grout, and filled with mortar. Mortar shall be a stiff mix of 1 part Portland cement to not more

2 parts fine aggregates passing the no.16 mesh sieve, and minimum amount of water. The color of the mortar shall match the adjoining concrete color. Mortar shall be thoroughly compacted in place.

Holes passing through walls shall be completely filled from the inside face by forcing mortar through to the outside face. Holes which do not pass entirely through wall shall be packed full. Patchwork shall be finished to match adjoining Ambient temperature shall not be less than 10 degrees C. Dusting of finish surfaces with dry material or adding water to concrete surfaces will not be permitted.

34.14 CONCRETE FINISHED FOR SLABS

Slabs Receiving Concrete Paving: after concrete is placed and consolidated, slab shall be screeded or struck off. No further is required.

Smooth Finish: Required only where specified; screed concrete and float to required level with no coarse aggregate visible. After surface moisture has disappeared and laitance has been removed, the surface shall be finished by float and steel trowel.

Broom Finish: Required for paving, stairs and landings; the concrete shall be screeded and floated to required finish level with no coarse aggregate visible. After the surface moisture has disappeared and laitance has been removed, surface shall be float finished to an even finish. The floated surfaces shall be broomed with a fiber bristle brush in a direction transverse to the direction of the main traffic.

Tolerance: Smooth and broom finished surfaces shall be true to plane with no deviation in excess of 3 mm in any direction when tested with a 3m.straight edge.

35.15 FINISHES OF CONCRETE OTHER THAN FLOOR SLABS

Within 12 hours after forms are removed, surfaces defects should be remedied as specified herein. Honeycomb, aggregate, pockets, voids over 12 mm in diameter, and holes left by the rods or bolts shall be cut out to solid concrete, reamed, thoroughly wetted, brush coated with neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part Portland cement to not more than 2 parts fine aggregates passing the no. 16 mesh sieve, and minimum amount of water using Portland cement for all or part of the cement so that when dry, the color of the mortar shall be thoroughly compacted in place. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through the wall and shall be packed full. Patch works shall be damp cured for 72 hours. Protruding portions of bar supports shall be ground flushed with concrete surfaces that will expose, painted, or plastered directly.

Smooth Finish: After the above operations have been completed, smooth finish shall be given to interior and exterior concrete surfaces that are to be painted or exposed to view. Smooth finished shall consist of thoroughly wetting and then brush-coating the surfaces with cement grout composed by volume of 1 part fine aggregate passing the no. 30 m mesh sieve and mix water to the consistence of thick mixes, so that the final color of grout when dry, will be approximately the same as the color of the surrounding concrete. Grout shall be cork or wood-damp by means of fog spray during the setting period. The finish of any area shall be completed in the same day and the limits of a finished area shall be made at natural breaks in the finished surface.

Rough Slab Finish: Slabs to receive full and mortar setting beds shall be screeded with straight-edges to bring the surface to the required finish plane with no aggregate visible.

Broom Finish shall be given to exterior except concrete stairs treads, entrances, and landings for buildings. The concrete shall be screeded and floated to the required finish level with no coarse aggregate visible. After the surface moisture has disappeared and laitance has been removed, surfaces shall be still toweled to an even, smooth finish. The toweled surfaces shall be broomed with a fiber bristled in a direction transverse to that of the main traffic.

35.16 CURING

Concrete shall be protected against moisture loss, rapid temperature change, mechanical injury from a rain or flowing water, for a minimum period of 7 days.

Concrete shall be maintained in a most condition at temperature above 10 degrees C throughout the specified curing period and until remedied work started. Curing activities shall be started as soon as fever water has disappeared from the surface of the concrete after placing and finishing.

Form under surface shall be moist cured with forms in place for the full curing period or, if forms are removed prior to the end of the curing period by other approved means. Curing shall be accomplished by any of the following methods of combination thereof, as approved.

Water: Water used in curing shall be reasonably cleaned and free of oil, salt. acid. alkali or other substances injurious to the concrete. Drinking water may be used for curing test.

Moist Curing: Uniformed surfaces shall be covered with burlap or mats, wetted before placing and overlap at least 150 mm. Burlap or mats shall be kept continually wet and in intimate contact with the surface. If the forms are removed before the end of the curing period, curing shall be continued on uniformed surfaces, using suitable materials.

35.17 LIQUIDATED DAMAGES (Specific)

For failure to meet the specified strength required for concrete, designed, prepared and laid by him, the Contractor shall pay the AUTHORITY a liquidated damages, not as penalty or forfeiture the following, to be applied only to the quantity of concrete which the particular sample/s represent.

a. Payment of 30 % contract unit cost per cubic meter of concrete affected for test resulting to strength between 90 to 100 percent of specified strength;

b. Payment of 50 % contract unit cost per cubic meter of concrete affected for test resulting to strength between 80 to 90 percent of that specified strength;

c. Non-payment and removal and replacement at cost to the Contractor of all concrete affected for resulting to strengths below 80 percent of that specified; provide that;

To determine the adequacy of the affected pavement or structure the General Manger may order load tests on parts of the pavements/structure where concrete strength is below 80% of that specified, all in accordance with ACI-318, and at cost to the Contractor.

35.18 FIELD TESTS

Field test as may be deemed necessary to check on the quantity of the materials and mixtures and the manner of construction employed shall be conducted by the Project Engineer assigned to the project. And when such tests result to values less than that tolerated by standards set in applicable provisions of the ASTM Specifications referred to herein, or contrary to accepted good Engineering practice, the Contractor shall comply to any instructions given by the Project Engineer to upgrade the materials used and method of construction employed.

Section 28 – PRESTRESSED CONCRETE

SECTION 28 – PRESTRESSED CONCRETE:

28.01 GENERAL

The section relating to concrete, reinforced concrete and precast concrete shall be read in conjunction with the following clauses.

Unless otherwise ordered by Engineer, the Contractor shall certify for the Engineer's approval that a technician skilled in the required prestressing method will be available during its implementation to give aid and instruction in the use of prestressing equipment and installation of materials as maybe necessary to produce prestressed concrete.

28.02 TYPES OF CONCRETE

The concrete shall be of the types as specified on the Drawings and at the time of prestressing shall have reached the specified strengths as determined by the test cylinders which have matured under the same conditions as the units to which the cylinders shall be marked conspicuously with the date of casting and other identification marks as directed by the Engineer.

28.03 PRESTRESSING STRAND

Prestressing strand to be used shall be high-tensile strand conforming to JIS G 353G, SWPR 19.

28.04 PRESTRESSING METHODS

The methods of prestressing to be used shall be optional but shall be subject to all requirements herein after specified.

The Contractor prior to casting any members to be prestressed shall submit in advance for approval of the Engineer complete details of the methods, materials and equipment proposed to be used in the prestressing operations. Such details shall outline the method and sequence of prestressing, complete specifications and details of the prestressing steel and anchoring devices, proposed for use, anchoring stresses, type of sheath, and all data pertaining to the prestressing operations including the proposed arrangement of the prestressing units in the members pressure grouting materials and equipment.

28.05 PRESTRESSING EQUIPMENT

Hydraulic jacks shall be equipped with accurate pressure gauges. The Contractor may elect to substitute screw jacks or other types for hydraulic jacks. In which case, proving rings or other approved devices shall be used in connection with the jacks. All devices, whether hydraulic jack gauges or otherwise shall be calibrated so as to permit the stress in the prestressing steel to be computed at all times. A certified calibration curve shall accompany each device. Safety measures shall be taken by the Contractor to prevent accidents due to possible breaking of the prestressing steel or the slipping of the grips during the prestressing process.

28.06 CASTING YARD

The precasting of prestressed concrete structural members may be done at a location selected by the Contractor, subject of the approval of the Engineer.

28.07 PLACING ENCLOSURES

Enclosures for prestressed reinforcement shall be accurately placed at location shown on the plans or approved by the Engineer.

28.08 PLACING OF STEEL STRANDS

All steel strands units shall be accurately and firmly placed in the position shown on the drawings or as instructed by the Engineer.

Steel strands clearance from the forms shall be maintained by stays, blocks, ties or hangers approved by the Engineer. Blocks for holding units from contact with the form shall be precast mortar blocks of approved shape and dimensions. Layers of units shall be separated by mortar blocks or other equally suitable devices. Wooden blocks shall not be left in the concrete.

Suitable horizontal and vertical spacers shall be provided if required to hold the wire and strand correctly in place in the sheath.

28.09 PLACING OF CONCRETE

Concrete shall be deposited in the forms only after the Engineer had inspected and approved the reinforcement, enclosures, anchorages, and prestressing steel. The concrete shall be vibrated internally or externally or both with care as ordered by the Engineer in such a manner as to avoid displacement of reinforcement, enclosures, or prestressing strand.

28.10 CONTRACTION/CONSTRUCTION JOINT

Concreting for single prestressed concrete units shall be done continuously without any contraction joint.

Construction joints shall not be allowed unless permitted by the engineer in writing.

28.11 CURING

Concrete shall be adequately cured to prevent the harmful effects of drying and rapid change in temperature. Curing shall be done by methods approved by the Engineer. Proper care shall also be exercised to insure that fresh concrete will no be damaged by vibration, impact or lifting or loading.

Prestressed concrete slabs shall be adequately cured before the application of tensioning.

28.12 PRETENSIONING

The prestressing elements shall be accurately held in position and stressed by jacks. The contractor shall record the jacking forced and the elongations produced. Several units may be cast in one continuous line and stressed at one time. Sufficient space shall be left between ends of units to permit access for cutting after the concrete has attained the required strength. No bond stress shall be transferred to concrete, nor end anchorages released until the concrete has attained a compressive strength, as shown by cylinder tests, of at least Mpa. The elements shall be cut or released in such an order that lateral eccentricity or prestressed will be a minimum.

28.13 POST-TENSIONING

Tensioning of the prestressing reinforcement shall not be commenced until tests on concrete cylinders, manufactured from the same concrete and cured under the same conditions has attained a compressive strength of at least 280 kgf/cm^2.

The steel strands shall be stressed by means of jacks to the required tension and the stressed transferred to the end anchorages. The tensioning process shall be conducted in a manner that the tension being applied and the elongation of the prestressing elements may be measured at all times.

To minimize possible irregularity in quality the tensioning operation shall be closely supervised for each group of strands to insure that tension applied will not go under the specified value.

During the tensioning operation the Contractor shall monitor the amount of tension and the elongation of strand to insure that they are proportional. The tension applied to the strand shall be measured by the load gauge and elongation by approved method. The tensioning operation shall be re-executed if the relationship between the applied tension and the elongation vary from the allowed proportion. In the event that any abnormality is found after re-execution of tensioning the operation shall be suspended and the cause determined taking into account friction loss, deformation or slippage of anchors and other causes allowed by the engineer. Where tension is applied to each piece of strand or group of

strands, care shall be exercised so that no harmful stress is allowed to concentrate at any stage of operation. The tension to be applied at the end of strands shall be determined taking into account the change in tension applied to each group of strand due to elastic deformation of concrete.

28.14 GROUTING

Grouting shall be done in such a way that it will fill up the duct while the strands are well protected and concrete and strands are firmly bonded.

The grout shall be tested in accordance with the test methods for consistency, bleeding ratio, expansion ratio and concrete strength recommended by the Japan Society of the Civil Engineers or other equivalent standards of tests.

The test results shall comply with the following requirements:

- Consistency, Flow Time

  15-30 sec (JA funnel) or 6-12 sec (J funnel)

- Expansion ratio, Less than 10%
- 28 – day compressive strength more than 200 kg./cm^2.

The cement ratio of the grout shall less be than 45%.

All prestressing strands to be bonded shall be free of dirt, loose rust, grease, or other deleterious substances. Before grouting, the ducts shall be free of water, dirt or any other foreign substance. Cleaning may be done preferably by bombarding with compressed air until no water comes through the duct. The grout pump shall be capable of pumping grout gradually and without any air bubble. The duct shall be thoroughly cleaned and wet with water before commencing the grouting operation. Pouring of grout shall be done slowly, using the grout pump. The grout shall be filtered through suitable sieve before grouting. Sufficient pressure shall be used in grouting to force the grout completely through the duct, care being taken that rupturing of the ducts does not occur.

The grout mixer shall be of sufficient capacity and capable of mixing grout for a 5 minutes continuous grouting operation. Grout of uniform consistency shall be delivered through the outlets in sufficient amount. The outlets shall then be closed one by one along the direction of grouting. The grout shall be fluid or thick paint consistency proportioned so that free water will not separate from the mix. Commercial plasticizers used in accordance with the manufacturer's recommendation may be used provided they contain no ingredients that are corrosive to steel.

28.15 PREMOLDED EXPANSION JOINT FILLER

Premolded expansion joint filler used for the wharf widening section. Distance beam and the landside crane rail foundation beam shall be soft fiber strips impregnated with bitumen, conforming to Item 405-2.9 Type D, Standard Specification for Highway and Bridges of the Department of Public Highways, revised 1972.

STANDARD PROCEDURES AND REQUIREMENTS FOR TAKING PHOTOGRAPHS, PER PPA ENGINEERING MEMO CIRCULAR NO. 001-2005

1. The points where the photographs are to be taken shall be designed by the Project Engineer/ Project Representative.
2. Each item of works for the project must be photographed before, during and after the completion of the item

3. Photographs shall be taken with a person holding a signboard indicating the station and date.
4. Photographs shall be taken on the same points at the same angle before, during and after the completion of the particular item of work. The “during” photographs shall include equipment being used.
5. The photographs shall be colored and at least 4” by 6”.
6. The photographs shall be properly labeled indicating the item of work, the stage of construction (i.e. before, during, after) the name of the photographer and the front initialed by the Project Engineer concerned.

CLEAN-UP & DISPOSAL OF WASTE

The contractor shall be responsible for the general cleaning and disposing of all tools, surplus materials and equipment used in the execution of the work. As part of the demobilization cost, the Contractor shall furnish the owner the required as-built drawings as indicated in the General Conditions.

NOTE: Any of the aforementioned items of works not in conformity with the plans and specifications are subjected for replacement/repair at the expense of the Contractor.

AS - BUILT PLAN

Upon completion of the project, the contractor shall submit and file with owner a complete mark-up print of the as-built plan including electrical system layout as actually installed in AUTO CAD form for the owner’s future reference.

Section VII.

Drawings

(To be issued manually)