SOCIAL SECURITY SYSTEM

PHILIPPINE BIDDING DOCUMENTS

Sixth Edition

Procurement of INFRASTRUCTURE PROJECTS

Government of the Republic of the Philippines

RETROFITTING OF NAGA
AND CALAMBA BUILDINGS
(RE-ADVERTISEMENT)

ITB-SSS-CIVIL No. 2023-019

NOVEMBER 2023

REGINE M. IGNACIO
TWG Chairperson

TABLE OF CONTENTS

Glossary of Terms, Abbreviations, and Acronyms

ABC – Approved Budget for the Contract.

ARCC – Allowable Range of Contract Cost.

BAC – Bids and Awards Committee.

Bid – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender*. (2016 revised IRR, Section 5[c])

Bidder – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])

Bidding Documents – The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])

BIR – Bureau of Internal Revenue.

BSP – Bangko Sentral ng Pilipinas.

CDA – Cooperative Development Authority.

Consulting Services – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])

Contract – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

Contractor – is a natural or juridical entity whose proposal was accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded. Contractor as used in these Bidding Documents may likewise refer to a supplier, distributor, manufacturer, or consultant.

CPI – Consumer Price Index.

DOLE – Department of Labor and Employment.

DTI – Department of Trade and Industry.

Foreign-funded Procurement or Foreign-Assisted Project – Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).

GFI – Government Financial Institution.

GOCC – Government-owned and/or –controlled corporation.

Goods – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term "related" or "analogous services" shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

GOP – Government of the Philippines.

Infrastructure Projects – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

LGUs – Local Government Units.

NFCC – Net Financial Contracting Capacity.

NGA – National Government Agency.

PCAB – Philippine Contractors Accreditation Board.

PhilGEPS - Philippine Government Electronic Procurement System.

Procurement Project – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

PSA – Philippine Statistics Authority.

SEC – Securities and Exchange Commission.

SLCC – Single Largest Completed Contract.

SSS – Social Security System.

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

UN – United Nations.

Section I. Invitation to Bid

REPUBLIC OF THE PHILIPPINES
SOCIAL SECURITY SYSTEM
East Avenue, Diliman, Quezon City
Tel. Nos. (632)8709-7198*(632)8920-6446
E-mail: member_relations@sss.gov.ph*Website http://www.sss.gov.ph

Invitation to Bid

ITB-SSS-Civil-2023-019

RETROFITTING OF NAGA AND CALAMBA BUILDINGS (RE-ADVERTISEMENT)

Approved Budget for the Contract (ABC) & Source of Fund	*Delivery/ Completion Period*	*Price of Bid Documents (non-refundable)*	*Schedule of Activities Date/Time*	
			Pre-bid Conference	*Deadline of submission and receipt of bids*
₱23,275,500.00 Broken down as follows: Item 1: Naga Building – ₱ 13,325,000.00 Item 2: Calamba Building – ₱ 9,950,500.00 Approved 2023 Corporate Operating Budget – Capital Outlay with Code PAP 2023-0180 & 0181 of the APP	Within one hundred fifty (150) calendar days from receipt of Notice to Proceed (NTP) and Signed Contract Within two hundred ten (210) calendar days from receipt of Notice to Proceed (NTP) and Signed Contract	₱13,500.00	*November 20, 2023 (Monday) 2:30pm*	*December 4, 2023 (Monday) 2:00pm*

1. The ***SOCIAL SECURITY SYSTEM (SSS)*** now invites bids for the above Procurement Project. Completion of the Works is required within the specified period as indicated above. Bidders should have completed within five (5) years prior to the date of submission and receipt of bids, a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

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

3. Bidding will be conducted through open competitive bidding procedures using non-discretionary "pass/fail" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

4. Interested bidders may obtain further information from SSS and inspect the Bidding Documents at the address in the last item of the ITB from Monday to Friday, 8:00 a.m. to 5:00 p.m.

5. A complete set of Bidding Documents may be acquired by interested Bidders starting **11 November 2023 up to the scheduled submission & opening of bids** from the address stated in the last item of the ITB and upon payment of the applicable fee for the Bidding Documents, in the amount specified above.

The mode of payment will be on a cash basis payable at the SSS Cash Department, SSS Main Bldg., Ground floor, upon accomplishment of SSS Form R-6. The Bidding Documents shall be received personally by the prospective Bidder or his authorized representative.

It may also be downloaded free of charge from the website of the Philippine Government Electronic Procurement System (PhilGEPS) and the website of the SSS, provided that Bidders shall pay the applicable fee for the Bidding Documents not later than the submission of their bids .

6. The SSS will hold a Pre-Bid Conference on the date and time specified above at the Bidding Room (formerly CDPRD Computer Room), 2nd Floor, SSS Main Bldg., East Avenue, Diliman, Quezon City which shall be open to prospective bidders, but attendance shall not be mandatory.

   The Pre-Bid Conference will be conducted through online conference using Microsoft Teams. Kindly e-mail us on or before 17 November 2023, through e-mail address bac@sss.gov.ph, the following:

   a. Name of the representative and e-mail address; and
   b. Technical and administrative queries.

7. Bids must be duly received by the BAC Secretariat at the Bidding Room, 2nd Floor, SSS Main Building, East Avenue, Diliman, Quezon City on the deadline specified above. All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in the **ITB** Clause 14.

   Bid opening shall be on the date and time specified above at the Bidding Room, 2nd Floor, SSS Main Building, East Avenue, Diliman, Quezon City. Bids will be opened in the presence of the Bidders' representatives who choose to attend at the address above. Late bids shall not be accepted.

8. References to the dates and times shall be based on Philippine Standard time. Should any of the above dates fall on a holiday, the deadline shall be extended to the same time on the immediately succeeding business day in Quezon City.

9. The SSS reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Section 36.5 and 41 of RA 9184 and its IRR, without thereby incurring any liability to the affected bidder or bidders.

10. The SSS assumes no obligation to compensate or indemnify parties for any expense or loss that they may incur as a result of their participation in the procurement process, nor does SSS BAC guarantees that an award will be made as a result of this invitation. Furthermore, the SSS reserves the right to waive any defects or formality in the responses to the eligibility requirements and to this invitation and reserves the right to accept the proposal most advantageous to the agency.

11. For further information, please refer to:

    Bids & Awards Committee
    The Secretariat
    2nd Flr., SSS Main Bldg., East Ave., Diliman, Q.C.
    Tel # (632) 8922-1070; 8709-7198 local 5492 & 6382
    Email – bac@sss.gov.ph

12. Bidding documents may be downloaded from the PROCUREMENT tab at **www.sss.gov.ph** starting **11 November 2023**.

THE CHAIRPERSON
BIDS & AWARDS COMMITTEE

ref.: itb-sss-civil-2023-019- SSS Naga and Calamba Buildings

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, *Social Security System* wishes to receive Bids for the Retrofitting of Naga and Calamba Buildings, with identification number *ITB-SSS-Civil-2023-019.*

The Procurement Project (referred to herein as "Project") is for the construction of Works, as described in Section VI (Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for *CY 2023* in the amount of Twenty-Three Million Two Hundred Seventy-Five Thousand Five Hundred Pesos (₱23,275,500.00)

2.2. The source of funding is: Approved 2023 Corporate Operating Budget – Capital Outlay of the APP 2023-0180 & 2023-0181 of the APP.

3. Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manual and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or invitation to bid by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have inspected the site, determined the general characteristics of the contracted Works and the conditions for this Project, such as the location and the nature of the work; (b) climatic conditions; (c) transportation facilities; (c) nature and condition of the terrain, geological conditions at the site communication facilities, requirements, location and availability of construction aggregates and other materials, labor, water, electric power and access roads; and (d) other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

4. Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices

The Procuring Entity, as well as the Bidders and Contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. The Bidder must have an experience of having completed a Single Largest Completed Contract (SLCC) that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC adjusted, if necessary, by the Bidder to current prices using the PSA's CPI, except under conditions provided for in Section 23.4.2.4 of the 2016 revised IRR of RA No. 9184.

A contract is considered to be "similar" to the contract to be bid if it has the major categories of work stated in the **BDS**.

5.3. For Foreign-funded Procurement, the Procuring Entity and the foreign government/foreign or international financing institution may agree on another track record requirement, as specified in the Bidding Document prepared for this purpose.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

6. Origin of Associated Goods

There is no restriction on the origin of Goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN.

7. Subcontracts

7.1 The Procuring Entity has prescribed that: **Subcontracting is not allowed.**

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address **Bidding Room, 2nd Floor, SSS Main Bldg., East Avenue, Diliman, Quezon City and/or through online conference using Microsoft Teams** as indicated in paragraph 6 of the **IB.**

9. Clarification and Amendment of Bidding Documents

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

10. Documents Comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

10.2. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. For Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.

10.3. A valid PCAB License is required, and in case of joint ventures, a valid special PCAB License, and registration for the type and cost of the contract for this Project. Any additional type of Contractor license or permit shall be indicated in the **BDS**.

10.4. A List of Contractor's key personnel (e.g., Project Manager, Project Engineers, Materials Engineers, and Foremen) assigned to the contract to be bid, with their complete qualification and experience data shall be provided. These key personnel must meet the required minimum years of experience set in the **BDS**.

10.5. A List of Contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.3. For Foreign-funded procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

12. Alternative Bids

Bidders shall submit offers that comply with the requirements of the Bidding Documents, including the basic technical design as indicated in the drawings and specifications. Unless there is a value engineering clause in the **BDS**, alternative Bids shall not be accepted.

13. Bid Prices

All bid prices for the given scope of work in the Project as awarded shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances as determined by the NEDA and approved by the GPPB pursuant to the revised Guidelines for Contract Price Escalation guidelines.

14. Bid and Payment Currencies

14.1. Bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

14.2. Payment of the contract price shall be made in Philippine Pesos.

15. Bid Security

15.1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.

15.2. The Bid and bid security shall be valid until **one hundred twenty (120) calendar days reckoned from the date of the submission and opening of bids**. Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

16. Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission to the given website or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

17. Deadline for Submission of Bids

The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

18. Opening and Preliminary Examination of Bids

18.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

18.2. The preliminary examination of Bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

19. Detailed Evaluation and Comparison of Bids

19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "*passed*" using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of 2016 revised IRR of RA No. 9184.

19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 15 shall be submitted for each contract (lot) separately.

19.3. In all cases, the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184 must be sufficient for the total of the ABCs for all the lots participated in by the prospective Bidder.

20. Post Qualification

Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS), and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

Section III. Bid Data Sheet

Bid Data Sheet

<table>
<tr><th>ITB Clause</th><th></th></tr>
<tr><td>5.2</td><td>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall involve structural retrofitting of buildings, bridges and similar structures using fiber-reinforced polymer (FRP) system as the primary retrofitting methodology and materials used within Five (5) years prior to the date of submission and receipt of bids.</td></tr>
<tr><td>7.1</td><td>Subcontracting is not allowed.</td></tr>
<tr><td>10.3</td><td>PCAB License and Registration

License Category : B
Size Range : Medium A
Classification : General Building

The bidder shall have at least five (5) years of experience in construction/ structural retrofitting works</td></tr>
<tr><td>10.4</td><td>The key personnel must meet the required minimum years of experience set below:
<table>
<tr><th>Key Personnel</th><th>General Experience</th><th>Relevant Experience</th></tr>
<tr><td>Project Manager (Civil Engineer)</td><td>10 years</td><td>Building construction and/or structural retrofitting</td></tr>
<tr><td>Project Engineer (Civil Engineer)</td><td>5 years</td><td>Building construction and/or structural retrofitting</td></tr>
<tr><td>Materials Engineer</td><td colspan="2">DPWH Accredited Materials Engineer I</td></tr>
<tr><td>Foreman</td><td>5 years</td><td>Building construction and/or structural retrofitting</td></tr>
<tr><td>Construction Safety and Health Officer</td><td colspan="2">40 hrs seminar on Health and Safety</td></tr>
</table>
Except for the Construction Safety and Health Officer and Foreman, all key personnel should be PRC-registered engineers in good standing.</td></tr>
<tr><td>10.5</td><td>The minimum major equipment requirements are the following:
<table>
<tr><th>Construction Equipment</th><th>Required No. of Units</th><th>Maximum Capacity/ Unit</th></tr>
<tr><td>Backhoe</td><td>1 unit for Calamba only</td><td>0.80 m^3</td></tr>
<tr><td>Dump Truck</td><td>1 unit for Calamba only</td><td>12 yd^3</td></tr>
<tr><td>Plate Compactor</td><td>1 unit for Calamba only</td><td>5 hp</td></tr>
<tr><td>Concrete Vibrator</td><td>1 unit for Calamba only</td><td>5 amp</td></tr>
<tr><td>One Bagger Mixer</td><td>1 unit for Calamba only</td><td>4-6 ft^3/min</td></tr>
<tr><td>Bar Cutter</td><td>1 unit for Calamba only</td><td></td></tr>
<tr><td>Bar Bender</td><td>1 unit for Calamba only</td><td></td></tr>
<tr><td>Welding Machine</td><td>2 units</td><td></td></tr>
<tr><td>Jack Hammer</td><td>2 units</td><td></td></tr>
<tr><td>Air Compressor (all models)</td><td>2 units</td><td></td></tr>
</table></td></tr>
<tr><td>12</td><td>Alternative bids shall not be accepted.</td></tr>
<tr><td>15.1</td><td>The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:

a. The amount of not less than ₱465,510.00, if bid security is in cash, cashier’s/manager’s check, bank draft/guarantee or irrevocable letter of credit;</td></tr>
</table>

	b. The amount of not less than **₱1,163,775.00**, if bid security is in Surety Bond.
19.2	Partial bid is not allowed.
20	The Lowest Calculated Bidder shall submit the following: 1. Registration certificate from Securities and Exchange Commission (SEC) for corporation including Articles of Incorporation and General Information Sheet (GIS), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document 2. Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas; 3. Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR) 4. Latest Audited Financial Statements 5. Latest income tax return corresponding to the Audited Financial Statements submitted, filed electronically (EFPS); 6. Quarterly VAT (business tax returns) per Revenue Regulations 3-2005 for the last six (6) months prior to the submission & opening of bids filed electronically (EFPS);
21	No further instruction.

Section IV. General Conditions of Contract

1. Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

2. Sectional Completion of Works

If sectional completion is specified in the **Special Conditions of Contract (SCC)**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date shall 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. Possession of Site

3.1 The Procuring Entity shall give possession of all or parts of the Site to the Contractor based on the schedule of delivery indicated in the **SCC,** which corresponds to 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.

3.2 If possession of a portion is not given by the above date, the Procuring Entity will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contract time to address such delay may be addressed through contract extension provided under Annex "E" of the 2016 revised IRR of RA No. 9184.

4. The Contractor's Obligations

The Contractor shall employ the key personnel named in the Schedule of Key Personnel indicating their designation, in accordance with **ITB** Clause 10.3 and specified in the **BDS**, 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.

5. Performance Security

5.1. 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 successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR.

5.2. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to RA No. 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.

6. 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.

7. Warranty

7.1. In case the Contractor fails to undertake the repair works under Section 62.2.2 of the 2016 revised IRR, 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.

7.2. The warranty against Structural Defects/Failures, except that occasioned-on force majeure, shall cover the period from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity. Specific duration of the warranty is found in the **SCC**.

8. 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.

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

9. Termination for Other Causes

Contract termination shall be initiated 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 corrupt, fraudulent, collusive, coercive, and obstructive practices as stated in **ITB** Clause 4.

10. Dayworks

Subject to the guidelines on Variation Order in Annex "E" of the 2016 revised IRR of RA No. 9184, 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.

11. Program of Work

11.1. The Contractor shall submit to the Procuring Entity's Representative for approval the said Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works. The submissions of the Program of Work are indicated in the **SCC.**

11.2. 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.

12. Instructions, Inspections and Audits

The Contractor shall permit the GOP or the Procuring Entity to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors of the GOP or the Procuring Entity, as may be required.

13. Advance Payment

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**, subject to the requirements in Annex "E" of the 2016 revised IRR of RA No. 9184.

14. Progress Payments

The Contractor may submit a request for payment for Work accomplished. Such requests 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.

15. Operating and Maintenance Manuals

15.1. If required, the Contractor will provide "as built" Drawings and/or operating and maintenance manuals as specified in the **SCC.**

15.2. If the Contractor does not provide the Drawings and/or manuals by the dates stated above, or they do not receive the Procuring Entity's Representative's approval, the Procuring Entity's Representative may 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	
2	No sectional completion date.
3.1	The **SOCIAL SECURITY SYSTEM** shall give possession of all parts of the Site to the Contractor for the duration of the contract which shall commence upon receipt of the Notice to Proceed and Contract/Job Order.
6	Not Applicable
7.2	Fifteen (15) years from issuance of Certificate of Final Acceptance by the Procuring Entity
8	**Liability of the Contractor** 1. CONFIDENTIALITY. Neither party shall, without the prior written consent of the other, disclose or make available to any person, make public, or use directly or indirectly, except for the performance and implementation of the works, any confidential information, acquired from an information holder in connection with the performance of this Contract, unless: (i) the information is known to the disclosing party, as evidenced by its written records, prior to obtaining the same from the information holder and is not otherwise subject to disclosure restrictions on the disclosing party, (ii) the information is disclosed to the disclosing party by a third party who did not receive the same, directly or indirectly, from an information holder, and who has no obligation of secrecy with respect thereto, or (iii) required to be disclosed by law. The obligation of confidentiality by both parties, as provided herein, shall survive the termination of the Agreement. 2. MERGER AND CONSOLIDATION. In case of merger, consolidation or change of ownership of the CONTRACTOR with other company, it is the responsibility of the surviving company/consolidated company/acquiring entity to inform SSS of the change in corporate structure/ownership. Failure to do so shall translate in such company assuming all liabilities of the acquired/merged company under the Agreement. 3. FORCE MAJEURE. SUPPLIER shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that CONTRACTOR's delay in performance or other failure to perform its obligations under this Agreement is the result of a force majeure. For purposes of this Agreement 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 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 CONTRACTOR. Such events may include, but not limited to, acts of SSS in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes. If a force majeure situation arises, CONTRACTOR shall promptly notify SSS in writing of such condition and the cause thereof. Unless otherwise directed by SSS in writing, CONTRACTOR shall continue to perform its obligations under this Agreement as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the force majeure.

4. NON-ASSIGNMENT. CONTRACTOR shall not assign its rights or obligations under this Agreement, in whole or in part, except with SSS's prior written consent. CONTRACTOR shall not subcontract in whole or in part the PROJECT and deliverables subject of this Agreement without the written consent of SSS.

5. WAIVER. Failure by either party to insist upon the other strict performance of any of the terms and conditions hereof shall not be deemed a relinquishment or waiver of any subsequent breach or default of the terms and conditions hereof, which can only be deemed made if expressed in writing and signed by its duly authorized representative. No such waiver shall be construed as modification of any of the provisions of the Agreement or as a waiver of any past or future default or breach hereof, except as expressly stated in such waiver.

6. CUMULATIVE REMEDIES. Any and all remedies granted to the parties under the applicable laws and the Contract shall be deemed cumulative and may therefore, at the sole option and discretion, be availed of by the aggrieved party simultaneously, successively, or independently.

7. NO EMPLOYER-EMPLOYEE RELATIONSHIP. It is expressly and manifestly understood and agreed upon that the employees of CONTRACTOR assigned to perform the PROJECT are not employees of SSS. Neither is there an employer-employee relationship between SSS and CONTRACTOR.

   The Agreement does not create an employer-employee relationship between SSS and the CONTRACTOR including its personnel; that the services rendered by the personnel assigned by CONTRACTOR to SSS in the performance of its obligation under the contract do not represent government service and will not be credited as such; that its personnel assigned to SSS are not entitled to benefits enjoyed by SSS' officials and employees such as Personal Economic Relief Allowance (PERA), Representation and Transportation Allowance (RATA), ACA, etc.; that these personnel are not related within the third degree of consanguinity or affinity to the contracting officer and appointing authority of SSS; that they have not been previously dismissed from the government service by reason of an administrative case; that they have not reached the compulsory retirement age of sixty-five (65); and that they possess the education, experience and skills required to perform the job. The CONTRACTOR hereby acknowledges that no authority has been given by SSS to hire any person as an employee of the latter. Any instruction given by SSS or any of its personnel to CONTRACTOR's employees are to be construed merely as a measure taken by the former to ensure and enhance the quality of project performed hereunder. The CONTRACTOR shall, at all times, exercise supervision and control over its employees in the performance of its obligations under the contract.

8. PARTNERSHIP. Nothing in the contract shall constitute a partnership between the parties. No party or its agents or employees shall be deemed to be the agent, employee or representative of any other party.

9. COMPLIANCE WITH SS LAW. CONTRACTOR shall report all its employees to SSS for coverage and their contributions, as well as, all amortizations for salary/education/calamity and other SSS loans shall be updated. Should CONTRACTOR fail to comply with its obligations under the provisions of the SS Law and Employees' Compensation Act, SSS shall have the authority to deduct any unpaid SS and EC contributions, salary, educational, emergency and/or calamity loan amortizations, employer's liability for damages, including interests and penalties from CONTRACTOR's receivables under this Agreement.

	Further, prescription does not run against SSS for its failure to demand SS contributions or payments from CONTRACTOR. Moreover, CONTRACTOR shall forever hold in trust SS contributions or payments of its employees until the same is fully remitted to SSS. 10. COMPLIANCE WITH LABOR LAWS. CONTRACTOR, as employer of the personnel assigned to undertake the PROJECT, shall comply with all its obligations under existing laws and their implementing rules and regulations on the payment of minimum wage, overtime pay, and other labor-related benefits as well as remittances or payment of the appropriate amount or contributions/payment (SSS, EC, Pag-IBIG, PhilHealth and taxes) with concerned government agencies/offices. It is agreed further, that prior to the release of any payment by SSS to SUPPLIER, its President or its duly authorized representative, shall submit a sworn statement that all monies due to all its employees assigned to the PROJECT as well as benefits by law and other related labor legislation have been paid by CONTRACTOR and that he/she assumed full responsibility thereof. 11. COMPLIANCE WITH TAX LAWS. CONTRACTOR shall, in compliance with tax laws, pay the applicable taxes in full and on time and shall regularly present to SSS within the duration of the Contract, tax clearance from the Bureau of Internal Revenue (BIR) as well as copy of its income and business tax returns duly stamped by the BIR and duly validated with the tax payments made thereon. Failure by CONTRACTOR to comply with the foregoing shall entitle SSS to suspend payment of the Contract Price. As required under Executive Order (EO) 398, s. 2005, CONTRACTOR shall submit income and business tax returns duly stamped and received by the BIR, before entering and during the duration of this Agreement. CONTRACTOR, through its responsible officer, shall also certify under oath that it is free and clear of all tax liabilities to the government. CONTRACTOR shall pay taxes in full and on time and that failure to do so will entitle SSS to suspend or terminate this Agreement. 12. LIQUIDATED DAMAGES. If CONTRACTOR fails to satisfactorily deliver any or all of the Goods and/or to perform the Services within the period(s) specified in the PBD inclusive of duly granted time extensions if any, SSS shall, without prejudice to its other remedies under this Agreement and under the applicable law, deduct from the Contract Price, as liquidated damages, the applicable rate of one tenth (1/10) of one (1) percent of the cost of the unperformed portion for every day of delay until actual delivery or performance. Once the amount of liquidated damages reaches ten percent (10%), SSS may rescind or terminate this Agreement, without prejudice to other courses of action and remedies open to it. 13. HOLD FREE and HARMLESS. SUPPLIER agrees to defend, indemnify, and hold SSS free and harmless from any and all claims, damages, expenses, fines, penalties and/or liabilities of whatever nature and kind, whether in law or equity, that may arise by reason of the implementation of the Agreement. In addition, CONTRACTOR agrees to indemnify SSS for any damage as a result of said implementation. SUPPLIER hereby assumes full responsibility for any injury, including death, loss or damage which may be caused to SSS' employees or property or third person due to CONTRACTOR's employees' fault or negligence, and further binds itself to hold SSS free and harmless from any of such injury or damage. SSS shall not be responsible for any injury, loss or damage which CONTRACTOR or any of its employees may sustain in the performance of CONTRACTOR's obligations under this Agreement.

	14. SETTLEMENT OF DISPUTES. If any dispute or difference of any kind whatsoever shall arise between SSS and CONTRACTOR in connection with or arising out of this Agreement, the Parties shall make every effort to resolve amicably such dispute or difference by mutual consultation. If after thirty (30) days, the Parties have failed to resolve their dispute or difference by such mutual consultation, then either SSS or CONTRACTOR may give notice to the other Party of its intention to commence arbitration, in accordance with RA No. 876, otherwise known as the "Arbitration Law" and RA No. 9285, otherwise known as the "Alternative Dispute Resolution Act of 2004," in order to settle their disputes. No arbitration in respect of this matter may be commenced unless such notice is given. Notwithstanding any reference to arbitration herein, the Parties shall continue to perform their respective obligations under this Agreement unless they otherwise agree. 15. VENUE OF ACTIONS. In the event court action is necessary in order to promote Arbitration, such action shall be filed only before the proper courts of Quezon City, to the exclusion of all other venues. 16. GOVERNING LAW. The Agreement shall be governed by and interpreted according to the laws of the Republic of the Philippines. 17. AMENDMENTS. This Agreement may be amended only in writing and executed by the parties or their duly authorized representatives. 18. SEPARABILITY. If any one or more of the provisions contained in the contract or any document executed in connection herewith shall be invalid, illegal or unenforceable in any respect under any applicable law, then: (i) the validity, legality and enforceability of the remaining provisions contained herein or therein shall not in any way be affected or impaired and shall remain in full force and effect; and (ii) the invalid, illegal or unenforceable provision shall be replaced by the parties immediately with a term or provision that is valid, legal and enforceable and that comes closest to expressing the intention of such invalid illegal or unenforceable term of provision. 19. BINDING EFFECT. The Agreement shall be binding upon the Parties hereto, their assignee/s and successor/s-in-interest.
10	Dayworks are applicable at the rate shown in the Contractor's original Bid.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within **five (5) calendar days** after the conduct of pre-construction meeting.
11.2	The Program of Work update must be submitted within seven (7) calendar days from notice of change in the general methods, arrangements, order, and timing for all the activities, if any. Ten percent (10%) of the progress billing will be withheld on top of applicable ten percent (10%) retention money for late submission of an updated Program of Work.
13	Advance payment is not allowed.
14	Progress payment shall be made in four (4) billings and upon written request by the Contractor, following the matrix below:

<table>
<tr><td></td><td>
<table>
<tr><th>PROGRESS PAYMENT</th><th>BASIS OF PAYMENT</th></tr>
<tr><td>1st Billing</td><td>20% or more work accomplishments</td></tr>
<tr><td>2nd Billing</td><td>50% or more work accomplishments</td></tr>
<tr><td>3rd Billing</td><td>75% or more work accomplishments</td></tr>
<tr><td>4th or Final Billing</td><td>One Hundred percent (100%) completion of the project and upon issuance of Certificate of Completion as certified by the Procuring Entity’s Representative/s</td></tr>
</table>

Materials and equipment delivered on the site but not completely put in place shall not be included for payment.

The 10% amount of retention money and the cumulative value of the work previously certified and paid for shall be deducted from the progress payments as prescribed in item 5 of Annex E of the Revised IRR of RA 9184.</td></tr>
<tr><td>15.1</td><td>The contractor must submit the “as built” drawings within fourteen (14) calendar days from the completion of the project.</td></tr>
<tr><td>15.2</td><td>SSS shall withhold ten percent (10%) of the amount of Final Billing for failing to submit “as built” drawings within fourteen (14) calendar days from the completion of the project.</td></tr>
</table>

Section VI. Specifications

PROJECT : RETROFITTING OF NAGA AND CALAMBA BUILDINGS

SPECIFICATIONS

A. GENERAL REQUIREMENTS

A.1. Scope of Work

a. The work contemplated under this Contract shall consist of furnishing of all materials, labor, plant, tools and equipment, permits including the satisfactory performance of all work necessary for the complete execution of all work as shown on the plans, specifications and other contract documents. The following are the scope of work:

Retrofitting Works (refer to "Annex A" for details)

1. Surface preparation/repair prior to application of FRP and/or enlargement of structural beams/girders and columns.

2. Application of FRP system including provision of plastering or topcoat for composite fibers and enlarged beams/girders and columns.

3. Restoration of all affected areas, surfaces, finishes, fixtures/equipment, utilities that are affected during retrofitting works.

The General Contractor is required to submit material testing results, detailed methodologies and drawings as required per Technical Specifications.

Miscellaneous Works

1. Provision/ installation of safety signage, dust barriers, board-ups, floor coverings and other safety requirements for the protection of SSS personnel and clients, properties, Contractor's personnel, etc. at the work site and other affected areas.

2. Removal of existing ceiling covers, joists, etc. to provide access during installation works.

3. Repair/ restoration of affected ceiling, wall surfaces, floor finishes, fixtures and other affected components of electro-mechanical system, and structured cabling/ datacom.

4. Temporary relocation/ transfer of employee workstations and office equipment that will be affected by the retrofitting works.

Provide temporary power and datacom outlets at the relocation space. Return all affected workstations and office equipment to its original location immediately after restoration works were deemed complete and accepted by the Implementing Unit. Ensure that all power and datacom outlets are properly working and/or energized.

As-built Plan and Electronic File

1. Preparation and submission of three (3) sets as-built plans in 20" x 30" blueprint format duly signed and sealed by the Contractor's Structural Engineer upon checking/review by the Structural Design Consultant of the retrofitting project.

2. The Contractor shall likewise submit electronic file copy of as-built plan in CAD format (should be compatible with earlier versions of AutoCAD software).

b. Materials and work deemed necessary to complete the project but not specifically mentioned in the Specifications, working drawings or in the other contract documents are inferred and shall be supplied, installed and rendered by the Contractor without extra cost

to the Owner. Such material shall be of the highest quality available, installed and applied in workmanlike manner at prescribed or appropriate locations.

A.2 Workmanship

All required phases of work shall be done by skilled and competent men who regularly engaged or specialized in the type of work specified. Workmanship shall be the very best trade practice.

A.3 Site Examination

Examine the site premises and all conditions apparent and visible therein. Consider all such conditions that may affect work. Measure every existing work/structure at site. Verify all given dimensions and deviations in the plans/ drawings and Bill of Quantities. It shall be understood that the work covers all exposed external surfaces regardless of measurements made.

A.4 Protection of Work and Property

Provide adequate protection on the existing furniture, equipment, and other areas not affected by the work specified. Place warning signs where work is being undertaken. Remove work materials damaged by failure to provide protection. Replace with new work materials at no extra cost to the Owner.

Any damages incurred during the activity shall be restored/ repaired by the Contractor at his own expense and shall be dine in as satisfactory and approved manner.

Submit Construction Safety and Health Program (CSHP) approved by the Department of Labor and Employment to ensure the protection and welfare of all employed construction workers and general public.

A.5 Submittals

The Contractor shall submit sample finishes and contractor-furnished materials for approval of the SSS Implementing Unit and/or the Structural Design Consultant.

A.6 Cleaning

Leave premises clean, neat and orderly. Remove all stains, spots, blemishes, soil dirt from all finished work. Remove all excess materials and supplies, rubbish, trash, construction debris and soil, used containers, and unusable tools/equipment out of the SSS premises during the progress of work and upon completion of work.

A.7 Insurance

Within fifteen (15) days from the execution of the Contract Agreement, the Contactor shall, at its own expense, obtain the following insurance from company/ies duly accredited by the Office of the Insurance Commissioner and likewise acceptable to the Client and maintain the same for the duration of the Contract Agreement or any extension thereof or until the Final Acceptance of the Project:

a. All-risk Insurance – Contractor's All-Risk Insurance Policy in the amount equivalent to the total Contract Price;

b. Transportation Insurance – Insurance for the Equipment, Machinery and supplies owned by the Contractor and transported to the Site;

c. Personal Insurance – Personal Injury and Death Insurance for the employee of the Contractor; and

d. Third Party Liability Insurance – Comprehensive Insurance for Third Party Liability to Contractor's direct or indirect act or omission causing damage to third persons.

B. TECHNICAL SPECIFICATIONS

B.1 Site/ Preparatory Works

Dismantling works shall be done with extra care so that all salvageable and reusable materials are removed with least damage. Turn-over such materials to concerned SSS Building Administrator for safekeeping. Dispose waste materials off-site.

B.2 Carpentry Works

Lumber shall be kiln-dried and free from defects such as loose and unsound knots, pitch, pockets, sapwood, cracks and other imperfections impairing its strength, durability and appearance.

Plywood shall be free from defects such as split in veneer, buckling or warping and shall conform to the requirement of the Philippine Trade Standards.

Exposed wood surfaces shall be free from disfiguring defects such as raised grains, stains, uneven planning, sanding, toll marks and scratches. Exposed surfaces shall be machine or hand-sanded to an even, smooth surface and ready for painting or other applicable finishes.

Ceiling shall be repaired or restored using the same materials and finishes as existing. Correct deflections or bends in the ceiling by providing additional vertical supports/hangers and ceiling joists.

B.3 Retrofitting Works (refer to Annex A)

B.4 Painting Works

a. Manufacturer

Application shall be as per manufacturer's instructions. Submit all samples for approval by the EFMD prior to final application. All items of work not specified but necessary to complete the project shall be painted with appropriate paint. Finish work shall be smooth and free from any imperfection.

b. Painting Schedule

Proper surface preparation shall be done prior to application of paint. Use appropriate primers. Allow the first coat to dry prior to application of the second coat.

<u>Doors/jambs, baseboards/mouldings and frames (lacquer-based finish)</u>

Apply lacquer putty all through-out plywood surfaces, smoothen thoroughly with sandpaper prior to application of lacquer primer and 2 coats lacquer paint or until desired finish is attained (spray applied).

<u>For new plywood/wood surfaces</u>

Apply polituff with hardener on rough and uneven surfaces and joints. Smoothen thoroughly with sandpaper and apply low-odor wood primer. Apply one coat (or 2 coats, if necessary) flatwall enamel on surfaces that will be covered by wallpaper and 2 coats semi-gloss enamel as topcoat for other wood surfaces not covered by wallpaper.

<u>For existing masonry wall/ drywall partition/ ceiling</u>

Remove/clean off loose paints using sandpaper, apply polituff with hardener/ masonry putty on rough and uneven surfaces. Smoothen thoroughly with sandpaper prior to application of proper primers. Apply topcoats using: 1 coat flat latex paint for wallpaper finish surfaces, 2 coats semi-gloss latex for wall surfaces, 2 coats flat latex on acoustic ceiling.

For window grilles, lighting frames and A/C diffusers

Clean off loose materials such as old paint or anything that can be manually removed by using brush, scrapers, etc. Apply 2 coats of quick dry enamel paint; colors similar to the existing.

The Contractor shall submit sample paint finishes for approval of the SSS Implementing Unit prior to application.

B.5 Electrical Works

General Conditions

1. All electrical works shall be done in accordance with the approved plans and specifications;

2. All materials and equipment to be used shall be brand new, must be of the approved type and shall conform with the standards of Philippine Electrical Code, Underwriter's Laboratories, Inc. (UL), ASA, IIEE, NEMA, IPCEA and ASTM;

3. Sample of materials shall be submitted for approval as required by the Owner's Representative;

4. Rough-in layout above ceiling shall be concealed with intermediate metallic conduit (IMC);

5. Rough-in layout concealed between walls shall be IMC and/or Polyvinyl Chloride (PVC);

6. Rough-in layout embedded in concrete slab or under the floor shall be PVC;

7. Outdoor roughing-in layout shall be rigid steel conduit (RSC);

8. PVC pipe fittings layout shall be provided with appropriate PVC adapter with locknut and glued with PVC solvent;

9. All electrical conduits, fittings, boxes and insulations shall be rigidly secured using appropriate connectors and supports at standard intervals;

10. Minimum size of conduit to be used shall be 15mm diameter;

11. Minimum size of conduit to be used for long runs exceeding 270° bend shall be 20 mm diameter;

12. Color coding mode in wiring receptacle outlets shall be as follows. Any deviation herewith shall be indicated in the as-built plans:

C.	FOR NORMAL POWER	D.	
E.	Line 1	F.	Black
G.	Line 2	H.	Red
I.	Ground	J.	Green
K.	FOR UPS POWER	L.	
M.	Line 1 and 2	N.	White
O.	Ground	P.	Green

13. Adapt existing color coding or mode of labelling for receptacle outlet device plate covers to identify UPS from normal power source;

14. Provide labelling/ marking on panel board directory prior to turnover to the Owner;

15. Newly installed conduits and boxes/pullboxes shall be painted with applicable finishes as protection against deterioration;

16. All works shall be properly coordinated with the Project Engineer or authorized representative of the Implementing Unit;

17. Testing, commissioning and proper documentations shall be made prior to turn-over of the completed project;

18. All areas affected by the installation works, chipping, dismantling, relocation and other related activities shall be repaired or restored to its original condition at the sole expense of the Contractor;

19. The plans are diagrammatic and do not necessarily show all fittings, etc. the locations of equipment/apparatus and appliances shown on them are approximate. The Contractor shall be responsible for the proper location in order to make them fit with the electrical details/plans and on-site instructions.

20. All dismantled devices and materials shall be properly accounted and turned-over to the Engineering and Facilities Maintenance Department (EFMD) for proper disposition.

Products and Execution

1. All wiring materials shall conform to the Philippine National Standard, IIEE 04/PNS 662:1992. The standard specifies the allowable capacities of insulated conductors rated 0-35,500 volts for different temperatures, insulation materials and conditions.

2. All wires and cable shall comply with the requirements of the PNS, Underwriters Laboratories, ASTM and the IPCEA as they apply to the particular usage.

3. All wire and cable shall be plastic insulated for 600 volt working pressure, type THW or THWN unless otherwise noted on plans or specified below.

4. All wires 3.5 mm^2 and larger shall be stranded.

5. All wires shall be of recent manufacturing and in no case shall be more than six month old. Any conductor whose insulation shows signs of deterioration within one (1) year from final acceptance of the work shall be replaced by the Contractor.

6. All wires shall be continuous from outlet to outlet and there shall be no splice except in outlet or junctions and pull/terminal boxes.

7. Wiring shall only be permitted if conduit installation has been completed and approved by the Owner or its representative. Permission to wire shall be given by the Engineer or Architect in writing.

B.6 Mechanical Works

All materials, machineries, and equipment shall be of the required quality used in good commercial and trade practice and shall be essentially the standard products if reputable manufacturers. The acceptability of these items including their workmanship and method of installation shall be established by the following:

a. The Philippine Mechanical Engineering Code
b. The Philippine Electrical Code
c. Fire Code of the Philippines
d. Building Code of the Philippines
e. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
f. American Society of Mechanical Engineer (ASME)
g. National Fire Protection Associations (NFPA)
h. Air Moving and Conditioning Association (AMCA)

Aside from herein specified, the equipment and materials to be furnished and the installation of the systems shall conform to local laws, codes and other ordinances that are being enforced.

Note: Aforementioned specifications for electrical and mechanical works are general in nature. However, the Contractor shall adhere to the herein stated specifications when applicable, specifically in the repairs/restoration of affected components of existing electrical and mechanical system. Likewise, specific electro-mechanical and datacom matters shall be referred to the SSS Implementing Unit for evaluation and/or approval.

PART 1 - WORKING DRAWINGS

1.1 In the interpretation of Structural Plans, indicated dimensions shall govern and distances or sizes shall not be scaled for construction purposes.

1.2 In cases of conflict in details or dimensions between the Architectural and Structural plans, verify with the Structural Engineer or his authorized representative for decision.

1.3 In case of conflict between the Structural Plans and Structural Specifications, the Plans shall govern.

PART 2 - EQUIPMENT LOADING

2.1 Equipment not indicated in the plans shall not be installed without the approval of the Structural Engineer.

2.2 The Manufacturer shall submit equipment data specifying the service weight, its reaction at the base, and its vibration characteristics.

PART 3 - REINFORCED CONCRETE BEAMS

3.1 Unless otherwise noted in the plans or specifications, camber all reinforced concrete beams at least 10 mm for every 4000 mm of clear span and for cantilever beams shall be 50 mm for every 3000 mm of clear span.

3.2 When a beam crosses a girder, rest beam bars on top of the girder bars. At column intersection girder bars shall be on top of beam bars.

PART 4 - REINFORCED CONCRETE SLABS

4.1 Unless otherwise noted in plans or specifications, camber all reinforced concrete slabs 8 mm per 3000 mm of shorter span and 14 mm for every 2000 mm of cantilever span.

4.2 If bars are reinforced both ways, bar along the shorter span shall be placed below those along the long span at the center and over the longer span bars near the supports.

PART 5 - STRUCTURAL TOLERANCES

Unless otherwise specified by the Structural Engineer, the following are the acceptable tolerances for cast-in-place concrete construction. All dimensions not within the required tolerances shall be corrected prior to pouring of concrete.

5.1 Cross sectional dimensions and location of reinforcement

Dimension less than 200 mm	- + 6 mm
200 mm to 600 mm	- + 9 mm
Over 600 mm	- + 12 mm

5.2 Deviation from straight line (Sweep and/or plumbness) - + 6 mm per 3000 mm

5.3 Locations of bar cut-off or bonds - + 50 mm

PART 6 - CONCRETE PROTECTION FOR BUNDLED REINFORCEMENT

6.1 For bundled bars, the minimum concrete cover shall be equal to the equivalent diameter of the bundled bars, but need not be greater than 50 mm.

PART 7 - STANDARD HOOKS

7.1 "Standard hook" for rebars shall mean either of the following:

7.1.1 A semi-circular turn plus an extension of at least 4 bar diameter but not less than 65 mm at free end of bar.

7.1.2 A 90-degree turn plus an extension of at least 12 bar diameter at the free end of bar.

7.2 Minimum diameter of bend measured on the inside of the bar shall be as follows:

10 mm Ø to 25 mm Ø	- 6 bar diameter
28 mm Ø to 32 mm Ø	- 8 bar diameter
No. 11 to No. 18	- 10 bar diameter

PART 8 - WELDED SPLICES

8.1 The Contractor shall submit details of all welded splices for approval by the Structural Engineer.

8.2 Only Certified welders shall be allowed to perform welding operations.

8.3 Connection of crossing bars by tack welding is not allowed.

PART 9 - CONSTRUCTION JOINT

9.1 Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance and standing water removed. Vertical joint also shall be thoroughly wetted and coated with rich cement grout immediately before pour of new concrete.

PART 10 - PIPES EMBEDDED IN CONCRETE

10.1 Conduits and pipes, with their fittings, embedded within a concrete column shall not displace more than 4 percent of the cross-sectional area where strength is calculated or required for fire protection.

10.2 Vertical pipes are not allowed to punch through beams or girders.

10.3 Aluminum pipes shall not be embedded in concrete.

PART 1 – GENERAL

1.1 SCOPE

The work shall consist of the removal of all superficial obstructions including trees, shrubs and the like on the site in the way of or otherwise affected by the work as shown on the drawings. The Contractor shall clear each part of the site at times and to the extent required or approved by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials and equipment required for the proper execution of the work of this section shall be selected by the Contractor subject for approval of the Engineer.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

a. Where shown on the Drawings or directed by the Engineer trees shall be unprotected or cut down as near as possible to ground level. Any individual tree as the Engineer may mark in white paint shall be left standing. When necessary to prevent injury to structures, other trees shall be cut in sections from the top downward.

b. Stumps, tree roots, undergrowth, bushes, vegetations, logs, branches and the like and rubbish and other objectionable material shall, unless otherwise directed by the Engineer, be grubbed up or clear and disposed off in accordance with Item 3.2 of this section.

c. Holes left by stumps or roots shall, within one week, be filled with suitable material and compacted in accordance with Section 02200 - Earthwork.

3.2 DISPOSAL OF MATERIALS

All cleared materials shall be burnt or disposed off the site dumps to be provided by the Contractor in a manner approved by the Engineer.

PART 1 – GENERAL

1.1 SCOPE

1. Work Included:

    a. Furnish equipment and perform labor required to complete demolition of reinforced concrete floor slab removal of rubbish and debris

    b. See drawings for area coverage of work involved

1.2 DUST CONTROL

1. Take appropriate action to check the spread of dust at occupied portions of the building and to avoid the creation of nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution.

1.3 PROTECTION

1. Protect existing work which is to remain in place, that is to be reused, or which is to remain the property of the owner by temporary covers, shoring, bracing and supports. Items which are to remain damaged during performance of the work shall be repaired to their original condition and replace with new. Do not overload structural elements. Provide new supports and reinforcement for existing construction weekend by demolition or removal.

2. Protect all electrical and mechanical services and utilities.

PART 2 – PRODUCTS

2.1 DISPOSAL MATERIALS

1. All salvageable materials shall remain the property of the Owner. Salvaged materials shall be hauled by the Contractor to the Owner’s storage within 300 meters radius without additional cost to the Owner.

2. All debris and other materials resulting from the demolition work shall be immediately removed from the premises.

PART 3 – EXECUTION

3.1 CLEAN UP

1. Remove and transport debris and rubbish in a manner that will prevent spillage on adjacent areas. Clean up spillage from adjacent areas.

3.2 EQUIPMENT

1. Compressor type and other high vibratory equipment are not to be used for areas with precast construction. Submit methodology for evaluation and approval.

2. Rebars are to be mechanically/manually cut but in no instance by acetylene.

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition shall be applicable.

1.1.1 U.S. Army Corps of Engineers (COE) Waterways Experiment Station Publications:

CRD-C-572	Specifications for Polyvinylchloride Waterstop
CRD-C-621	Handbook for Concrete and Cement, Specification for Nonshrink Grout, Volume II
PS 1	Construction and Industrial Plywood

1.1.2 American Concrete Institute (ACI) Publications:

117	Standard Tolerances Of Construction for Concrete Construction and Materials.
211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
301	Specifications for Structural Concrete for Buildings
302	Guide for Concrete Floor and Slab Construction
304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
315	Details and Detailing of Concrete Reinforcement
347	Recommended Practice for Concrete Formwork

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 82	Cold-Drawn Steel Wire for Concrete Reinforcement
A 185	Welded Steel Wire Fabric for Concrete Reinforcement
A 615	Deformed & Plain Billet-Steel Bars for Concrete Reinforcement
C 31	Making and Curing Concrete Test Specimens in the Field
C 33	Concrete Aggregates
C 39	Compressive Strength of Cylindrical Concrete Specimens
C 42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C 94	Ready-Mixed Concrete
C 143	Slump of Portland Cement Concrete
C 150	Portland Cement
C 171	Sheet Materials for Curing Concrete
C 172	Sampling Freshly Mixed Concrete
C 309	Liquid Membrane-Forming Compounds for Curing Concrete
C 494	Chemical Admixtures for Concrete
C 881	Epoxy-Resin-Base bonding Systems for Concrete
C 920	Elastomeric Joint Sealants
D 1190	Concrete Joint Sealer, Hot-Poured Elastic Type
D 1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous types)
D 1752	Preformed Sponge Rubber and Cork Expansion Joint Filler for Concrete Paving and Structural Construction
D 1850	Concrete Joint Sealer, Cold Application Type

1.1.4 American Welding Society (AWS) Publication:

D1.4	Structural Welding Code-Reinforcing Steel

1.2 DESCRIPTION OF WORK: The work includes the provision of cast-in place concrete. In the ACI publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Reproductions of contract drawings are unacceptable.

1. Shop Drawings for Reinforcing Steel: ACI 315. Unless otherwise waived by the Engineer, the Contractor shall submit three (3) sets of shop drawings for review and approval by the Engineer prior to any steel reinforcing bar fabrication and installations. Shop drawings shall be drawn on either 20" x 30" or 30" x 40" sheets. Indicated bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

1.3.2 Contractor Mix Design: Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type, brand, source and amount of cement, and admixtures; applicable reference specifications; and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Provide fly ash and pozzolan test results performed within 6 months of submittal date. Obtain approval before concrete placement. Submit additional data regarding concrete aggregates if the source of aggregate changes.

1.3.3 Certificates of Compliance:

a. Aggregates
b. Admixtures
c. Reinforcement
d. Cement

1.3.4 Catalog Data:

a. Waterstops
b. Materials for Curing Concrete
c. Joint Sealant
d. Joint Filler
e. Vapor Barrier
f. Epoxy Bonding Agents

1.4 DELIVERY: Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement.

PART 2 - PRODUCTS

2.1 CONCRETE

2.1.1 Contractor-Furnished Mix Design: ACI 211.1 and ACI 301. Concrete shall have a 28-day compressive strengths as specified or indicated on the drawings. Provide ASTM C 33 aggregate size no. 57 and 67. The maximum chloride content shall not exceed one percent.

2.1.1.1 Slump Requirements:

The allowable slump shall be as follows:

ELEMENT	SLUMP (mm)	
	MINIMUM	MAXIMUM
Walls, columns, and grade beams	50	130
Floors, exterior slabs, and other building construction	25	100

2.2 MATERIALS

2.2.1 Cement: ASTM C 150, Type I for general use in construction; Type II where concrete is exposed to moderate sulfate action or where moderate heat of hydration is required.

2.2.2 Water: Water shall be fresh, clean and potable.

2.2.3 Aggregates: ASTM C 33, Class 1N or 2N, except as modified herein. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement. Aggregates shall consist of gravel, crushed gravel, or crushed stone conforming to the requirements of ASTM C 33. Submit test results as required in ASTM C 33.

1. Aggregates for Lightweight Concrete: ASTM C330.1

2.2.4 Non-shrink Grout: COE CRD-C-621.

2.2.5 Admixtures: Water-reducing retarders shall be used in proportions recommended by the manufacturer. Trial mixes shall be made with the admixture and job materials at temperatures and humidities anticipated on the project. Sampling and testing shall be performed at no cost to the Owner, and with the supervision of the Project Inspector.

1. Water Reducing: ASTM C 474, Type A or F.

2.2.6 Reinforcement:

2.2.6.1 Reinforcing Bars: ACI 301 unless otherwise specified. ASTM A 706, Grade 60 (see notes on drawings.) ASTM 615, Grade 40 and 60 may be used provided it meets the requirement s of NSCP with regards to their strengths.

2.2.6.2 Welded Wire Fabric: ASTM A 185 or ASTM A 497.

2.2.6.3 Wire: ASTM A 82 or ASTM A 496.

2.2.7 Vapor Barrier: ASTM C 171 polyethylene sheeting, minimum 6 mil thickness.

2.2.8 Polyvinylchloride Waterstops: COE CRD-C-572.

2.2.9 Materials for Curing Concrete:

1. Impervious Sheeting: ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene - coated burlap.

2. Pervious Sheeting: AASHTO M 182.

3. Liquid Membrane-Forming Compound: ASTM C 309, white-pigmented, Type 2 Class B, free of paraffin or petroleum.

4. Liquid Chemical Sealer-Hardener Compound: Compound shall not contain petroleum resins or waxes. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing waterproofing, or other material applied to concrete.

2.2.10 Expansion/Contraction Joint Filler: ASTM D 1751 or ASTM D 1752, 1/2-inch thick, unless otherwise indicated.

2.2.11 Joint Sealants

1. Horizontal Surfaces (3 percent slope, maximum):

   a. Outside Buildings: ASTM D 1190.
   b. Inside Buildings: ASTM D 1190 or ASTM D 1850.

2. Vertical Surfaces (greater than 3 percent slope): ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.2.12 Epoxy Bonding Compound: ASTM C 881, Type I, for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete.

PART 3 - EXECUTION

3.1 FORMS: ACI 301. Provide forms, shoring, and scaffolding for concrete placement unless indicated or specified otherwise. Concrete for footings may be placed in excavations without forms upon inspection and approval by the Engineer. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners or concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.1.1 Coating: Before concrete placement, coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms of surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.2 Removal of Forms: Prevent concrete damage during form removal. After placing concrete, forms shall remain in place for the following minimum time period, not necessarily consecutive, where minimum temperatures specified in paragraph entitled “Curing Period and Minimum Temperatures” are maintained adjacent to the concrete and formwork. The minimum time period for removal of forms shall govern where it exceeds the minimum specified curing period. Where the formwork for one element supports the formwork for another element, the greater time period shall apply to both elements.

ELEMENT	TIME PERIOD (Days Minimum)
Walls, columns, sides of beams girders and slabs on grade	1
Pan joist forms (sides only):	
30 inches wide or less 3 Over 30 inches wide	4
Joist, beam, or girder soffits:	
Clear span between structural supports	
Under 10 feet	7
10 to 20 feet	14
Over 20 feet	21

One-way floor slabs: Clear span between structural supports	
Under 10 feet	4
10 to 20 feet	7
Over 20 feet	10

3.1.3 Reshoring: Re-shore concrete elements where forms are removed prior to the specified time period. Do not permit elements to deflect or accept loads during form stripping or reshoring. Where columns, walls, or other load-bearing concrete members are placed in advance of other framing and forms are needed for future use, forms may be stripped after 2 days if loads are not applied to load-bearing members, and if members are cured as specified in paragraph entitled "Curing and Protection". After forms are removed, slabs and beams over 10 feet in span and cantilevers over 4 feet shall be re-shored for the remainder of the specified time period in paragraph entitled "Removal of Forms." Perform reshoring operations to prevent subjecting concrete members to overloads, eccentric loading, or reverse bending. Reshoring elements shall have the same load-carrying capabilities as original shoring and shall be spaced similar to original shoring. Firmly secure and brace reshoring elements to provide solid bearing and support.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301. Provide bars, wire, fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not contain rust, scale, oil, grease, clay, and foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per foot of the reinforcement has been reduced to less than specified in paragraph entitled "Reinforcing Bars". Remove loose rust prior to placing steel. Tack welding is prohibited.

3.3 MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE

ASTM C 94, ACI 301, ACI 302.1R, and ACI 304, except as modified herein. ASTM C 94

Provide mandatory batch ticket information for each load of ready mix concrete.

3.3.1 Measuring: Make moisture, weight, and air determination of intervals as specified in paragraph entitled "Sampling and Testing." Allowable tolerances for measuring cement and water shall be 1 percent; for aggregates, 2 percent; and for admixtures, 3 percent.

3.3.2 Mixing: ASTM C 94. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F unless it can be proven by test results that the time can be increased with the addition of admixtures. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

3.3.3 Transporting: Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or

chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.3.4 **Placing:** Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris and water from within the forms. Deposit concrete as close as practicable to the final position in the forms. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10-foot centers maximum in each direction when pouring interior slabs and on 20-foot centers maximum for exterior slabs.

3.3.4.1 Vibration: ACI 301. Furnish a spare vibrator at the jobsite whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straight edge. Operate vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18-inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.3.4.2 Application of Epoxy Bonding Compound: Apply a thin coat of compound to dry, clean surfaces where indicated. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is stringy. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy-resins.

3.4 SURFACE FINISHES (EXCEPT FLOOR, SLAB AND PAVEMENT FINISHES)

3.4.1 **Defects:** Repair formed surfaces by removing minor honeycombs, pits greater than one square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with non-shrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb (including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate or other defects) which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI 347. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

3.4.2. **Not Against Forms (Top of Walls):** Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.4.3 Formed Surfaces:

3.4.3.1 As-Cast Rough Form (For Surfaces Not Exposed to Public View): Remove fins and other projections exceeding 0.25 inch is height; level abrupt irregularities.

3.4.3.2 As-Cast Smooth Form (For Surfaces Exposed to Public View): Form facing material shall produce a smooth, hard, uniform texture on the concrete. Remove fins and other projections.

3.4.4 Rubbed Finish: Provide concrete with a smooth form finish. Finish as follows:

a. Smooth Rubbed: Provide a newly hardened concrete within 24 hours following form removal. Wet surfaces and rub with an abrasive tool to produce uniform color and texture. Use only the cement paste drawn from the concrete rubbing process.

b. Grout Cleaned: Finishing operations shall not begin until adjacent surfaces to be cleaned are completed and accessible. Cleaning as the work progresses shall not be permitted. Mix one part cement and 1.5 parts fine sand with sufficient water to produce a grout with the consistency of thick paint. Substitute white cement for a part of the gray cement in order to produce a color matching the color of the surrounding concrete, determined by a trial patch. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout. Apply the grout uniformly with brushes or spray gun. Immediately after applying the grout, scrub the surface vigorously with cork float or stone to coat the surface and fill air bubbles and holes. Remove excess grout while still plastic by working the surface with a rubber float, sack, or other approved method. When dry, rub the surface vigorously with clean burlap. Keep damp for 36 hours minimum after final rubbing.

3.4.5 Surface Finish Samples: Provide a minimum of three samples concrete panels for each finish for each mix design, 3 feet by 3 feet, 3 inches thick. Use the approved concrete mix design(s). Provide sample panel on-site at locations directed. Once approved, each set of panels shall be representative of each of the finishes specified and shall be representative of the workmanship and finish/es required. Do not remove or destroy samples until directed by the Architect.

3.5 FLOOR, SLAB AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION. ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Depress the concrete base slab where quarry tile, ceramic tile, or marble tile are indicated. Provide interior floor slabs with a steel troweled finish or power float finish, as required. After troweling is completed, apply a liquid chemical sealer-hardener compound on interior floor slabs that do not receive floor covering.

3.5.1 Finish: Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.5.1.1 Floated: Provide for machinery pads and other exterior slabs where not otherwise specified. Float the surface by hand with a wood or magnesium float, or use a power-driven float. Floating or any one area shall be the minimum necessary to produce an even finish, level within 1/4 inch in 10 feet for exterior work and level within 1/8 inch in 10 feet for interior work where floor drains are not provided.

3.5.1.2 Steel Troweled: First, provide a floated finish. When slab attains a proper set, trowel to a smooth, hard, dense finish. Finished surfaces shall be free of troweled marks, uniform in texture, and a true plane, flat within 0.01 foot (Approximately 1/8 inch) in 10 feet. Hand finish portions of the slab not accessible to power-finishing equipment (e.g., edges, corners) to match the remainder of the slab. Power trowel once and finally hand trowel where a finished floor covering (e.g., tile, carpet) is specified. Power trowel twice and finally hand trowel for exposed concrete floors.

3.5.1.3 Broomed: Provide for exterior walks, platforms, patios, and ramps unless otherwise indicated. Provide a floated finish, then finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.5.1.4 Pavement: Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straight edge to check slope and flatness; correct and refloat as necessary. Obtain final finish by belting. Lay belt flat on the concrete surface and advance with a sawing motion; continue until a uniform but gritty non-slip surface is obtained. Round edges and joints with an edger having a radius of 1/8 inch.

3.5.2 Concrete Walks: Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints ¾ inch deep with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; spac expansion joints every 50 feet maximum apart. Provide walks with a broomed finish. Provide a transverse slope of 1/4 inch per foot. Limit variation in cross section to 1/4 inch in 5 feet.

3.5.3 Pits and Trenches: Place bottoms and walls monolithically or provide waterstops and keys.

3.5.4 Curbs and Gutters: Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints ¾ inch deep with a jointing tool after the surface has been finished. Provide expansion joints ½ inch thick and spaced every 100 feet maximum unless otherwise indicated. Provide a pavement finish.

3.6 CURING AND PROTECTION: ACI 301 unless otherwise specified. Begin curing immediately following form removal. Protect concrete from injurious action by sun, rain, flowing water, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If

forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period.

3.6.1 Moist Curing: Provide for the removal of water without erosion or damage to the structure.

3.6.2 Liquid Membrane-Forming Compound Curing: Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pounds of water per square foot per hour.

3.6.3 Curing Period:

TIME PERIOD (Days Minimum)	CONCRETE STRUCTURE OR CEMENT TYPE
7	ASTM C 150, Type I or II, either with or without fly ash, pozzolan or ground slag; and ASTM C 595 cement for concrete not specified otherwise.
10	Retaining walls that will be subjected to deteriorating conditions; pavement not under a roof, chimneys.
14	Water tanks for potable and non-potable water; structures that will be in contact with water; decks and similar parts of water front structures over seawater that will not ordinarily be wetted by sea-water.

3.6.3.1 Additional Curing: Double the required curing period if either one or the average of both 7-day test cylinders indicate less than 90 percent of the strength specified (f'c).

3.7 SAMPLING AND TESTING:

3.7.1 Sampling: ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31 for making test specimens. Samples shall be collected at final discharge point.

3.7.2 Testing:

3.7.2.1 Slump Tests: ASTM C 143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 10 cubic yards (maximum) of concrete.

3.7.2.2 Temperature Tests: Test the concrete delivered and the concrete in the forms. Perform tests for each batch (minimum) or every 10 cubic yards (maximum) of concrete, until the specified temperatures obtained, and whenever test cylinders and slump tests are made.

3.7.3. Compressive Strength Tests: ASTM C39. Sampling shall be in accordance with ASTM C 31. Obtain cylinder samples for compressive strength tests at the rate of three (3) sets of five (5) samples per set for each day's pour or for every 150 cubic meters of concrete poured or for every 500 square meters of area for slabs or walls, whichever is greater. Test two (2) cylinders at 7 days,

one (1) cylinder at 14 days and one (1) cylinder at 28 days, and hold one (1) cylinder in reserve. If the average strength of the 28-day test cylinders is less than the specified f'c and a maximum of one single cylinder is less than f'c minus 500 psi, obtain core samples for compressive strength tests in accordance with ASTM C 42 at the rate recommended in ACI 318. Concrete represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be re-tested. Remove concrete not meeting strength criteria and provide new, acceptable concrete. Repair core holes with non-shrink grout. Match color and finish of adjacent concrete.

3.7.4. Cost of Tests: All costs of initial tests for compressive strength of concrete and test for reinforcing bars shall be at the Contractor's expense. Cost of re-tests, core tests, load tests and other tests performed as a result of initial test failing to meet all specified requirements shall likewise be at the Contractor's expense.

3.8 SAMPLING AND TESTING OF STEEL REINFORCEMENT

3.8.1 The Contractor shall satisfy the Engineer that steel reinforcement delivered to the site has had sufficient routine inspection and testing carried out by the manufacturer. In addition the following routine testing shall be carried out on steel reinforcement delivered to the site.

3.8.2. Hot –Rolled Steel Reinforcing Bars

a. Every batch of steel bars delivered to the site shall be tested to verify the mass and tensile properties for every shipment of 5,000 kg or fraction thereof.

b. The test shall consist of 5 specimens. Abbreviated testing may be considered on a particular batch at the discretion of the Engineer. If the bar pattern of the specific diameter is acceptable for abbreviated testing the test shall consist of 3 specimens.

c. The specimens should be selected from different bars in the batch. A batch is defined as any quantity of bars of one size and grade, manufactured by the same mill, covered by the same mill certificate, and delivered to the site at any one time. Steel bars in more than one delivery to the site within a short period may be considered as part of the same batch provided that the deliveries belong to one single consignment from the manufacturer and are covered by the same mill certificate.

d. If one of more valid test results is less than 93% of the specified characteristics strength, the batch shall be deemed not complying with the characteristic strength requirements.

e. If one of more valid test results fail to meet the mass, tensile strength, elongation or bend test requirements, two additional specimens for each failure shall be taken from different bars for the same batch and subjected to the test, or tests in which the original specimen failed. If any of the additional specimens fail, the batch shall be deemed not complying.

f. The test report should contain the following information:

1. Full description of test specimens including names of steel manufacturer, country of origin, grade and size as stated by the person submitting them for testing;

2. Sketch of pattern deformation or mill marks;

3. Mill Certificate;

4. Identification of the batch and date of delivery to the site to which the test specimens relate;

5. Measured mass and calculated effective cross-sectional area of test specimens;

6. Results of yield stress tensile strength, elongation and bond tests if required.

3.9 COST OF TESTS

3.9.1 All costs of initial tests for compressive strength of concrete and test for reinforcing bars shall be at the Owner's expense, except costs of retests, core tests, load tests and other tests performed as a result of initial tests failing to meet all specified requirements, in which case costs shall be at the Contractor's expense.

3.10 TOLERANCES

3.10.1 Tolerances of formwork, reinforcements, finished concrete work shall be in accordance with ACI Standard 117.

PART 1 - GENERAL

1. SUMMARY

1.1 Structural steel framing and shoring system, complete with base plates, bracing, anchorage including the following:

a. Erection and connecting structural steel frame and temporary structural steel framework.

b. Baseplate grouting.

1.2 **APPLICABLE PUBLICATIONS:** The publications listed below form part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition shall be applicable.

1.2.1 American Institute of Steel Construction (AISC):

1. "Code of Standard Practice for Steel Buildings and Bridges," except Paragraph 4.2.1 is modified by deletion of the following sentence: This approval constitutes the owner's acceptance of all the responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings."

2. Manual of Steel Construction, Allowable Stress Design, 9th Edition, 1989.

3. "Specifications of the Design, Fabrication and Erection of Structural Steel for Buildings."

4. Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1.2.2 American Society of Testing and Materials (ASTM):

A6 General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
A36 Structural Steel.
A53 Pipe.
A123 Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.
A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A307 Carbon Steel Externally and Internally Threaded Standard Fasteners.
A325 High Strength Bolts for Structural Steel Joints.
A441 High Strength, low Alloy Structural Manganese Vanadium Steel.
A490 Quenched and Tempered Alloy Steel Bolts for Structural Steel Joint.
A500 Grade B Cold-Formed Welded and Seamless Carbon Steel Structuring Tubing.
A501 Hot-Formed Welded and Seamless Carbon Steel Structural Pipe.
A572 High Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
A588 High Strength Low-Alloy Structural Steel with 50,000 PSI Minimum Yield Point to 4-inch Thickness.

1.2.3 American Welding Society (AWS):

A2.4 Welding Symbols
A3-0 Terms and Definitions
A5.1 Specifications for Mild Steel Electrodes for Flux Cored Arc Welding.
A5.20 Specification for Low-Alloy Steel Covered Arc-Welding Electrodes.
A5-5 Specification for Low-Alloy Steel Covered Arc-Welding Electrodes.
A5.17 Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
A5-23 Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.
D1.1 Structural Welding Code-Steel.
D1-4 Reinforcing Steel Welding Code, including Metal Inserts and Connections in Reinforced Concrete.
F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

1.2.4 Federal Specifications (Fed. Spec.):

TT-C-490 Cleaning Method and Pretreatment of Ferrous Surfaces for Organic Coatings
TT-P-645 Primer Paint, Zinc Chromate, Alkyd Type

1.2.5 Military Specifications (Mil. Specs):

DOD-P-15328 Primer (wash,) Pretreatment (Formula No. 117 for Metals)
DOD-P21035A Paint, High Zinc Dust Content, Galvanizing repair

1.2.6 Steel Structures Painting Council (SSPC) Publications:

SP3 Power tool Cleaning
SP6 Commercial Blast Cleaning

1.3 QUALITY ASSURANCE

1.3.1 Fabricator/Erector: Must have plant, facilities and personnel qualified and sufficient to fabricate and/or erect structural metal framing as indicated on drawings. Must have minimum of 5 years experience and to be able, upon request, to show framing of size, materials and scope similar to work of this contract.

1.3.2 Material: Provide only structural steel certificate as conforming with specified requirements and fabricate especially to the requirements of this contract. Material which, does not conform to the requirements of this contract, may be rejected at any time prior to final acceptance.

1.3.3. Allowable Tolerances: Unless otherwise specified or noted on drawing, provide structural steel work in accordance with the following minimum tolerances:

a. Fabrication Tolerances: In accordance with requirements of AISC specification unless noted otherwise and as required to maintain the erection tolerances specified herein.

b. Erection Tolerances: In accordance with requirements of AISC. The contractor alone shall be responsible for the correct fitting of all structural members including the elevations and alignments. Refer to the drawings for additional requirements.

1.3.4 Connection Identification: Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that the Owners Testing Lab can refer to the person making the connection.

1.3.5. Test and Inspection: Work is subject to special testing and inspection. The fabricator/erector shall provide the Owners Testing Lab and Architect/Engineer access to places where material is being fabricated/erected. Notice shall be given for joints requiring inspection for proper end preparation, root opening, etc., prior to welding.

1.3.6 Connections Designed on the Structural Drawings:

a. Contractor shall not deviate from these designs unless approved by the Architect/Engineer.

b. Connections shown on the drawings may eliminate certain methods of erection.

c. If contractor elects a method of erection that required a change of some of the connections, it must be approved by Architect/Engineer.

1.3.7 Engineering by Contractor: Design and calculations shall be prepared by a Contractor's Structural Engineer, for the support of hoisting equipment, welding machines and other superimposed loads, for the stacking of materials such as metal decking, etc., and where required for temporary bracing, shoring and other safety related construction procedures.

a. It is Contractor's responsibility to obtain and pay for such engineering services.

1.3.8 Welder Qualifications:

a. Each welder performing work on this project shall be qualified in accordance with the American Welding Society. AWS D1.1.

b. He shall have been qualified a minimum of six (6) months before commencement of welding on this project.

c. Copies of each welder's qualification records shall be made available to the Engineer for inspection.

1.3.9 Inspections: Shop welding is to be done in ICBO approved licensed shops. Field welds shall be continuously inspected by a qualified inspector per UBC Section 306.

1.3.10 Vendor Quality Assurance: The fastener supplier shall visit the project site during the bolting start-up to demonstrate proper installation procedures and verify inspection procedure with the Owners Testing Lab. The fastener supplier must provide documentation of quality assurance including mill reports and description of bolt origin. Submit performance records from two

prior projects of similar size. Records should include percentage of bolt failure during erection and rate of replacement required during inspection. Supplier quality assurance program shall also be outlined. Program must include assurance that bolts from only one heat will be included in a keg.

1.3.11 Shop Testing by Contractor: The Contractor shall perform ultrasonic testing and visual inspection of all plate material and rolled sections greater than 1-½ inches in thickness and located at welded connections for discontinuities prior to fabrication. The test area is defined as a cone up to 6 inches away from the weld in the connection. These tests shall be in additional to the ultrasonic testing of all full-penetration welds which will be performed by the Owners Testing Lab. The contractor's testing shall be approved by the Architect/Engineer and Owners Testing Lab. All costs associated with this testing shall be borne by the Contractor.

a. Ultrasonic Testing: Conduct in accordance with ASTM A435 with the following modifications and supplementary requirements:

i. Supplementary Requirement S1, requiring 100 percent scanning of the test are to be included.

ii. Section 5.2, Acceptance Standards, is supplemented with the following provision: "The fabricator, insofar as practical, may reposition a rejected plate so that rejected defects are not located in a test area."

1.3.12 Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.4 SUBMITTALS

1.4.1 Shop Drawings: Submit shop drawings for review prior to commencing any fabrication of structural steel.

a. Before shop drawings are submitted, fabricator shall back check drawings to discover obvious drafting and detailing errors.

b. Show framing layout, dimensions, connections with adjoining materials and construction, finishes, welds, bolts and fasteners, anchoring and all fabrication or erection accessories required.

c. Show field welds, cuts, holes and fasteners.

d. Verify all dimensions and correlate with adjoining construction and materials.

e. Indicate size, type and grade of all members.

f. Include with each detail shown on the top shop drawings a reference to the Architect's and Engineer's drawings and details, where applicable.

1.4.2 Submit fabricator's quality assurance procedures to the architect, engineer, owner and Owners Testing Lab.

1.4.3 Indicate welded connections on shop drawings using standard AWS welding symbols. Show all welded connections with details showing size, length, location and type of welds.

1.4.4 Mill Reports: Submit certified copies of mill reports indicating heat and melt numbers of steel.

a. If test reports are not submitted or test reports cannot be identified with material proposed for use in the work, then secure and perform structural test on 5 percent of all such identified steel.

b. Contractor shall furnish all such material for testing and pay for all such tests.

c. Furnish Owner, Architect and Structural Engineer certified copies of all test reports.

1.4.5. Inspection Test Reports: Upon request, submit to Engineer copies of ultrasonic testing reports.

1.4.6 Placement Plans: Submit placement plans and details as required for the satisfactory placing, connection and anchorage of all structural members.

1.4.7 Survey Reports: Upon request, promptly submit an accurate survey of actual elevations and location of base plates and anchor bolts and alignments as well as elevations of all steel as noted on the drawings.

1.4.8 Certification: Submit manufacturer's certified test reports on load indicator washers and/or tension control bolts on at least three samples from each heat supplied to conform to tolerance range.

1.4.9 Welding Procedures: For welded joints pre-qualified and non pre-qualified by AWS D1.1, submit detailed description of welding procedures proposed for use on structural metals. Obtain approval prior to any welding operation. Furnish joint welding procedure qualification tests as required by AWS D1.1 for non prequalified welded joints.

1.4.10 Manufacturer's Certification: Required as follows:

a. Bolts, Nuts and Washers: Furnish complete manufacturer's mill test reports conforming to ASTM A325, Type 1, or ASTM A490. Markings and chemistry must also comply to specification. Certification numbers must appear on product containers and correspond to certification numbers on mill test report to be accepted. Mill test report must be supplied to both purchaser and Owners Testing Lab.

b. Filler material welding.

1.5 DELIVERY, STORAGE, HANDLING

1.5.1 Comply with the requirements of the general conditions and of ASTM A6, including the following.

1.5.2 Store materials to permit easy access for inspection and identification.

a. Keep steel members off the ground, using pallets, platforms or other supports.

b. Protect steel members and packaged materials from erosion and deterioration.

1.5.3 Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures at no additional

expense to owner.

1.5.4 Columns, beams, girders and other members, which are to receive sprayed-on fireproofing, shall be free of loose rust, heavy mill scale, oil, dirt or other foreign substances prior to application of fireproofing materials.

1.5.5 All fasteners shall be stored and protected in accordance with the current requirements of the "Specification for Structural Joints using ASTM A325 or A490 Bolts."

1.6 JOB CONDITIONS

1. **Coordination:** Coordinate exact locations of beam penetrations with mechanical and/or electrical contractor. Exact locations of all penetrations must be submitted to the Engineer for review.

2. **Temporary Bracing:** Temporary bracing and guylines shall be provided to adequately protect all persons and property and to ensure proper alignment.

3. **Temporary Floors:** All temporary flooring, planking and scaffolding necessary in connection with the erection of the structural steel or support of erection machinery shall be provided. The temporary floors or use of steel decking shall be as required by law and governing safety regulations. The reduced load capacity of members and assembly, especially the floor and roof beams and girders, due to their untraced connection prior to welding of metal deck and completion of concrete slabs is hereby noted.

4. **Holding and Protection:** In assembling and during welding, the component parts shall be held with sufficient clamps or other adequate means to keep parts straight and in close contact. In welding, precautions shall be taken to minimize "lock-up" stress and distortion due to heat. During high winds, welding shall be done only after adequate wind protection is furnished and set up.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

2.1.1 **Carbon Steel and High Strength Low-Alloy Steel:** Provide steel shapes, plates and bars of structural quality, sizes and types noted on drawings for use in welded and bolted construction. Steel manufactured by the acid Bessemer process shall not be used for structural purposes. Steel, which in the opinion of the inspector is badly corroded or physically damaged, shall not be incorporated in the work.

2.1.2 **Coating:** Provide steel unprimed where steel is to be fireproofed. Metal Shop Finish for required primer and painting of non-proofed steel.

2.1.3 **Standard Fasteners:** Low-carbon steel externally and internally threaded fasteners conforming to requirements of ASTM A307, Grade A. Provide hexagonal heads and nuts for all connections. Include lock washers under nuts or self-locking nuts.

2.1.4 High-Strength Fasteners: Quenched and tempered steel bolts and nuts conforming to requirements of ASTM A325 or AST A490.

a. Provide heavy hexagonal head bolts and nuts, and hardened steel washers.

b. Load indicator washers conforming to ASTM F959 or tension control bolts shall be used.

c. Any proposed substitutions must have documentation submitted for review and approval of the structural engineer prior to construction.

d. Acceptable tension control bolt suppliers shall be Lejuene Bolt Company/Lakeview, Minn. And Bristol Industries/Brea, Calif.

2.1.5 Welded Electrodes:

a. For base metal conforming with ASTM A36, A53 and A500, shielded metal arc, fluxcored arc and submerged arc welding use E70XX, E7XT-X and F7X-EXXX electrodes in accordance with AWS A5.1, AWS a5.20, AWS A5.20 or AWS 23.

2.1.6 Steel Stud Anchors: All steel stud anchors welded to steel beams or plates for concrete anchorage shall be "tru-weld studs," Division of Tru-Fit Screw Products Corporation, Cleveland, Ohio, "Nelson Stud," Division of Gregory Industries, Inc., Lorain, Ohio or approved equal. All stud anchors shall be automatically end-welded in shop or field with equipment recommended by manufacturer of studs.

2.1.7 Drilled-in-Concrete Anchors: Refer to structural drawings.

2.1.8 Shop Painting:

a. Pre-Treatment: Mil. Specs DOD-P-15328 or Fed. Specs. TT-C-490, Type I, II or IV.

b. Primer: Fed. Specs TT-P-645

2.1.9 Galvanizing: ASTM A123 or A153, as applicable, unless specified otherwise.

a. Galvanizing Repair Paint: Mil. Specs. DOD-P-21035

2.1.10 Other Materials: Provide all incidental and accessory materials, tools, methods and equipment required for fabrication and erection of structural steel framing as indicated on drawings.

2.1.11 General: Miscellaneous materials or accessories not listed above shall be provided as specified hereinafter under the various items of work and as indicated on the drawings or required for good construction practice.

2.1.12 Provide additional structural steel support framing for metal deck where normal deck bearing is precluded by column flange plates or other framing members.

2.1.13 Provide other materials, not specifically described but required for a complete and proper installation, as selected by the contractor subject to the approval of the Engineer.

2.2 FABRICATION

2.2.1 Fabricate all steel in accordance with requirements of AISC specifications and in accordance with details indicated on the drawings or as approved on shop drawings.

a. Identify all steel at mill showing grade and yield points.

b. Identify each piece with an erection mark corresponding to identifications noted on erection drawings.

2.2.2 Cutting: All holes and openings must be approved by the owner's Structural Engineer.

a. No flame cutting by hand for openings greater than one half the depth of the member shall be allowed, unless approved by engineer.

b. All flame-cut holes shall be smoothed by chipping, planning or grinding members to required AISC tolerances.

c. Sharp bends or kinks will not be allowed.

d. Flame cutting by hand will not be allowed for holes at connections.

2.2.3 Materials shall be properly marked and matched-marked where field assembly requires. The sequence of shipments shall be such as to expedite erection and minimize the field handling of material.

2.2.4 Milled surfaces shall be completely assembled or welded before milling. Milled surfaces to provide full bearing over the cross section.

2.2.5 Beams and girders shall be upward cambered where indicated on the drawings. For beams and girders without specified cambers, fabricate members so that after erection, any minor camber due to rolling or fabrication is upward.

2.2.6 Beam connections shall be as shown or noted on the drawings.

a. Unless noted otherwise, standard connections shall be used in accordance with AISC standards.

b. Steel requiring adjustment shall be provided with slotted holes, as indicated on the drawings.

2.2.7 Combination of bolts and welds techniques and procedures shall conform to the requirements of UBC – Standard No. 27-6.

a. Welding, AISC specification for the "Design, Fabrication and Erection of Structural Steel for Buildings," and AWS "Structural Welding Code," and "Filler Metal Specifications."

2.2.8 For stud anchor and deformed bar anchor welding, the area where the anchor is to be attached shall be made free of all foreign material such as rust, oil, grease, paint, etc.

a. When the mill scale is sufficiently thick to cause difficulty in obtaining proper welds, it shall be removed by grinding or sandblasting.

b. Use automatic end welding of headed stud shear connections in accordance with manufacturer's printed instructions.

2.2.9 Welding processes other than shielded metal arc, flux core arc, and submerged arc may be used provided procedure qualification tests in accordance with the American Welding Society are made for the intended application of all such processes.

2.2.10 Built-up sections assembled by welding shall be free or warpage and all faces shall be true alignment.

2.2.11 Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.

2.2.12 Welding sequences, preheat methods, and detailing of joints shall be such as to reduce the residual stresses to a minimum.

a. Structural Engineer may authorize suitable testing to determine magnitude of residual stresses due to welding on several initial fabricated production units. Such testing will be performed in a timely manner coordinated with the fabricator's production schedule.

b. Types of Welds: Required weld types are indicated by symbols on drawings; characteristics of welds in accordance with standard specifications or codes as applicable; each welder shall mark his identification symbol on his work.

c. Welding: Shape edges to be joined as indicated on drawings; prepare and clean edges of all oil, grease, scale and rust in accordance with AWS D1.1.

d. Reinforcing Steel: Welding or tack welding or reinforcing bars to other bars or plates, angles and similar shapes is prohibited, except where specifically shown on plans or approved by structural engineer, where required, use electrodes in accordance with requirements of AWS D1.4/12.1, and the structural general notes.

2.2.13 The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.

2.2.14 Detailing of connections, welding sequences and preheat methods shall be such as to minimize the accumulation and concentration of through thickness strains due to weld shrinkage.

2.2.15 Cleaning: Clean all surfaces of oil, grease, loose rust, loose mill scale and other foreign matter present in sufficient quantities to impair bond of spray fireproofing.

a. Remove all slag or flux remaining on any bean before proceeding; remove any cracks or blow holes that appear on any bead by chipping, grinding or gas gouging before proceeding.

2.2.16 Fabrication Tolerances: In accordance with AISC specifications, except as required to maintain the erection tolerances specified herein. Maximum tolerances for camber of steel beams/girders shall be plus or minus ¼ inch.

2.2.17 Steel Stud and Deformed Bar Anchors:

a. All anchors shall be automatically end-welded in the shop or field with equipment recommended by the manufacturer of the studs and by qualified welders. Steel stud material, welding and inspection shall be in accordance with AWS D1.1. End-weld in such a manner as to provide complete fusion between the end of the stud and the

plate. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate.

b. Tests and Inspections: At the beginning of each day's work, a minimum of two test stud welds shall be made, with the equipment to be used, to metal which is the same as the actual work pieces. The test studs shall be subjected to a 90-degree bend test by striking them with a heavy hammer. After the above test, the weld section shall not exhibit any tearing out or cracking.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

3.1.1 Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.1.2 Shop Painting: Shop paint structural steel, except as modified herein. Do not paint steel surfaces embedded in concrete, galvanized surfaces, bearing surfaces, or surfaces within ½ inch of the toe of the welds prior to welding except surfaces on which metal decking or shear studs are to be welded. Prior to assembly, paint surfaces which will be concealed or inaccessible after assembly. Do not apply paint in foggy or rainy weather; when the ambient temperature is below 45ºF or over 95ºF; or when paint may be exposed to temperatures below 40ºF within 48 hours after application, unless approved otherwise.

3.1.2.1 Cleaning: SSPC SP6, except as modified herein. SSPC SP3 or SP6 for steel surfaces exposed in spaces above ceilings, attic spaces, crawl spaces, furred spaces, and chases. In addition, maintain steel surfaces free from rust, dirt, oil, grease and other contaminants through final assembly.

3.1.2.2 Pretreatment: Immediately after cleaning, provide the metal surfaces with one coat of Mil. Spec. DOD-P-15328 pretreatment to a dry film thickness of 0.3 to 0.5 mil. Fed. Spec. TT-C-490 pretreatment may be applied to SSPC SP 6 cleaned surfaces, in accordance with Fed. Spec. TT-C-490.

3.1.2.3 Priming: Immediately after the pretreatment coating has dried, apply primer to a minimum dry film thickness 0f 2.0 mil. Repair damaged primed surfaces with an additional coat of primer.

3.1.2.4 Galvanizing: Provide as indicated or specified. Galvanize after fabrication where practicable.

3.1.2.4.1 Galvanizing Repair: ASTM A780, using galvanizing repair paint for galvanizing damaged by handling, transporting, cutting, welding or bolting. Do not heat surfaces that repair paint has been applied to.

3.1.2.5 Bearing Surfaces and Friction Type Joints: In the shop, coat with a temporary rust preventive. Remove coating, as recommended by the coating manufacturer, immediately prior to field erection.

3.2 ERECTION

3.2.1 General: Erect structural steel framing in accordance with governing codes and specifications. Conform with configurations and connections as approved on shop and erection drawings.

3.2.2 Bracing: Provide temporary shoring and bracing members as necessary.

3.2.3 Column Base and Bearing Plates: Align attached column bases and bearing plates for beams and similar structural members. Set loose column bases and bearing plates. Grout solid with non-shrink grout as specified.

3.2.4 Field Assembly: Accurately assemble structural framing to lines and elevations indicated within specified or noted tolerances.

a. Align and adjust various members of framing system prior to fastening.

b. Prior to assembly, clean bearing surfaces and surfaces, which will be in permanent contact.

c. Splice structural members only where indicated or where approved.

d. Cut holes by drilling only.

e. Fasten splices of compression members after bringing abutting surfaces completely into contact.

f. Make all field connections by high strength bolting or welding unless otherwise noted.

g. Tighten and leave erection bolts in place after welding. Where high strength bolts is required, provide identified and marked bolts; install using procedure as hereinafter specified; mark tightened bolts.

3.2.5 Do not use gas cutting torches in the field, unless approved by Architect/Engineer for correcting fabrication errors in the structural framing.

3.2.6 Furnish shim plates or develop fills where required to obtain proper fit and alignment.

3.2.7 Composite Construction: This building utilizes composite (concrete and structural steel) construction for various beams, careful sequencing of steel erection and concrete placement is recommended.

3.2.8 Connections: No welding or bolting shall be done until as much of the structure as will be stiffened by the welding or bolting has been properly aligned.

3.2.9 Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged shall be reamed up to a maximum of 1/16th of an inch larger to admit bolts. Burning, drifting and reaming may be used to align unfair holes, in members only after approval by the Owner's Structural Engineer.

3.2.10 When high-strength friction or high-strength bearing bolts are used, the installation shall be by use of direct tension indicator washers or tension control bolts as specified.

a. All bolts shall have threads extended not less than ¼ inch beyond nuts. Provide a minimum of one washer per bolt.

3.2.11 Mutilate threads or use lock nuts for unfinished bolts to prevent nuts from backing off. Draw unfinished bolt heads and nuts tight against the work.

3.2.12 Establish required leveling and plumbing measurements on the mean operating temperature of the structure.

a. Make allowances for differences between temperature at time of erection and mean temperature at which the structure will be maintained when completed and in service.

3.2.13 The steel erector shall leave the steel clean of oil or other contaminants as outlined under Part 2 of this specification.

3.3 HIGH STRENGTH BOLT INSTALLATION AND INSPECTION

3.3.1 General: All high-strength bolts, nuts and washers, as well as their installation and inspection, shall conform to requirements of current edition of "Specification for Structural Joint using ASTM A325 of A490 Bolts," except that the installation of "turn-of-nut tightening" will not be accepted.

a. All high-strength bolts, both friction and bearing type, shall be installed in accordance with Paragraph 5D, "tightening by use of direct tension indicator," unless, noted otherwise on the drawings.

b. Load-indicator washers (LIW) or tension bolts (TCB) shall be used as the authorized direct tension indicator.

3.3.2 Load Indicator Washers (LIW): LIW shall be supplied, providing tensions at gaps specified no less than the minimum and no more than 20 percent above the minimum bolt tensions per Table 3, "Structural Joints Using ASTM A325 or A490 Bolts," (-0, +20%)

a. The manufacturer shall provide certified test reports of at least three load indicators from each heat supplied to confirm the tolerance range (-0, +20%.)

b. Hardened washers shall be used under elements turned on all high – strength bolts to reduce galling of components

c. Prior to the final tightening of all high-strength bolts in multi-bolt connections, draw together all the piles of steel by partially compressing LIX protrusions during "snug tight" operation. This will show that each bolt has been partially tensioned, allowing for plat compression so that there will be no subsequent loosening of the bolts when they are finally tightened. The tensioning shall progress systematically from the most rigid past of the joint to its free edges until the protrusions of all LIW's are closed to the required gap.

d. The Inspection Testing Laboratory (ITL) need not be present during the entire installation and tightening operation, provided that it has done the following:

i. Inspected the surfaces and bolt type for conformance to plans and specifications as proof to start bolting.

ii. Will, upon completion of all bolting, verify the minimum specified bolt tensions visually and by using the feeler gauge as "no go" inspection on a few bolts in each connection (10 percent or two bolts, whichever is greater.)

e. All LIW's shall be of the same surface condition, either "weathered" or "bright."

3.3.3 Tension Control Bolts (TCB): TCB shall be supplied providing shearing of the bolt tip at no less than the minimum and no more than 20 percent above the minimum bolt tension per Table 3, "Structural Joints Using ASTM A325 or A490 Bolts," (-0 , + 20%.) To ensure quality control, test a minimum of three bolts for each grade, diameter and type for each heat, tests shall be performed at weekly intervals on three bolts for each grade, diameter and type taken from the supply of bolts on the floor actually being installed at the time. Tighten each bolt in the SWBTC until the torque-off spline has sheared and observe the tensions values obtained. The values obtained on the SWBTC shall be no less than the minimum and no more than 20 percent above the minimum bolt tension per Table 3 (-0, +20%.)

a. Prior to the final tightening of all high-strength bolts in a multi-bolt joint, draw together all the plies of steel to a "snug-tight" condition by partially tightening the bolts without shearing the torque-off spline. After a "snug-tight" condition has been accomplished, tension the bolts until the torque-off spline shears, progressing systematically from the most rigid part of the joint to its free edge.

b. The ITL need not be present during the entire installation and tightening operation, provided the ITL has:

i. Prior to the start of bolting, inspected all surfaces and bolt types for conformance with plans and specifications.

ii. Performed the quality control bolt tests specified above.

iii. Visually inspected 100 percent of the high-strength bolts for proper installed tension. Except as noted below, it will be assumed that properly installed bolt tensions have been achieved if the spline has twisted off.

3.3.4 Other Inspections: In both LIW and TCB installation, the ITL shall further examine large, multibolt, multirow connections for possible loss of bolt tensions due to fit-up problems.

a. In the case of a dispute regarding final installed bolt tensions in a specific joint, a calibrated torque wrench shall be used to verify the installation as outlined in Section 6 (D) 4 of "Structural Joints Using ASTM A325 or A490 Bolts."

3.4 CUTTING

3.4.1 Do not field cut or alter structural member without the written approval of the Structural Engineer.

3.4.2 Do not use gas cutting torches for correcting fabrication errors in structural framing.

3.4.3 Finish Gas-cut sections equal to a sheared performance.

3.5 ERECTION TOLERANCES AND SURVEY

3.5.1 Plumb, level and align individual pieces in accordance with the requirements of the "AISC Code of Standard Practice for Steel Buildings and Bridges."

3.5.2 Field Survey: Make an accurate survey of alignments and elevations of all steel members as noted on the drawings.

a. Should locations vary beyond the allowable tolerances, notify Architect/Engineer and take necessary corrective measures and modify details and/or procedures as required and approved.

b. Permanent benchmarks shall be established by a registered Professional Engineer employed by Contractor in accordance with the requirements of contract documents.

PART 1 - GENERAL

1.1 SCOPE

These specifications are intended for use in the construction of bonded repair and retrofit of concrete structures using fiber reinforced polymer (FRP) composites. These specifications cover construction of FRP systems used as externally bonded or near surface mounted reinforcement to enhance axial, shear, or flexural strength or ductility of a concrete member, such as column, beam, slab, or wall.

PART 2 - DEFINITION OF TERMS

2.1 Composite FRP—A polymer matrix, either thermosetting or thermoplastic, reinforced with a fiber or other material with a sufficient aspect ratio (length to thickness) to provide a discernible reinforcing function in one or more directions.

2.2 Development Length—The bonded distance required for transfer of stresses from concrete to the FRP to develop tensile capacity of FRP.

2.3 Epoxy—A polymerizable thermosetting polymer containing one or more epoxide groups, cured by reaction with phenols, anhydrides, polyfunctional amines, carboxylic acids, or mercaptans. An important matrix resin in FRP; also used as structural adhesive.

2.4 Fiber Reinforced Polymer (FRP) System— Composite material consisting of a polymer matrix reinforced with cloth, mat, strands, or any other fiber form. See composite.

2.5 Structural Adhesive—A resinous bonding agent used for transferring required loads between adherents.

PART 3 - MATERIALS

3.1 CARBON FIBER STRUCTURAL STRENGTHENING SYSTEM

MAXICARB 600G is a high-strength uni-directional carbon fiber sheet for structural reinforcement, manual wraps lamination, and tensile strength reinforcement to structural members.

Fiber Material	High Strength Carbon
Color	Black
Nominal Thickness	0.331mm
Tensile strength	4,900 MPa
Tensile Modulus	252 GPa
Elongation at Break	> 2.0%
Density	1.82 g/cm3

3.2 UNIDIRECTIONAL CARBON FIBER STRIP

MAXICARB PLATE is a high-strength unidirectional pultruded strip construed with carbon fibers. The CFRP strips are bonded to the substrate using compatible epoxy resin. The strips are ideal for the strengthening concrete, wood and steel structures.

	US Units	SI Units
Density	0.047 lb/ in3	1.3 g/cm3
Tensile strength	348ksi	2,400MPa
Tensile modulus	24msi	165GPa
Ultimate Elongation	1.5%	1.5%
Ply thickness	0.047in	1.2mm

3.3 STRUCTURAL PRESSURE INJECTION EPOXY

SEALBOND EPOXY UNDERWATER (385-UE) is a 100% Epoxy-Amine type curing agent especially formulated for use to cure at high humidity, low temperature (down to 5°C) and underwater. It has excellent chemical resistance and low water miscibility. It renders excellent adhesion and bonding capabilities designed for the all-around remedy of structural concrete defects and flaws through pressurized injection and grouting and for other marine applications. It may be applied even on damp surfaces or even during cold conditions.

Colors	Component A	Light Straw
	Component B	Amber
Viscosity	Component A	4900 cps
At 27°C	Component B	1200 cps
Tensile Strength		3000 – 5000 psi
ASTM D638-91		At 7 days full curing
Flexural Strength		6000 – 9000 psi
ASTM D790-92		At 7 days full curing
Bond Strength (slant Shear		3000 – 5000 psi at 7 days
Test) AASHTO T-237		full curing
Compressive Strength		11000 – 12500 psi at 7
ASTM c109-95/D695		days full curing

3.4 LAMINATING EPOXY FOR COMPOSITE FIBER

SEALBOND NUVOXIBOND Clear C65 Laminating Epoxy for Composite Fiber is a two-component epoxy formulation primarily designed for structural retrofitting works particularly for cured in place application such as laminating composite E-Glass and Carbon Reinforcement Fabrics.

Color	Clear
Odor	Slightly Aromatic
Viscosity at 25°C	1500-3500 cps
Appearance	Straw
Flashpoint	150°C
Density (Admixture)	8.58 lbs/gal
Solid by volume	100%
Compressive Strength (ASTM C-39)	9,100 psi (63 MPa)
Bond Strength (ASTM D-7234)	> 1.5 MPa

PART 4 - EXECUTION

4.1 Surface Preparation: All surfaces must be thoroughly cleaned to remove dirt, grease, mill scale, loose rust, chalk, and any other contaminants that can reduce adhesion. Use abrasive blasting, pressure wash, shotblast, grind, or other approved mechanical means to achieve an open-pore texture. In certain applications and at the engineer's discretion, the bond between the substrate and fabric may be determined to be non-critical (such as in column confinement applications). Smoothen the surfaces by mechanical grinding. All corners must be rounded up to 20mm diameter radius the surface must be clean and free from fins, sharp edges and protrusions.

4.2 Application of Materials:

4.2.1 Application of Carbon Fiber: Installation of MAXICARB CARBON FIBER strengthening system should be performed only by a specially trained, approved contractor. Note the specified number of plies, ply widths and fiber orientation.

Saturate the MAXICARB CARBON FIBER with Sealbond Nuvoxibond Laminating Epoxy both sides and apply it to the surface of the member by hand. Use an aluminum roller to remove all air pockets and ensure the intimate contact with the surface. Exerting a uniform tensile force that will distributes across the entire width of the MAXICARB fiber will squeeze out all air bubbles or air pockets.

Apply Sealbond Nuvoxibond Laminating Epoxy to MAXICARB CARBON FIBER for final lamination. Let it be cure for 24 to 48 hours. The cured composite wrap shall have proper bond with the substrate and between the layers to ensure the uniform thickness and density with no porosity.

The finished composite wraps maybe painted over with acrylic paint, a two component urethane coating, any desired surface finish or protective fireproofing coating may be applied on the cured composite surface.

4.2.2 Application of Carbon Plate: Installation of MAXICARB strengthening system should be performed only by a specially trained, approved contractor. Saturate the plate and fiber with Sealbond Nuvoxibond Laminating Epoxy both sides and apply it to the surface of the member by hand. Exerting a uniform tensile force that will distributes across the entire width. All the air bubbles or air pockets shall be squeeze out. Apply Sealbond Nuvoxibond to MAXICARB for final lamination of carbon plate/ strip. Let it be cure for 24 to 48 hours. The cured composite wrap shall have proper bond with the substrate and between the layers to ensure the uniform thickness and density with no porosity. The finished composite wraps maybe painted over with acrylic paint, a two component urethane coating, any desired surface finish or protective fireproofing coating may be applied on the cured composite surface.

DIVISION 5 – THERMAL AND MOISTURE PROTECTION HOT PRESS WATER PROOFING 07106

PART 1 - GENERAL

1.1 SCOPE

a. Furnish materials and equipment and perform labor required to complete.

1. Waterproofing of water reservoir and roof decks. See drawings and details for location and extent of requirements.

2. Submit to Architect/Engineer samples of materials to be used and secure approval.

PART 2 - PRODUCTS

2.1 WATERPROOFING

LABIRIT TORCHED –ON WATER PROOFING MEMBRANE is a prefabricated membrane made of bitumen distillate modified with elastomeric and plastomeric polymers.

2.2 Non Shrink Cementitious Grout

SEALPROOF NON-SHRINK CEMENTITIOUS GROUT 8008 is a non-shrink, cement based, high strength developing grout, which is specially formulated for use in critical grouting operations where positive expansion and non-staining characteristics are required.

Typical result of Compressive Strength at a flowable consistency (0.18 water/powder ratio):

Time	Flowable	Trowellable
24 hours	2,500-3,000 psi	2,800- 3,000psi
7 days	5,500-6,000psi	5,500- 6,000psi
28 days	6,500 psi	7,000 psi

Flowable Yield Grout:
25 kg SEALPROOF 8008 ~ 13.5L grout
when mixed with 4.5L of water

Trowellable Yield Grout:
25 kg SEALPROOF 8008 ~ 12.5L grout
when mixed with 3.5L of water

PART 3 - EXECUTION

Application of Waterproofing Membrane:

3.1 Two layer of 3mm thick shall be laid fully torched on blinding concrete with minimum of 10mm end laps and 150mm side laps.

3.2 The blinding surface shall be primed with EUROPRIMER to placing the membrane.

3.3 Prior to succeeding works the applied primer shall be inspected by the engineer 24 hours after the placement.

3.4 It shall be performed using cylinder fed propane gas torch, trowel to seal the seams of the membrane and knife for cutting. It is then unrolled again and torched on pressing the melted area against the substrate.

3.5 Repeat till the entire length of the membrane is bonded firmly onto the surface then the second membrane is laid in the same way with an overlap of 150mm at the end 100mm at the side.

3.6 Provide an upstand waterproofing membrane vertically with 200mm along the perimeter wall. Use same application on torched-on method.

Application of Non Shrink Cementitious Grout

FORMWORK

The formwork should be constructed to be leak-proof to contain the material until it has hardened ie around base plates. In order to prevent leakage or seepage, all of these formers must be sealed, by using Optimastic PU Sealant to seal gaps between formwork & concrete.

PLACING

Pour grout within 15-20mins after mixing to gain full advantage of the expansion process. Grouting of base plate should be carried out continuously. Ensure to have enough material in place prior placing. Star placing the mixed grout from one side of the formwork to prevent entrapment of air. During application ensure entrapped air is able to escape through relief holes. Check for any loss in the material through the formwork or between any unsealed joints.

SECTION 02100
PREPARATION OF SITE

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing all labor, materials, tools and equipment required for the preparation of the Site prior to construction.

1.2 SUBMITTALS *(to be submitted during implementation stage)*

A. Detailed working drawings.

1.3 PROTECTION

The Contractor shall exercise the greatest care in protecting existing structures and piping while proceeding with work under this Section. All repairs required because of damage from the Contractor's operations shall be at the expense of the Contractor and no claims for additional payment will be accepted.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CLEARING, GRUBBING AND STRIPPING

A. Except as otherwise directed, cut, grub, remove and dispose of all trees, stumps, brush, shrubs, roots, paving and any other objectionable material within the construction limits shown on the Drawings. All stumps, brush and roots shall be grubbed and removed from the site.

B. Protect the area beyond the limits of grading shown on the Drawings and any trees designated by the Engineer from damage by any construction operation by erecting suitable barriers or other approved means.

C. Strip topsoil from all areas to be occupied by buildings, trenches, roadways, the sludge lagoons, and all other areas to be excavated or filled. Avoid mixing topsoil with subsoil and stockpile it in areas on the site as approved by the Engineer. Topsoil shall be stockpiled free from brush, trash, large stones and other extraneous material. Any topsoil remaining, after all work is in place, shall be disposed of by the Contractor as directed by the Engineer.

**** END OF SECTION ****

SECTION 02200
EXCAVATION, BACKFILL, FILL, GRADING AND SLOPE PROTECTION

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing all labor, materials, equipment and incidentals necessary to perform all excavation, backfilling, filling, grading, and slope protection as shown on the Drawings.

1.2 RELATED SECTIONS

Other Sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33001	Site Preparation
Section 33003	Yard Piping
Section 33004	Roadways and Paving
Section 33006	Loaming and Seeding
Section 33007	Waste Water Disposal System

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM D698	Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D1556	Density of Soil in Place by the Sand Cone Method
ASTM D1557	Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Proposed methods of construction including dewatering, excavation, sheeting, bracing, filling, compaction and backfilling for the various portions of the project.

B. Samples as required by the applicable Reference Standards and under Part 2 – PRODUCTS of this Specification.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that materials conform to the specifications, and to be paid for by the Contractor.

1.6 PROTECTION

A. Sheeting and Bracing – General

1. The Contractor shall furnish, put in place and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures from undermining or other damage. If, in the opinion of the Engineer, sufficient or proper supports have not been provided, additional supports shall be put in at the expense of the Contractor. The Contractor is responsible for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled with compacted granular fill and rammed.

2. The Contractor shall leave in place all sheeting and bracing which the Engineer may direct him in writing to leave in place at any time during the progress of the Work for the purpose of preventing injury to structures, utilities or property, whether public or private.

3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction of other structures, utilities or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with compacted granular material by ramming with tools especially adapted to that purpose, or by other means as approved.

4. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability to damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

5. No wood sheeting shall be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than one foot above top of any pipe.

B. Pumping and Drainage

1. The Contractor shall at all times during construction, provide and maintain proper equipment and facilities to remove all water entering excavations. Excavations shall be kept dry so as to obtain a satisfactory undisturbed sub-grade foundation until the fills or structures to be built thereon have been completed to such extent that they will not be floated or damaged by allowing water levels to return to natural levels.

2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the sub-grade soils at proposed bottom of excavation.

3. The Contractor shall maintain the water level below the bottom of excavation in the various work areas continuously. The Contractor's proposed method of dewatering, if required, shall be approved by the Engineer.

4. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

5. The Contractor shall take all additional precautions to prevent uplift of any structure during construction. All such arrangements shall be subject to the approval of the Engineer.

6. Drainage shall be disposed of in an approved area only so that flow or seepage back into the excavated area will be prevented.

7. Floatation shall be prevented by the Contractor by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible and liable for all damages that may result from failure to adequately keep excavations dewatered.

8. Removal of dewatering equipment, if required, shall be accomplished after the system is no longer required; the material and equipment constituting the system shall be removed by the Contractor.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General

1. Excess materials which have been excavated and stockpiled in selected areas on the site which meet the Specifications shall be used as much as possible for fills.

2. For both materials obtained on site and for materials obtained off-site, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer for approval, a representative sample weighing approximately 25 kilograms, at least ten calendar days prior to the date of anticipated use of such material. Samples shall be resubmitted as required until approval is obtained.

B. Fill

1. Common Fill

Common fill may be obtained from on-site excavated material if approved by the Engineer or from off-site sources. Common fill shall consist of mineral soil, substantially free of clay, organic material, loam, wood, trash, and other objectionable material which cannot be compacted properly.

Common fill shall not contain broken concrete, masonry, rubble, asphalt pavement, or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling.

Common fill shall not contain stones larger than 250mm in any dimension, nor stones larger than 150mm in the upper 0.50 meter of fill. Not more than 30% shall pass a No. 200 sieve. The liquid limit of the fraction passing a No. 40 sieve shall not exceed 50%.

2. Structural Fill

Structural fill shall be furnished and placed as required to replace materials encountered and found unsuitable below foundation elevation of structures; or when foundation elevation is set above existing grade as shown on the plans or directed by the Engineer in writing. Structural fill shall be used below all structures that have under drains as shown on the Drawings.

Structural fill shall consist of suitably graded clean sands or gravel-sand mixtures belonging to Group Symbol SW or GW of the Unified Soil Classification, ASTM D2487. Particles shall be sound and not more than 15% shall pass the No. 200 sieve, nor more than 50%, the No. 40 sieve.
The composite material shall be non-plastic and free from organic matter, clay lumps, or other deleterious materials.

3. Granular Fill

Granular fill material shall consist of hard, durable, free draining sand and gravel or hard stone; shall be free from organic matter or other deleterious substances and shall be reasonably well-graded within the following limits:

Size	Percent by Weight Passing
75mm (3 in.)	100
0.60mm (No. 30)	0-20
0.15mm (No.100)	0-5

4. Screened Gravel

Screened gravel shall consist of hard, durable, rounded or sub-angular particles of proper size and gradation, and shall be free from sand, loam, clay, excess fines, and deleterious materials. Screened gravel shall be graded within the following limits:

Sieve Size	Percent by Weight Passing
16mm (5/8 in.)	100
13mm (1/2 in.)	40-100
10mm (3/8 in.)	15-45
2.0mm (No. 10)	0-5

PART 3 - EXECUTION

3.1 STRIPPING AND GRUBBING

Before any fills are placed or any paving or construction started, the area of all such work shall be stripped and grubbed of all top organic materials to a minimum depth of 150mm. Any weak, loose, soft, spongy, or otherwise unsuitable materials shall be removed from the site, and may be deposited in a spoil area, as directed by the Engineer, but shall not be used in any on-site fills.

3.2 EXCAVATION

Excavation shall include, without classification, the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper

execution and completion of the Work. The removal of said materials shall conform to the lines and grades shown on the Drawings.
The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other approved measures for the removal or exclusion of water, including taking care of storm water reaching the site of the Work from any source so as to prevent damage to the Work or adjoining property.

Excavations shall be sloped or otherwise supported in a safe manner in accordance with the latest applicable safety requirements of the Department of Public Works and Highways and as approved by the Engineer.

A. Excavation below Grade

1. If the bottom of any excavation is taken out below the limits specified on the Drawings, or directed by the Engineer, it shall be refilled at the Contractor's expense with concrete, compacted structural fill, or other material satisfactory to the Engineer.

2. Compacted structural fill, when used for refill, shall be placed in not greater than 150mm layers.

B. Structure Excavation

1. Excavation for structures to be founded on base slabs and footings are intended to be carried to undisturbed natural soil of suitable approved bearing capacity. If, upon uncovering and in the opinion of the Engineer, the material at or below the normal grade of excavation as indicated on the Drawings, is unsuitable for the support of structures, such material shall be over excavated and replaced with compacted structural fill. The Contractor will be paid based on unit price established in the Schedule of Bid Prices.

2. Excavation, including removal of rock and boulders, shall be made to such lines and grades as will give suitable room for buildings and structures, for bracing and supporting, pumping and draining, and to the limits indicated on the Drawings. The bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the Engineer.

3. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structures as a result of inadequate excavation, dewatering or other construction methods, shall be removed and replaced by compacted structural fill at the Contractor's expense.

4. Dewatering shall be such as to prevent boiling or detrimental under seepage at the base of the excavation. The Contractor shall install such means as required to preserve the stability of the base of the excavation.

5. Excavating equipment shall be satisfactory for carrying out the work in accordance with the Specifications.

6. When excavation for foundations has reached prescribed depths, the Engineer shall be notified and he will inspect conditions. If materials and conditions are not satisfactory to the Engineer, the Engineer will issue instructions as to the procedures, and if additional costs are involved, adjustments of the Contract will be made on the basis of unit prices agreed upon by the Engineer and the Contractor in accordance with the provisions of the Contract Documents.

C. Miscellaneous Excavation

The Contractor shall perform all the remaining miscellaneous excavation. He shall make all excavations necessary to permit the placing of loam and plants, for constructing roadways, and any other miscellaneous earth excavation.

3.3 FILL AND COMPACTION

A. General

1. Fills shall be placed as shown on the Drawings or as directed by the Engineer. Where embankments are to be placed and compacted on hillsides, or to be placed against existing embankment, or to be built one half at a time, the slopes of original hillsides, existing embankments, or new fill shall be cut into or benched in order to accommodate each layer of new work a horizontal distance of not less than 1.5 meters. Materials thus removed shall be spread and compacted with the new materials.

2. Compaction shall be performed as specified hereinafter for the particular materials and operations:

   a) A pass shall be one complete coverage of the area to be compacted by the rear wheel tire treads or tractor treads in contact with the flat earth surface.

   b) Areas adjacent to structures and other areas inaccessible to a roller or truck shall be compacted with approved mechanical compaction equipment. Compaction of the fill by such means shall be to the same degree of compaction as obtained by other approved equipment. The Engineer may make the necessary tests to determine the amount of compactive effort necessary to obtain equal compaction. The fill compacted by mechanical compactors shall be placed in 150mm layers and thoroughly tamped over the entire surface. Compaction equipment is subject to approval by the Engineer.

3. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated, and no soft spots or uncompacted areas will be allowed in the Work.

4. Temporary bracing shall be provided as required during filling and backfilling of all structures to protect partially completed structures against all construction equipment loads, hydraulic pressures, and earth pressures.

B. Placing Structural Fill

1. After all unsuitable materials have been stripped and removed, the area to be filled shall be compacted by rolling using pneumatic tire rollers or tandem rollers of capacity approved by the Engineer. Moisture content of the material in situ should be dry to the optimum. The Engineer shall conduct density test on the compacted base. At least 95% of modified proctor maximum density (ASTM D1557, Method C) must be attained.

2. Fill shall be spread by graders or bulldozers and compacted in layers not thicker than 150mm.
3. Compacted structural fill shall be placed and compacted as specified laterally to the limits defined by a 1 on 1 line sloped outward and downward from a point at least 0.7 meters outside the bottom edge of all footings.

4. Water shall be added by means of sprinklers to each layer in amounts that will bring the fill material to its optimum density. Compaction will not be permitted on completely dry materials.

5. A minimum of two coverage is required for each layer. The Engineer may, during the progress of the work, conduct tests as to the degree of compaction of the fill and may require additional passes when density of the fill has not reached 95% of modified proctor dry density (ASTM D1557, Method C).

6. In areas inaccessible to the large rollers, hand-held tampers shall be used in which case, maximum layer heights shall be 0.15 meter when compacted or as required to achieve 95% of modified proctor dry density.

C. Backfilling – Common Fill

1. Common fill may be used as backfill against the exterior walls of structures or in other areas as designated by the Engineer. Common fill materials shall be placed in layers having maximum thickness of 300mm measured before compaction. Moisture content of the material at the start of compaction shall be at or near optimum.

2. Common fill shall be compacted to at least ninety per cent of maximum density as determined by ASTM D698.

3. Materials placed in fill areas shall be deposited to the lines and grades shown on the Drawings, making due allowance for settlement of the material and for the placing of loam thereon.

4. The surfaces of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas will be allowed in the Work.

5. No compaction shall be done when the material is too wet either from rain or from excess application of water.

3.4 GRADING

A. Grading in preparation for placing of loam, planting areas, paved walks and roadways, and appurtenances shall be performed at all places that are indicated, to the lines, grades, and elevations shown on the Drawings or as directed by the Engineer. All material encountered of whatever nature within the limits indicated, shall be removed and disposed of. During the process of grading, the sub-grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the condition of the Work.

B. If at the time of grading, it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extra payment will be made for the stockpiling or double handling of excavated material.

C. The right is reserved to make minor adjustments or revisions in lines or grades, if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.

D. Stones or rock fragments larger than 100mm in their greatest dimensions will not be permitted in the top 150mm of the finished sub-grade of all fills or embankments.

E. In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the Drawings, or as directed by the Engineer.

3.5 DISPOSAL OF UNSUITABLE/SURPLUS MATERIALS AND ROCKS

A. Unsuitable excavated materials shall be removed from the immediate site of work and disposed of by the Contractor on the Owner's land as directed by the Engineer.

B. Suitable excavated material may be used for fill or backfill, if it meets the specifications for common fill. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not inconvenience traffic or adjoining property owners. If space limitations do not permit stockpiling on the site, the Contractor will be required to make arrangements for off-site stockpiling. Transport of such material from and to the immediate site, including any stockpiling agreements, shall be entirely at the Contractor's expense and shall not constitute grounds for additional payment.

C. Surplus excavated material shall be used to fill depressions or other purposes as the Engineer may direct.

D. The Contractor shall remove and dispose of all pieces of rock which are not suitable for use in other parts of the Work. Rock disposed of by hauling away to spoil areas is to be replaced by approved surplus excavation obtained elsewhere on the Work, insofar as it is available. Any deficiency in the backfill material shall be made up with acceptable material approved by the Engineer.

E. Fragments of ledge and boulders smaller than 25kgs.weight may be used in backfilling trenches and other deep fills. If, in the opinion of the Engineer, the quantity is excessive, he may order the removal and disposal of some of this rock. The small pieces of rock used as backfill shall not be placed in trenches until the pipe has at least 0.7 meters of earth over it. The Contractor shall place these pieces of stone in thin layers, alternating them with earth to be sure that all voids between the stones are completely filled with earth to prevent the occurrence of voids and settlement which will result there from.

F. Rock may be used for fill only with the approval of the Engineer.

3.6 COMPACTION/FIELD DENSITY TESTS

Field density tests shall be performed in accordance with the test procedure specified in ASTM D1556.

The location and frequency of field tests shall be at the discretion of the Engineer. Necessary tests shall be performed by the Engineer for acceptance of a compacted layer before attempting to place new fill material. Any layer or portion thereof that does not meet minimum compaction requirements shall be reworked and re-compacted until it meets the specified density requirements as determined by the Engineer.

**** END OF SECTION ****

SECTION 03150
CONSTRUCTION JOINTS

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing all materials, labor, equipment and incidentals required to make all concrete joints tight as detailed on the Drawings.

1.2 RELATED SECTIONS

Other Sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33009	Concrete Reinforcement
Section 33010	Concrete Finishes

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM D412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D746	Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2240	Rubber Property – Durometer Hardness

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Detailed working drawings.
B. Samples/test reports/certificates as required by the applicable Reference Standards.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and to be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 - EXECUTION

2.1 INSTALLATION

- Construction joints shall be provided as indicated on the Drawings. Unless otherwise indicated on the Drawings, bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with Section 33010.

- Construction joints will be permitted at locations other than those indicated on the Drawings provided, a written permission from the Engineer is obtained.

- The surfaces of the groove for the rubber sealant shall not be coated with curing compound.

- Where indicated on the Drawings, joint sealant shall be placed in all joints to the depth shown. Cleaning of the grooves, priming, handling and application of the materials, including bond breaker, shall be as recommended by the manufacturer.

- Waterstops for all joints shall be continuous around the corners and intersections, either in horizontal or vertical direction, as indicated on the Drawings. Field splices and joints shall be made in accordance with the waterstop manufacturer's instructions, using a thermostatically controlled heating iron.

- Holes for steel tying wires shall be drilled in the waterstops as recommended by the manufacturer.

- Steel tying wire shall be as specified in Section 33009, Concrete Reinforcement.

- A sufficient number of wire ties shall be installed to ensure that the waterstops remain in their original position during the placement of concrete.

**** END OF SECTION ****

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

The WORK includes fabrication and installation of all steel bars and steel tie wire, clips, supports, chairs, and spacers required for the reinforcement of concrete as shown on the Drawings.

1.2 RELATED SECTIONS

Not Used

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM A82	Steel Wire, Plain, for Concrete Reinforcement
ASTM A615	Deformed and Plain Billet – Steel Bars for Concrete Reinforcement
PNS 49	Philippine National Standard – Steel Bars for Concrete Reinforcement

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Detailed working drawings and bending schedules of all reinforcement.
B. Samples and test certificates as required by the applicable Reference Standards.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

Reinforcement steel shall be deformed, new billet steel bars conforming to ASTM A615, Grade 60 and 40, substantially free from mill scale, rust dirt, grease or other foreign matter.

Chemical Composition: The percentages of carbon, manganese, phosphorus, sulfur and silicon on finished bars shall conform to the specified values in PNS 49 as shown in Table 2.

Rail – steel bars will not be permitted in the Work.

Table 2 – Chemical Requirements

Element	Chemical Composition, Pecent Maximum	
	Hot-Rolled Non-weldable Deformed Steel Bar	Hot-Rolled Weldable Deformed or Plain Steel Bar
Carbon	-	0.38
Manganese	-	1.26
Phosphorus	0.0625	0.058
Sulfur	0.0625	0.058
Silicon	-	-

Reinforcement steel shall bear a mill identification symbol, shall be tagged with the size and mark number so that different types may be identified, and shall be stored off the ground to protect the steel from moisture and dirt until placed in final position.

Steel wire for tying reinforcing bars and waterstops shall conform to ASTM A82.

The following reinforcing steel bar sizes shall be used for all reinforced concrete design under this Contract.

Bar Designation	Approximate Cross Sectional Area (mm^2)	Approximate Unit Weight (kg/m)
#10	78	0.616
#12	113	0.888
#16	201	1.579
#20	314	2.466
#25	492	3.854
#28	615	4.833
#32	804	6.313
#36	1018	7.991

Should the Contractor wish to use reinforcing steel bars having areas different from those shown (with consequent different designations), the following requirements shall apply:

- If the proposed substitute bar has an area from 97% to 105% of the designated bar, a direct substitution may be made without changes to bar spacing.

- If the proposed substitute bar has an area less than 97% of the designated bar, substitution may be allowed provided bar spacing is reduced to not less than the minimum clear distance between bars.
- If the proposed substitute bar has an area more than 105% of the designated bar, changes in spacing is limited to a maximum spacing of 300mm. All proposed changes shall be submitted to the Engineer for approval.

- Changes shall be implemented upon approval by the Engineer of the reinforcing arrangement Drawings, required as shop drawings, which shall be finalized upon issuance by the Engineer of the guidelines on related criteria, as maximum and minimum spacing and bond strength.

- Approval by the Engineer of bar size substitutions does not relieve the Contractor of other specified requirements, including steel grade and bar deformations.

PART 3 - EXECUTION

3.1 FABRICATION OF REINFORCEMENT

Reinforcement steel shall be accurately fabricated to the dimensions shown on the shop drawings and bar schedules.
All reinforcing bars shall be bent cold around a pin with a free revolving collar having a diameter of the bar of not less than the following:

- Two times for stirrups
- Six times for bars up to and including 25mm diameter
- Eight times for bars over 25mm diameter

Reinforcement steel shall not be straightened nor rebent. Bars with kinks or bends not shown on the Drawings will not be accepted.

3.2 INSTALLATION OF REINFORCEMENT

All reinforcing bars shall be accurately placed as shown on the Drawings, and in accordance with the shop drawings and bar schedules. The reinforcing bars shall be secured against displacement with annealed iron wire ties of minimum 1.0mm diameter or suitable clips at the intersections.

Except as otherwise indicated on the Drawings reinforcement steel shall be installed with a clearance for concrete cover as follows:

• Concrete placed directly on earth	75 mm
• Formed surfaces in contact with the soil, water or exposed to the weather	75 mm
• Concrete cover of main reinforcement steel for columns and beams	40 mm

No reinforcing bars shall be welded.

All reinforcing bars in slabs shall be supported on concrete cubes or chairs of the correct height, containing soft steel wires embedded therein for fastening to the reinforcement steel. Such spacers or chairs shall have a minimum compressive strength of 24 MPa.

Reinforcing bars for vertical surfaces in beams, columns and walls shall be properly and firmly positioned from the forms by means of stainless steel (tipped) bolsters or other equal methods approved by the Engineer.
Reinforcement steel projecting from structures that are to be concreted or where concrete has already been poured shall not be bent out of its correct position.

**** END OF SECTION ****

SECTION 03300
CONCRETE

PART 1 – GENERAL

1.1 SCOPE OF WORK

The WORK includes furnishing all labor, materials, equipment and incidentals necessary for the construction of all concrete work.

1.2 RELATED SECTIONS

Other Sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33009	Concrete Reinforcement
Section 33010	Concrete Finishes
Section 33011	Construction Joints

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams
ASTM C94	Ready-mixed Concrete
ASTM C143	Slump of Hydraulic-Cement Concrete
ASTM C150	Portland Cement
ASTM C347	Recommended Practice for Concrete Formwork, US Corps of Engineers CRD C-572
ASTM C494	Chemical Admixtures for Concrete
ASTM C805	Rebound Number of Hardened Concrete

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Samples as required by the applicable Reference Standards and in accordance with Part 3 – EXECUTION of this Specification.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspections required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement: Cement shall be Portland Cement conforming to ASTM C150, Type II, as follows:

Table 1- Physical Requirements of Cement

Test	Requirement
Compressive Strength for ages indicated, min. 3 days 7 days	 12.0 MPa 19.0 MPa
Time Setting by Vicat Method Initial Set, minimum Final Set, maximum	 45 minutes 375 minutes
Fineness, by turbidimeter test, minimum	160 m^2/kg

B. Aggregates

1. Fine Aggregate: Fine aggregate shall be washed inert natural sand conforming to ASTM C33, and shall range in size from coarse to fine within the following limits of US Standard sieve sizes:

Table 2- Grading Requirements for Fine Aggregates

Sieve Designation	Percent (%) Passing
9.5 mm (3/8)	100
4.75 mm (No. 4)	95-100
2.36 mm (No. 8)	80-100
1.18 mm (No. 16)	50-85
0.60 mm (No. 30)	25-60
0.300 mm (No. 50)	5-30
0.150 mm (No. 100)	0-10
0.075 mm (No. 200)	0-3

2. Coarse Aggregate: Coarse aggregate shall be well graded crushed stone or washed gravel conforming to ASTM C33, size No. 67 as follows:

Table 3 – Grading Requirements for Coarse Aggregates

Sieve Designation	Weight Percent (%) Passing
25 mm (1”)	100
19.0 mm (3/4)	90-100
9.5 mm (3/8)	20-55
4.75 mm (No. 4)	0-10
2.36 mm (No. 8)	0-5
0.075 mm (No. 200)	0-1

3. Water: Water used in mixing, curing or other designated application shall be reasonably clean and free of oil, salt, acid, alkali, grass or other substances injurious to the finished product.

4. Admixtures

   - Admixtures conforming to ASTM C494 may be used upon approval of the Engineer in writing, to control the time setting, to effect water reduction and to increase workability. Proportioning and mixing shall be as recommended by the manufacturer.

   - The admixture may be a hydroxylated carboxylic acid type or a hydroxylated polymer type, but shall contain no calcium chloride. The use of an admixture shall not change the required quantities of cement specified under Table 4 of this Section.

   - The total air entrained measured at the discharge from the truck shall be 3.0 per cent maximum for finished slabs and 3.5 to 5.0 per cent for all other concrete.

2.2 QUALITY OF CONCRETE

A. Before placing any concrete, the Contractor shall discuss with the Engineer the source of materials and concrete he proposes to use. Samples of aggregate and cement shall be furnished to the Engineer for testing.

B. The Contractor shall submit to the Engineer, his proposed design mix for evaluation.

C. Compressive strength, water-cement ratio and cement factor specified in Table 4 shall apply for regular and pumped concrete:

Table 4 – Concrete Quality Requirements

Test	Requirements	
	Concrete Fill	All Structural Concrete
Minimum Compressive Strength at 28 days (Mpa)	17.0	21.0 – 42.0
Maximum Net Water Content (liters/100kg cement)	62.0	53.0
Minimum Cement Content (kg/m³)	260	330
Total Air Content (%)	3.5 – 5.0	3.5 – 5.0

Concrete Temp., Max. (°C)	32	32

D. Consistency of the concrete as measured in accordance with ASTM C143 shall be as shown in Table 5.

No excessively wet concrete will be permitted. Concrete delivered to the site having a slump more than that specified herein will be rejected.

Table 5 – Concrete Consistency

Type of Structure	Slump (mm)	
	Recommended	Range
Pavement and Slabs on Ground	50	25 – 75
Plain footings, gravity walls, slabs and beams	50 – 75	25 – 100
Heavy reinforced foundation walls and footings	75 – 100	50 – 125
Thin reinforced walls and columns	100	75 – 125

2.3 FORMS

A. Forms shall be made of either steel or new lumber approved by the Engineer and shall be free from roughness and imperfections, substantially watertight, adequately braced and tied to prevent movement when concrete is placed and vibrated. No wooden spreaders will be allowed in the concrete. Forms shall be thoroughly cleaned before using and shall be treated with non-staining oil or other approved material and allowed to dry before placement of the reinforcing steel.

B. Form ties in concrete exposed to view shall be the cone-washer type. Throughbolts or common wire shall not be used for form ties.

C. Molding or bevels shall be built into the forms to produce a 20-mm chamfer on all exposed projecting corners.

D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste.

PART 3 - EXECUTION

3.1 MIXING CONCRETE

A. Ready-mixed or transit-mixed concrete shall conform to ASTM C94. The concrete supplier shall furnish to the Engineer for his approval, the dry proportions to be used, with evidence that these will produce concrete of the quality specified.

B. Ready-mixed or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks. Discharge at the site shall be within one (1) hour after the cement was first introduced into the mix. Retempering (i.e. mixing with or without additional cement, aggregate or water) of the concrete which has partially hardened, will not be permitted.

3.2 PLACING OF CONCRETE

A. All debris, dirt and water shall be removed from the forms. Forms, reinforcement steel, pipes, conduits, sleeves, anchors and other embedded items shall be inspected and approved by the Engineer before placing any concrete. The Contractor shall advise the Engineer of his readiness to proceed at least 12 hours before each placement of concrete.

B. The surfaces of previously placed concrete, such as vertical or horizontal construction joints, shall be roughened, cleaned of foreign matter and laitance, and saturated with water.

Immediately before the new concrete is placed, all hardened surfaces shall receive a thorough coating of neat cement grout at least 5 mm thick which shall be well scrubbed in by means of stiff bristle brushes. The new concrete then shall be placed before the grout sets up.

Concrete shall be uniformly placed during the process of depositing until the completion of the layer to maintain an approximately horizontal plastic surface. The rate of placing concrete in forms shall not exceed o.60 meter of vertical rise per hour. The spreading of mounds of concrete with vibrator or by shoveling will not be permitted.

C. Concrete shall not be placed in water or stay submerged within 24 hours after placing, except for curing nor shall running water be permitted to flow over concrete surfaces within four days after the placing of concrete.

D. Chutes for conveying concrete shall be of U-shaped metal and provided with a baffle plate at the end. Chutes shall be placed at an angle of not less than 25 degrees, nor more than 45 degrees from horizontal and shall be kept clean and free from hardened concrete. Maximum length of chute to be traveled by plastic concrete shall not be more than 1.50 meters.

E. In thin walls or columns of considerable height, the concrete shall be placed in such a manner as to prevent segregation and accumulation of hardened concrete on the forms or the reinforcement steel located above the concrete mass. Free fall of concrete shall not be permitted to exceed 1.50 meters below the ends of hoppers, chutes, ducts, tremies, or “windows” in wall forms, without approval of the Engineer.

F. Where waterstop type construction joints are provided, the concrete shall be properly worked by rodding and vibrating around the waterstops to produce watertight joints, before any concrete is poured on the upper surfaces, particularly in the case of horizontal waterstops in slabs.

Waterstops shall be accurately positioned and securely held in place, and shall be protected at all times to prevent damage or displacement. Any damage to, or displacement of waterstops shall be corrected by the Contractor to the satisfaction of the Engineer.

3.3 TAMPING AND VIBRATING

A. During and immediately after placing the concrete, compaction shall be carried out by experienced operators using high-speed internal mechanical vibrators. Care shall be taken to ensure that vibration is continued long enough to produce optimum consolidation without segregation of the aggregates or migration of air.

B. At least one vibrator shall be used for every eight cubic meters of concrete placed per hour. One spare vibrator in operating condition shall be available on the site.

C. Vibrators shall be supplemented with proper wooden spade, puddling adjacent to forms and rodding around embedded fixtures, to remove trapped air bubbles and to prevent honeycombing.

3.4 CURING AND PROTECTION

A. All concrete work shall be properly cured. Details of the Contractor’s curing procedures and curing compounds intended to be used shall be subject to the approval of the Engineer.

B. All exposed surfaces including finished surfaces shall be treated immediately after concrete has been poured, to provide continuous moist curing for at least 7 days. Walls and vertical surfaces may be covered with continuously saturated burlap or kept moist by other approved means. Horizontal surfaces, slabs, etc. shall be ponded to a depth of 15mm or kept continuously wet by means of sprinklers or other approved methods.

C. Formed surfaces shall be thoroughly soaked with water at least twice each day until the forms are removed. Curing shall continue as specified above.

D. Where finishing of concrete surfaces is performed before the end of the curing period, the concrete shall not be permitted to dry out and shall be kept continuously damp by means of a fog of water from the time the concrete has been placed until the end of the curing period.

E. The Contractor shall protect all concrete work against injury from the elements and defacements of any nature during construction operations.

3.5 REMOVAL OF FORMS

A. The Contractor shall not remove any forms for at least 48 hours or until the concrete has attained a strength of at least 30 per cent of the ultimate 28- day strength. This is equivalent to approximately 50-day-degrees of moist curing. Day degree represents the total number of days times the average daily air temperature in °C at the surface of the concrete, e.g. 2 days at an average temperature of 25°C equals 50 day-degrees.

B. Forms for beams and slabs shall not be stripped for at least 150-day degrees and supports shall not be removed until the concrete has attained at least 60% of the specified 28-day strength and is capable of safely supporting its own weight. Construction live loads shall not be placed upon it until the concrete has attained its specified 28-day strength.

C. Removal of forms shall be in accordance with ACI – 347. Forms shall be stripped such that they will not damage the concrete. No forms shall be removed until the concrete has gained sufficient strength to support itself. The Contractor is responsible for the safety of all structures.

3.6 REPAIR OF DEFECTIVE CONCRETE

A. Defective or honeycombed areas, as determined by the Engineer, shall be chipped down to at least 25mm deep into sound concrete by means of chisels or chipping hammers. If honeycombs exist around reinforcement steel a clear space, at least 10mm wide shall be chipped all around the steel.

B. For areas less than 40mm deep, the patch may be made as in filling form-tie holes.

C. Thicker repairs will require build-up in successive 40mm deep layers on successive days, and each layer shall be applied with neat cement pastes.

D. For very deep patches, a non-shrink aggregate, with or without the addition of pea gravel, may be the used subject to the approval of the Engineer.

E. The materials shall be mixed as recommended by the manufacturer of the non-shrink aggregate or as directed by the Engineer.

Where a metallic non-shrink aggregate is utilized, the final 15mm of the patch shall be composed of 1 to 1-1/2 cement / sand mortar without the non-shrink aggregate to prevent rust staining of the surface. After hardening, the patch shall be rubbed as for filling form-tie voids, in accordance with Section 33010, Rubbed Finish.

F. All exposed concrete surfaces and adjoining work stained by spilling or leakage of concrete shall be cleaned to the satisfaction of the Engineer.

3.7 INSPECTION

Installation of reinforcing steel, pipes, sleeves, anchors and other embedded items, batching, mixing, transportation, placing, curing and finishing of concrete shall at all times be subject to the inspection of the Engineer. No concrete shall be placed without the prior approval of the Engineer.

3.8 FIELD CONTROL

A. Sets of six (6) cylinder specimens shall be taken at random by the Contractor in the presence of the Engineer in accordance with ASTM C31. One (1) set per 50 cubic meters of concrete, or fraction thereof, poured during the day shall be made for the compressive strength test. At least one set of samples for strength test shall be made for each class of concrete.

B. Two (2) cylinders shall be tested after 7 days and two cylinders after 28 days. Should the average strength of the 28-day test specimens be less than the specified value, a verification test shall be conducted on the remaining two (2) cylinder samples, after 28 to 45 days. Compressive tests shall be in accordance with ASTM C39 and shall be performed by a laboratory engaged by the Owner. Testing fees shall be paid by the Contractor.

C. The Contractor shall assist, cooperate and provide the concrete for the test cylinders and such auxiliary personnel and equipment needed to take the test specimens.

D. Ready-mixed concrete shall be sampled and tested in accordance with the following methods.

Table 9 – Sampling and Test Methods for Ready-Mixed Concrete

Sampling/Test Method	Applicable ASTM Standard
Compressive Test Specimens	C31
Compression Tests	C39
Yield, Unit Weight	C138
Air Content	C138/C173/C231
Slump	C143
Sampling Fresh Concrete	C172
Temperature	C1064

3.9 FIELD TESTING

A. Should the average strength of the verification test specimens be less than the specified value, the Engineer may take further core samples from the portion of the structure which was determined by the Engineer to represent the deficient 28- day/verification test specimens.

B. If the strength of any core samples is less than the minimum requirements shown in Table 4, the Contractor shall strengthen or replace the portions of the structure concerned at no additional cost and to the satisfaction of the Engineer.

C. The Contractor shall also deduct from payments otherwise due to him, the actual cost to the Owner for taking all core samples extracted from that portion of the Work.

D. Slump tests, temperature and entrained air measurements shall be made when specimens for strength tests are taken and during placement of concrete, as often as necessary for control checks. If measured slump or air content falls outside the specified limits, a check

test shall be made immediately on another portion of the same composite sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and the whole batch shall be rejected.

3.10 BASIS OF ACCEPTANCE / REJECTION

Final acceptance of all concrete will be based on satisfactory results of compressive strength tests.

Strength tests representing each class of concrete must meet the following two requirements:

- The average of any three consecutive strength tests shall be equal to, or greater than the specified strength.
- No individual strength strength test shall be more than 15% below the specified strength.

Except as provided below, acceptance criteria will be as outlined in ASTM C94 and ACI 318. Concrete which achieves the required compressive strength will be accepted as satisfactory for payment provided placement, finish and tolerance meet the specified requirements.

Concrete with average strength deficient by not more than fifteen percent (15%) of the required strength may be accepted, subject to cost reduction given in the following schedule:

Per Cent (%) Deficiency In Average Strength	Per Cent (%) of Unit Price Reduction
Less than 3	0
0 to less than 5	15
5 to less than 10	30
10 to 15	40
more than 15	100

Concrete represented by test results wherein the average strength indicated a deficiency of not more than fifteen percent (15%) but with an individual test deficient by more than fifteen percent (15%) will not be eligible for payment but may be accepted or ordered replaced at the discretion of the Engineer.

Concrete represented by compressive strength tests that fail to achieve the required strength as specified, shall be liable to rejection and subsequent removal and replacement.

However, if any strength tests falls below the specified value by more than 15%, or an individual test is deficient by more than 15%, and load carrying capacity has been significantly reduced, tests of cores drilled from the area in question may be required in accordance with ASTM C42, wherein L/D ratio is not less than 1.25 prior to capping. In such cases, three (3) cores shall be taken for each strength test more than 15% below the required value.

If concrete in the structure will be dry under service conditions, cores shall be air dried for 7 days before test and shall be tested dry. If concrete in the structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 40 hours and be tested wet.

Concrete in an area represented by core tests shall be considered structurally adequate if the average of three (3) cores is equal to at least 85% of the specified strength, and if no single core is less than 75% of the minimum requirement. Additional testing of cores extracted from locations represented by erratic core strength results shall be permitted.

Acceptance and subsequent payment of concrete in question shall be based on the results of such tests, provided the complete operation has been supervised by the Engineer.

Rebound hammer test (ASTM C805) may be carried out by the Contractor prior to drilling core samples from structure in question, but the results of such rebound tests shall not be used as basis for acceptance or rejection of the concrete.

**** END OF SECTION ****

SECTION 03300
EXISTING CONCRETE ENLARGEMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing all labor, materials, equipment and incidentals necessary for the construction of all concrete retrofitting work.

1.2 RELATED SECTIONS

Other Sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33009	Concrete Reinforcement
Section 33010	Concrete Finishes

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams
ASTM C94	Ready-mixed Concrete
ASTM C143	Slump of Hydraulic-Cement Concrete
ASTM C150	Portland Cement
ASTM C347	Recommended Practice for Concrete Formwork, US Corps of Engineers CRD C-572
ASTM C494	Chemical Admixtures for Concrete
ASTM C805	Rebound Number of Hardened Concrete

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Samples as required by the applicable Reference Standards and in accordance with Part 3 – EXECUTION of this Specification.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspections required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications and shall be paid for by the Contractor. The Contractor shall furnish the

owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement: Cement shall be Portland Cement conforming to ASTM C150, Type II, as follows:

Table 1- Physical Requirements of Cement

Test	Requirement
Compressive Strength for ages indicated, min. 3 days 7 days	 12.0 MPa 19.0 MPa
Time Setting by Vicat Method Initial Set, minimum Final Set, maximum	 45 minutes 375 minutes
Fineness, by turbidimeter test, minimum	160 m^2/kg

B. Aggregates

1. Fine Aggregate: Fine aggregate shall be washed inert natural sand conforming to ASTM C33, and shall range in size from coarse to fine within the following limits of US Standard sieve sizes:

Table 2- Grading Requirements for Fine Aggregates

Sieve Designation	Percent (%) Passing
9.5 mm (3/8)	100
4.75 mm (No. 4)	95-100
2.36 mm (No. 8)	80-100
1.18 mm (No. 16)	50-85
0.60 mm (No. 30)	25-60
0.300 mm (No. 50)	5-30
0.150 mm (No. 100)	0-10
0.075 mm (No. 200)	0-3

2. Coarse Aggregate: Coarse aggregate shall be well graded crushed stone or washed gravel conforming to ASTM C33, size No. 67 as follows:

Table 3 – Grading Requirements for Coarse Aggregates

Sieve Designation	Weight Percent (%) Passing
25 mm (1”)	100
19.0 mm (3/4)	90-100
9.5 mm (3/8)	20-55
4.75 mm (No. 4)	0-10

2.36 mm (No. 8)	0-5
0.075 mm (No. 200)	0-1

3. Water: Water used in mixing, curing or other designated application shall be reasonably clean and free of oil, salt, acid, alkali, grass or other substances injurious to the finished product.

4. Admixtures
   - Admixtures conforming to ASTM C494 may be used upon approval of the Engineer in writing, to control the time setting, to effect water reduction and to increase workability. Proportioning and mixing shall be as recommended by the manufacturer.

   - The admixture may be a hydroxylated carboxylic acid type or a hydroxylated polymer type, but shall contain no calcium chloride. The use of an admixture shall not change the required quantities of cement specified under Table 4 of this Section.

   - The total air entrained measured at the discharge from the truck shall be 3.0 per cent maximum for finished slabs and 3.5 to 5.0 per cent for all other concrete.

2.2 QUALITY OF CONCRETE

A. Before placing any concrete, the Contractor shall discuss with the Engineer the source of materials and concrete he proposes to use. Samples of aggregate and cement shall be furnished to the Engineer for testing.

B. The Contractor shall submit to the Engineer, his proposed design mix for evaluation.

C. Compressive strength, water-cement ratio and cement factor specified in Table 4 shall apply for regular and pumped concrete:

Table 4 – Concrete Quality Requirements

Test	Requirements	
	Concrete Fill	All Structural Concrete
Minimum Compressive Strength at 28 days (Mpa)	17.0	21.0 – 42.0
Maximum Net Water Content (liters/100kg cement)	62.0	53.0
Minimum Cement Content (kg/m³)	260	330
Total Air Content (%)	3.5 – 5.0	3.5 – 5.0
Concrete Temp., Max. (°C)	32	32

D. Consistency of the concrete as measured in accordance with ASTM C143 shall be as shown in Table 5.

No excessively wet concrete will be permitted. Concrete delivered to the site having a slump more than that specified herein will be rejected.

Table 5 – Concrete Consistency

Type of Structure	Slump (mm)	
	Recommended	Range
Pavement and Slabs on Ground	50	25 – 75
Plain footings, gravity walls, slabs and beams	50 – 75	25 – 100
Heavy reinforced foundation walls and	75 – 100	50 – 125

footings		
Thin reinforced walls and columns	100	75 – 125

2.3 FORMS

A. Forms shall be made of either steel or new lumber approved by the Engineer and shall be free from roughness and imperfections, substantially watertight, adequately braced and tied to prevent movement when concrete is placed and vibrated. No wooden spreaders will be allowed in the concrete. Forms shall be thoroughly cleaned before using and shall be treated with non-staining oil or other approved material and allowed to dry before placement of the reinforcing steel.

B. Form ties in concrete exposed to view shall be the cone-washer type. Through bolts or common wire shall not be used for form ties.

C. Molding or bevels shall be built into forms to produce a 20-mm chamfer on all exposed projecting corners.

D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste.

PART 3 - EXECUTION

3.1 MIXING CONCRETE

A. Ready-mixed or transit-mixed concrete shall conform to ASTM C94. The concrete supplier shall furnish to the Engineer for his approval, the dry proportions to be used, with evidence that these will produce concrete of the quality specified.

B. Ready-mixed or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks. Discharge at the site shall be within one (1) hour after the cement was first introduced into the mix. Retempering (i.e. mixing with or without additional cement, aggregate or water) of the concrete which has partially hardened, will not be permitted.

3.2 PLACING OF CONCRETE

A. All debris, dirt and water shall be removed from the forms. Forms, reinforcement steel, pipes, conduits, sleeves, anchors and other embedded items shall be inspected and approved by the Engineer before placing any concrete. The Contractor shall advise the Engineer of his readiness to proceed at least 12 hours before each placement of concrete.

B. The surfaces of previously placed concrete, such as vertical or horizontal construction joints, shall be roughened, cleaned of foreign matter and laitance, and saturated with water.

Immediately before the new concrete is placed, all hardened surfaces shall receive a thorough coating of neat cement grout at least 5 mm thick which shall be well scrubbed in by means of stiff bristle brushes. The new concrete then shall be placed before the grout sets up.

Concrete shall be uniformly placed during the process of depositing until the completion of the layer to maintain an approximately horizontal plastic surface. The rate of placing concrete in forms shall not exceed o.60 meter of vertical rise per hour. The spreading of mounds of concrete with vibrator or by shoveling will not be permitted.

C. Concrete shall not be placed in water or stay submerged within 24 hours after placing, except for curing nor shall running water be permitted to flow over concrete surfaces within four days after the placing of concrete.

D. Chutes for conveying concrete shall be of U-shaped metal and provided with a baffle plate at the end. Chutes shall be placed at an angle of not less than 25 degrees, nor more than 45 degrees from horizontal and shall be kept clean and free from hardened concrete. Maximum length of chute to be traveled by plastic concrete shall not be more than 1.50 meters.

E. In thin walls or columns of considerable height, the concrete shall be placed in such a manner as to prevent segregation and accumulation of hardened concrete on the forms or the reinforcement steel located above the concrete mass. Free fall of concrete shall not be permitted to exceed 1.50 meters below the ends of hoppers, chutes, ducts, tremies, or "windows" in wall forms, without approval of the Engineer.

F. Where waterstop type construction joints are provided, the concrete shall be properly worked by rodding and vibrating around the waterstops to produce watertight joints, before any concrete is poured on the upper surfaces, particularly in the case of horizontal waterstops in slabs.

   Waterstops shall be accurately positioned and securely held in place, and shall be protected at all times to prevent damage or displacement. Any damage to, or displacement of waterstops shall be corrected by the Contractor to the satisfaction of the Engineer.

3.3 TAMPING AND VIBRATING

A. During and immediately after placing the concrete, compaction shall be carried out by experienced operators using high-speed internal mechanical vibrators. Care shall be taken to ensure that vibration is continued long enough to produce optimum consolidation without segregation of the aggregates or migration of air.

B. At least one vibrator shall be used for every eight cubic meters of concrete placed per hour. One spare vibrator in operating condition shall be available on the site.

C. Vibrators shall be supplemented with proper wooden spade, puddling adjacent to forms and rodding around embedded fixtures, to remove trapped air bubbles and to prevent honeycombing.

3.4 CURING AND PROTECTION

A. All concrete work shall be properly cured. Details of the Contractor's curing procedures and curing compounds intended to be used shall be subject to the approval of the Engineer.

B. All exposed surfaces including finished surfaces shall be treated immediately after concrete has been poured, to provide continuous moist curing for at least 7 days. Walls and vertical surfaces may be covered with continuously saturated burlap or kept moist by other approved means. Horizontal surfaces, slabs, etc. shall be ponded to a depth of 15mm or kept continuously wet by means of sprinklers or other approved methods.

C. Formed surfaces shall be thoroughly soaked with water at least twice each day until the forms are removed. Curing shall continue as specified above.

D. Where finishing of concrete surfaces is performed before the end of the curing period, the concrete shall not be permitted to dry out and shall be kept continuously damp by means of a fog of water from the time the concrete has been placed until the end of the curing period.

E. The Contractor shall protect all concrete work against injury from the elements and defacements of any nature during construction operations.

3.5 REMOVAL OF FORMS

A. The Contractor shall not remove any forms for at least 48 hours or until the concrete has attained a strength of at least 30 per cent of the ultimate 28-day strength. This is equivalent to approximately 50-day-degrees of moist curing. Day degree represents the total number of days times the average daily air temperature in °C at the surface of the concrete, e.g. 2 days at an average temperature of 25°C equals 50 day-degrees.

B. Forms for beams and slabs shall not be stripped for at least 150-day degrees and supports shall not be removed until the concrete has attained at least 60% of the specified 28-day strength and is capable of safely supporting its own weight. Construction live loads shall not be placed upon it until the concrete has attained its specified 28-day strength.

C. Removal of forms shall be in accordance with ACI – 347. Forms shall be stripped such that they will not damage the concrete. No forms shall be removed until the concrete has gained sufficient strength to support itself. The Contractor is responsible for the safety of all structures.

3.6 REPAIR OF DEFECTIVE CONCRETE

A. Defective or honeycombed areas, as determined by the Engineer, shall be chipped down to at least 25mm deep into sound concrete by means of chisels or chipping hammers. If honeycombs exist around reinforcement steel a clear space, at least 10mm wide shall be chipped all around the steel.

B. For areas less than 40mm deep, the patch may be made as in filling formtie holes.

C. Thicker repairs will require build-up in successive 40mm deep layers on successive days, and each layer shall be applied with neat cement pastes.

D. For very deep patches, a non-shrink aggregate, with or without the addition of pea gravel, may be the used subject to the approval of the Engineer.

E. The materials shall be mixed as recommended by the manufacturer of the non-shrink aggregate or as directed by the Engineer.

   Where a metallic non-shrink aggregate is utilized, the final 15mm of the patch shall be composed of 1 to 1-1/2 cement / sand mortar without the non-shrink aggregate to prevent rust staining of the surface. After hardening, the patch shall be rubbed as for filling form-tie voids, in accordance with Section 33010, Rubbed Finish.

F. All exposed concrete surfaces and adjoining work stained by spilling or leakage of concrete shall be cleaned to the satisfaction of the Engineer.

3.7 INSPECTION

Batching, mixing, transportation, placing, curing and finishing of concrete shall at all times be subject to the inspection of the Engineer. No concrete shall be placed without the prior approval of the Engineer.

3.8 FIELD CONTROL

A. Sets of six (6) cylinder specimens shall be taken at random by the Contractor in the presence of the Engineer in accordance with ASTM C31. One (1) set per 50 cubic meters of concrete, or fraction thereof, poured during the day shall be made for the compressive strength test. At least one set of samples for strength test shall be made for each class of concrete.

B. Two (2) cylinders shall be tested after 7 days and two cylinders after 28 days. Should the average strength of the 28-day test specimens be less than the specified value, a verification test shall be conducted on the remaining two (2) cylinder samples, after 28 to 45 days. Compressive tests shall be in accordance with ASTM C39 and shall be performed by a laboratory engaged by the Owner. Testing fees shall be paid by the Contractor.

C. The Contractor shall assist, cooperate and provide the concrete for the test cylinders and such auxiliary personnel and equipment needed to take the test specimens.

D. Ready-mixed concrete shall be sampled and tested in accordance with the following methods.

Table 9 – Sampling and Test Methods for Ready-Mixed Concrete

Sampling/Test Method	Applicable ASTM Standard
Compressive Test Specimens	C31
Compression Tests	C39
Yield, Unit Weight	C138
Air Content	C138/C173/C231
Slump	C143
Sampling Fresh Concrete	C172
Temperature	C1064

3.9 FIELD TESTING

A. If the strength of any core samples is less than the minimum requirements shown in Table 4, the Contractor shall strengthen or replace the portions of the structure concerned at no additional cost and to the satisfaction of the Engineer.

B. The Contractor shall also deduct from payments otherwise due to him, the actual cost to the Owner for taking all core samples extracted from that portion of the Work.

C. Slump tests, temperature and entrained air measurements shall be made when specimens for strength tests are taken and during placement of concrete, as often as necessary for control checks. If measured slump or air content fall outside the specified limits, a check test shall be made immediately on another portion of the same composite sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and the whole batch shall be rejected.

3.10 BASIS OF ACCEPTANCE / REJECTION

Final acceptance of all concrete will be based on satisfactory results of compressive strength tests.

Strength tests representing each class of concrete must meet the following two requirements:

- The average of any three consecutive strength tests shall be equal to, or greater than the specified strength.
- No individual strength test shall be more than 15% below the specified strength.

Except as provided below, acceptance criteria will be as outlined in ASTM C94 and ACI 318. Concrete which achieves the required compressive strength will be accepted as satisfactory for payment provided placement, finish and tolerance meet the specified requirements.

Concrete with average strength deficient by not more than fifteen per cent (15%) of the required strength may be accepted, subject to cost reduction given in the following schedule:

Per Cent (%) Deficiency In Average Strength	Per Cent (%) of Unit Price Reduction
Less than 3	0
0 to less than 5	15
5 to less than 10	30
10 to 15	40
more than 15	100

Concrete represented by test results wherein the average strength indicated a deficiency of not more than fifteen percent (15%) but with an individual test deficient by more than fifteen percent (15%) will not be eligible for payment but may be accepted or ordered replaced at the discretion of the Engineer.

Concrete represented by compressive strength tests that fail to achieve the required strength as specified, shall be liable to rejection and subsequent removal and replacement.

However, if any strength tests falls below the specified value by more than 15%, or an individual test is deficient by more than 15%, and load carrying capacity has been significantly reduced, tests of cores drilled from the area in question may be required in accordance with ASTM C42, wherein L/D ratio is not less than 1.25 prior to capping. In such cases, three (3) cores shall be taken for each strength test more than 15% below the required value.

If concrete in the structure will be dry under service conditions, cores shall be air dried for 7 days before test and shall be tested dry. If concrete in the structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 40 hours and be tested wet.

Concrete in an area represented by core tests shall be considered structurally adequate if the average of three (3) cores is equal to at least 85% of the specified strength, and if no single core is less than 75% of the minimum requirement. Additional testing of cores extracted from locations represented by erratic core strength results shall be permitted.

Acceptance and subsequent payment of concrete in question shall be based on the results of such tests, provided the complete operation has been supervised by the Engineer.

Rebound hammer test (ASTM C805) may be carried out by the Contractor prior to drilling core samples from structure in question, but the results of such rebound tests shall not be used as basis for acceptance or rejection of the concrete.

**** END OF SECTION ****

SECTION 03730
CONCRETE REPAIR USING EPOXY RESIN
CONCRETE GROUTS AND MORTARS

PART 1 – GENERAL

1.1 APPLICABLE PUBLICATIONS

The publications listed below form part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 Military Specification

MIL-L-51149	Liquid Polymer, Polysulfide

1.1.2 American Society for Testing of Materials (ASTM) Publications

C 33-81	Concrete Aggregates
C 117-80	Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing
C 136-81	Sieve Analysis of Fine and Coarse Aggregates
C 144-81	Aggregate for Masonry Works
C 881-78	Epoxy-Resin-Base Bonding System for Concrete
D 1652-73	Epoxy Content of Epoxy Resins (R1980)
D 1824-66	Apparent Viscosity of Plastisols and Organosols at Low Shear Rates by Brookfield Viscometer
D 1963-74	Specific Gravity of Drying Oils, Varnishes Resins, and Related Materials at 25/25 Degrees (C).
D 2419-74	Sand Equivalent Value of Soils and Fine Aggregates (R1982)
E 70-77	PH of Aqueous Solutions with the Glass Electrode

1.2 SUBMITTALS *(to be submitted during implementation stage)*

1.2.1 Certified Test Reports

a. Aggregates: Sieve analysis test in accordance with ASTM C136 and ASTM C117.

b. Epoxy Resin Binder: Conforming to ASTM C881 and covering the following:
   1. Viscosity
   2. Consistency
   3. Gel Time
   4. Absorption
   5. Shrinkage
   6. Thermal Compatibility

c. Epoxy Resin Binder: Conforming to the two component epoxy resin binder type 1 specified hereinafter and covering the following.
   1. Epoxy Number
   2. Epoxy Viscosity
   3. Epoxy Specific Gravity
   4. Polysulfide Viscosity
   5. Polysulfide Specific Gravity
   6. Polysulfide pH
   7. Polysulfide Water Content
   8. Polysulfide Sulfur Content

1.2.2 Job Mix Formula: Submit for approval at least 15 days before work commences a job-mix formula for each use of epoxy resin. Test reports shall accompany the mix design. The formula shall identify the proposed source of the materials and state the proportions of aggregates and epoxy resin. Samples of materials to be used on the job shall be used to determine the job mix.

1.2.3 Samples: Submit the following samples for approval:

a. Not less than two sample epoxy concrete and epoxy mortar specimens for each mix design, 6-inches, ¾ inch thick.
b. Aggregates, 1-lb sample size, fine and coarse aggregates combined.
c. Epoxy resin components, 1 pint each

1.2.4 Equipment: Submit descriptive information on the mixing and application equipment.

1.3 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the Owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the Owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard.

PART 2 – PRODUCTS

2.1 MATERIALS

2.1.1 Epoxy Concrete and Epoxy Mortar:

2.1.1.1 Epoxy Resin Binder

2.1.1.1.1 ASTM C 881, Type III, Grade 2, Class C, with a bond strength of 1,400 psi.

2.1.1.1.2 A two-component epoxy resin-base binder of the epoxy resin-polysulfide polymer type with a suitable curing agent. The ratio of epoxy resin to polysulfide polymer shall be approximately 2:1 (by weight). The epoxy binder shall be a 100 percent solids system and no diluents, wetting agents, or volatile solvents shall be incorporated. The epoxy resin binder shall be Type I and shall conform to the following requirements:

2.1.1.1.2.1 Base Polymer: The base polymer shall be thermosetting resin of the epoxy type and shall be a transluscent liquid

having properties as specified herein. The epoxy resin shall be completed of 100 percent reactive constituents, which are condensation products of the reaction of epichlorohydrin with bisphenol A. This product shall be essentially pure liquid dislycidly either ofnbisphenol A and maybe allowed to contain only trace amounts of hydrolyzable chlorine, but no reactive diluents. The epoxy resin or base polymer shall conform to the requirements specified in the Table I.

Table I. Requirements for the Epoxy Resin or Base Polymer

Property	Test Method	Requirements	
		Min.	Max.
Epoxy Number	ASTM D 1652	175	210
Viscosity, Poises at 23C	ASTM D 1824	100	180
Specific Gravity at 25/25 C	ASTM D 1963	1.15	1.18

2.1.1.1.2.2 Polysulfide Polymer. The polysulfide polymer flexibilizer shall be a dichloroethylformal polysulfide in the 1000-molecular weight range conforming to the requirements specified in Table II.

Table II. Requirements for Polysulfide Polymer

Property	Test Method	Requirements	
		Min.	Max.
Viscosity at 23C centipoises	ASTM D 1824	700	1200
Specific Gravity at 25/25 C	ASTM D 1963	1.24	1.30
pH	ASTM E 70	6.0	8.0
Water content, percent	MIL-L-51149	-	0.1
Sulfur content, percent	ASTM D 129	36	40

2.1.1.1.2.3 Curing Agent: The curing agent shall be furnished combined with the polysulfide polymer flexibilizer as the polysulfide-curing agent component. The curing agent used shall be a tertiary amine type. When incorporated in the binder system, the curing agent shall be unaffected by moisture present on the surfaces to which the epoxy resin binder is applied or that moisture present in unhardened Portland cement concrete at the time of placement on the surface of the binder. These agents shall be a combination of 2-, 4-, 6-trimethylaminomethyl phenol and dimethylaminomethyl phenol. The 2-, 4-, 6-trimethylaminomethyl phenol may be used alone when application condition warrant.

2.1.2.2 Aggregate: Aggregate shall conform to the quality requirements of ASTM C 33 for epoxy concrete and shall have a minimum sand equivalent of 75 percent when tested in accordance with ASTM D 2419. ASTM C 144 for epoxy mortar. The material passing the No. 200 sieve shall be non-plastic and it shall be composed of a minimum of 75 percent limestone dust, talc or silica inert filler.

2.1.2.2.1 For Epoxy Concrete: Maximum size 3/8-inch. Shall conform to the following requirements:

Sieve Designation	Percent Passing by Weight
3/8 in	100
No. 4	70-80

No. 8	50-65
No. 16	37-53
No. 30	20-37
No. 50	10-20
No. 100	5-10
No. 200	3-5

2.1.2.2.2 For Epoxy Mortar: Maximum size: No 8 sieve

2.1.2 Pressure Grouting Epoxy:

2.1.2.1 For Pumping Into Cracks: ASTM 881, Type I, Grade I, Class C.

2.1.3 Bond Breakers : Use the type and consistency recommended by the sealant manufacturer for the particular application.

2.2 EQUIPMENT: The equipment for blending the epoxy resin binder and mixing the binder and aggregates shall be approve by the Engineers. A suitable capacity metal or polyethylene container recommended by the epoxy manufacturer shall be used as the mixing vessel for blending the epoxy resin. Mixing shall be accomplished using a poser drive (air or spark-proof) propeller type blade except that hand mixing maybe used for small batches. Equipment for field mixing of aggregates and epoxy resin shall be as specified by the epoxy manufacturer.

PART 3 – EXECUTION

3.1 CONSTRUCTION PROCEDURES

3.1.1 General: Mix the epoxy materials with or without files in strict accordance with the manufacturer's instruction. All application of the mixed materials shall be performed within the working life or pot life of the epoxy resin system. Unused mixed materials which have reached the end of the working or pot life, shall be removed from the jobsite. Field mixing and size of batch shall determine by the Contractor. Epoxy concrete, epoxy mortar, non-pressure epoxy grout, and pressure grouting of cracks shall be provided as indicated and required by this specification.

3.1.2 Epoxy Concrete:

3.1.2.1 Preparation of Patch Area: Remove loose concrete from the spalled areas indicated. Inspect the cavity of any remaining defective concrete by tapping with a hammer or steel rod throughout the areas and listening for dull or hollow sounds. In areas where tapping does not produce a solid tone, remove additional concrete until resting produces a solid tone. Use a high frequency chipping hammer or concrete saw to deepened cavity. Make maw cuts a minimum of ½ inch deep at a minimum distance of one inch outside the farthest edge of the spall. Roughen saw cuts surface by sand blasting. Remove residual fines from all surfaces with a high pressure water jet. Remove any free water with an oil free air jet.

3.1.2.2 Spalls at Joint: Spalls to be repaired that are adjacent to all joints and working cracks shall have performed joint filler of proper dimensions inserted to the bottom of the chipped spall cavities and shall be expanded a minimum of one inch beyond (horizontally) the entire working faces of the spall. The filler strip shall be secured in place prior to and during placement of epoxy concrete. A bituminous cement bond breaker shall be applied to all working faces at keyed joints. Care shall be exercised to keep bituminous cement bond breaker off of concrete surface to be bonded. After the epoxy

concrete has completely cured, the top inch of the preformed joint filler shall be sawed out and liquid joint sealer installed.

3.1.2.3 Mixing materials: Make batches small enough to assure placement before binder sets.

3.1.2.4 Prime coat: prime all surfaces of the cavity with the epoxy resin binder. Scrub prime coat into the surface with the stiff bristle brush. Make coating approximately 20 mils thick.

3.1.2.5 Epoxy Concrete Preparation: Mix epoxy resin binder and aggregates in accordance with manufacturer's recommendations.

3.1.2.6 Placement of Epoxy Concrete: Place epoxy in layers not exceeding 2 inches thick. Use vibratory floats, plates, or hand tampers to consolidate the concrete. Level each layer and screed the final surface to match the adjoining surfaces. Remove excess epoxy concrete on adjacent surfaces before concrete hardens. After the finishing operations and while the epoxy resin concrete is still tacky, uniformly spread a thin coating of Portland cement on the surface of the repaired area and lightly brush the cement into the surface. Upon completion of finishing operations, cure epoxy concrete in accordance with the manufacturer's recommendations.

3.1.3 Epoxy Mortar for cracks and saw Kerfs:

3.1.3.1 Preparation of Area: Concrete to which epoxy mortar is to be applied shall be newly exposed concrete free of loose and unsound materials: Prepare surfaces by sandblasting, scarifying or water blasting. Surfaces shall be dry before application of epoxy mortar.

3.1.3.2 Mixing Materials: Make batches small enough to assure placement before binder sets.

3.1.3.3 Prime Coat: Prime all surfaces with the epoxy resin binder. Scrub prime coat into the surface with a stiff bristle brush. Make coating approximately 20 mils thick.

3.1.3.4 Epoxy Mortar preparation: Mix epoxy resin binder and aggregates in accordance with manufacturer's recommendations.

3.1.3.5 Placement of Epoxy mortar: Apply epoxy mortar to concrete surface by trowel, roller or squeegee at a thickness not less than, nor more than, that recommended by the manufacturer. Work mortar into place and consolidate thoroughly so that all contact surfaces are wet by the feather edge epoxy mortar into adjacent surfaces.

3.1.4 Non-Pressure epoxy Grout: Prepare grout accordance with the manufacturer's instructions.

3.1.4.1 Cement Dowels: Immediately prior to placing dowel clean the hole of dust and other deleterious materials. Fill the hole with grout to a level that leaves enough space for the dowel without overflowing. Insert the dowel in the hole and tap down. If necessary add more grout.

3.1.4.2 Grout Cracks

3.1.4.2.1 Preparation of Area: Concrete to which epoxy grout in to be applied shall be newly exposed concrete free of loose and unsound materials. Prepare surfaces by sandblasting, scarifying or water blasting. Surfaces shall be dry before application of epoxy grout.

3.1.4.2.2 Apply epoxy grout to concrete surface by trowel, roller or squeegee at a thickness not more than 2-inches or as recommended by the manufacturer. Work grout into place and consolidate thoroughly so that all contact surfaces are wet by the grout. Finish surface of grout to the required texture. Do not feather edge epoxy grout into adjacent surfaces.

3.1.5 Pressure Grouting of Cracks: Fill cracks in concrete slabs, beams an by pumping a low viscosity epoxy resin system under pressure into the cracks. Install valves into position along the cracks by bonding in concrete with high viscosity, non-sagging epoxy resin paste mixture. Cracks shall be filled by pumping the low viscosity epoxy system through the valves.

3.1.5.1 Grout out cracks along its entire length to a depth of ¼ inch and a width of 3/8 inch. Vacuum or jet-blow off all dust and particles an the area of the groove.

3.1.5.2 At maximum intervals equivalent to the thickness of the member being repaired or 12 inches and at the juncture of two cracks the bottom of the groove shall be sawed flat and a valve inserted at each interval.

3.1.5.3 The groove between valves shall be filled flush with the concrete surface with the high viscosity epoxy mixture.

3.1.5.4 After the resin mixture has hardened and curved, a tube from a pressure pot containing the low viscosity resin mixture shall be attached t the first valve and the resin mixture pumped into the crack. Use a maximum pressure of 60 psi or less to protect the existing concrete.

3.1.5.5 As the resin mixture appears in the second valve, pinch closed the first valve, and attached the tube from the pressure pot to the second valve and commence pumping. Avoid delays in the pumping operations.

3.1.5.6 After the epoxy mixture has been pumped through all of the valves and the mixture has hardened, removed the valves by grinding off the valves flush with the concrete. Coat the areas of the valves with the high viscosity resin mixture and allow to curve.

3.2 FIELD TESTING AND INSPECTION:

3.2.1 Sampling: As soon as the epoxy resin and aggregate materials are available for sampling, obtain by random selection a sample of each batch in the presence of the Engineer. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by designated name, specification number, batch number, project contact number, intended use and quantity involved.

3.2.2 Testing: At the discretion of the Engineer, samples provided maybe tested for verification.

3.2.3 Inspection: Examine material at the jobsite to determine that it is material referenced in the report o test result or certificate of compliance.

3.2.3.1 Surface preparations and application procedures will be examined by the Engineer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

**** END OF SECTION ****

SECTION 04200
MASONRY

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing all labor, materials, equipment and incidentals required to construct all concrete masonry unit walls including the following:

- Concrete hollow block walls.
- Masonry reinforcing bars for concrete blocks.
- Grouting.
- Connecting wall anchors, ties, bolts and related embedded items.
- Installation of frames for doors, windows, louvers, steel lintels, and recessed fixtures.

1.2 RELATED SECTIONS

Other Sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33030	Cement Plastering
Section 33019	Caulking and Dampproofing
Sections 33020 to 33028	Doors, Windows and Glass

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM C33	Concrete Aggregates
ASTM C90	Loadbearing Concrete Masonry Units
ASTM C144	Aggregate for Masonry Mortar
ASTM C150	Portland Cement

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Detailed working drawings.
B. Samples as required by the applicable Reference Standards.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

1.6 PROTECTION OF MATERIALS

All perishable materials for the Work of this Section shall be delivered, stored and handled to preclude damage of any nature. Manufactured materials, such as cement, shall be delivered and stored in their original containers, plainly marked with identification of material and maker. Materials in broken containers, or in packages showing watermarks or other evidence of damage, shall not be used and shall be removed from the site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement

Portland cement shall conform to ASTM C150, Type I. Masonry cements shall not be used. One color of cement shall be used throughout the Work. Cement shall be used for the application intended and in accordance with the approved recommendation of the manufacturer.

B. Sand for Mortar

Sand shall be clean, durable particles, free from injurious amounts of organic matter and shall conform to the requirements of ASTM C144, Aggregate for Masonry Mortar.

Sand for grout shall conform to ASTM C144 or C33 as required.

C. Water

Water shall be free from injurious amounts of oils, acids, alkalis, organic matter, and shall be clean and fresh.

D. Concrete Hollow Blocks

1. Classification

Concrete block shall conform to ASTM C90, Type I, Normal Weight.

2. Manufacturing Requirements

Concrete hollow blocks shall be manufactured from Portland cement conforming to ASTM C150.

Aggregates for concrete blocks shall consist of sand and evenly graded pea gravel conforming to ASTM C33.

All concrete hollow blocks shall be even textured with straight and true edges, wet steam cured for at least 18 hours and then air cured in covered storage for not less than 28 days before delivery to the job site and shall conform to the requirements of Table 1.

Table 1 – Quality Requirements

Compressive Strength (Minimum, MPa)		Water Absorption (Maximum,kg/m³)	Moisture Content (Maximum, % of Total Absorption)
Average of Five (3) Samples	Individual Sample	Average of Five (3) Samples	Average of Five (3) Samples
7.1	6.9	208	40

The moisture content of hollow blocks when laid shall not exceed 35 per cent.

3. Dimensions

The actual dimensions of the concrete hollow blocks shall be as shown in Table 2.

Table 2 – Dimensions

Nominal Dimension (mm)			*Actual Dimension (mm)		
Width	Height	Length	Width	Height	Length
100	200	400	92	194	397
150	200	400	143	194	397
200	200	400	194	194	397

No average dimension shall differ from the specified actual dimensions by more than 3 mm.

4. Minimum Face Shell and Web Thickness

The following dimensions shown in Table 3 shall apply for minimum face and web thickness.

Table 3 - Minimum Thickness of Face Shells and Webs

Nominal Width mm (in.)	Face Shell Thickness (Minimum, mm)	Web Thickness (Minimum, mm)
102 (4”)	19	19
152 (6”)	25	25
203 (8”)	32	25

2.2 MORTAR MIXES

Masonry mortar for setting blocks shall be in the proportion of 1 part cement to 3 parts sand or as otherwise approved by the Engineer. Mortar shall be mixed with water in an amount compatible with workability. Ingredients shall be accurately measured by volume.

Mixing shall be done immediately before usage. The Contractor shall use the dry-mix method, wherein the materials for each batch shall be well turned together until the cementitious materials has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained.
Mortar boxes shall be cleaned out at the end of each day’s work and all tools shall be kept clean. Mortar that has begun to set shall not be used.

The mixing of mortar by hand will be permitted only when the quality of hand mixing is comparable to mechanical mixing. The Engineer reserves the right to reject hand mixing and require all mixing by mechanical means. Mortar shall not be retained for more than 1-1/2 hours and shall be constantly mixed until used.

Pointing mortar shall be prehydrated mortar mixed dry, and water added while mixing to obtain a damp, or workable mix. After one or two hours, sufficient water shall be added to bring it to proper consistency, which shall be somewhat drier than masonry mortar.

The color of mortars shall be uniform throughout for adjoining areas, and shall be satisfactory to the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General

All masonry shall be laid plumb and true to lines. Masonry shall be carried up in a uniform manner. No portion shall be raised more than one meter above adjacent portions, except with the approval of the Engineer.

B. Concrete Hollow Block

Concrete blocks shall be laid in running bond, unless otherwise indicated. Joints shall not exceed 10 mm, shall be uniform throughout, and finished slightly concave and smooth.

Pointing shall be performed with the proper tools to a dense and neat finish. Finger pointing will not be allowed.

All blocks shall be laid in a full bed of mortar applied to shells. Apply mortar to the vertical joint of blocks that have already set in the wall, and to all contact faces of the unit. Each unit shall be placed and shoved against the previously laid block to produce a well-compacted vertical mortar joint for the full shell thickness.

Intersecting bearing walls shall be tied together with metal ties at 0.80-meter vertical spacing. Bends of tie and reinforcing bars shall be embedded in cells filled with mortar.

Concrete blocks shall be reinforced with gage #10 bars at 0.80 meter on centers in vertical and horizontal direction.

- All necessary block cutting shall be neatly done by an approved hand tool.

- Unless otherwise shown on the Drawings, door, window and louver frames shall be installed using screws and expansion shields. All frames shall be set tightly against the masonry wall.

- Control joints shall be installed as detailed on the Drawings. The joints shall be raked out to a depth of 20 mm for the full height of the wall and caulked. The maximum length between joints shall be 10 meters, if not shown on the Drawings, or as directed by the Engineer.
  Joints made at the intersection of block walls with structural concrete, and where indicated, shall be filled with mortar grout and pointed.

C. Concrete Hollow Block to be Plastered

Concrete block walls, which are to be plastered, shall be laid in running bond. Joints are to be left rough to assist in the bonding of plaster. Otherwise, concrete block masonry shall conform to paragraph B, Concrete Hollow Block. Control joints in plastered block walls shall be carried through the plaster, but the joints shall not be plastered.

3.2 LINTELS, TIES AND MICELLANEOUS ITEMS

The Contractor shall build in all miscellaneous items specified in other sections to be set in masonry including frames, lintels, reinforcing steel, electrical boxes and fixtures, sleeves, grilles, anchors and other miscellaneous items. All anchorage, attachments, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar.

3.3 GROUTING

Grout and cement mortar for setting railings, frames in walls and where otherwise required shall be done with mortar of 1 part cement to 1 part sand. Before placing grout, thoroughly clean all surfaces. Grout shall be tamped into place with a blunt tool to fill the entire void. In the event space does not permit tamping, the Contractor shall build the necessary forms and place the grout by pouring from one side only. When grout is placed by pouring, a head of grout shall be maintained in the form. Grout shall be kept wet for three days after the temporary supports or adjusting wedges are removed; the empty space shall be filled with grout and shall be pointed.

3.4 CLEANING

All exposed masonry work shall be thoroughly cleaned. Mortar smears and droppings on concrete block walls shall be dry before removal with a trowel. Masonry work may be cleaned using a mild muriatic acid solution.

**** END OF SECTION ****

SECTION 05100
STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes providing all labor, materials, equipment and incidentals necessary to furnish and install all structural steel items including bearing plates and miscellaneous shapes and plates required for proper erection of structural materials as shown on the Drawings.

1.2 RELATED SECTIONS

Other sections of the Specifications shall also apply to the extent required for proper performance of this Work.

Section 33014	Miscellaneous Metals

1.3 SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following Standards apply to the WORK of this Section:

ASTM A36	Carbon Structural Steel
ASTM A325	Structural Bolts, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength
ISO 261	ISO General Purpose Metric Screw Threads - General Plan
AWS A5.1	Mild Steel Covered Arc-Welding Electrodes
AWS D1.4	Structural Welding Code – Reinforcing Steel
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete

1.4 SUBMITTALS *(to be submitted during implementation stage)*

A. Detailed shop drawings of all structural steel items.
B. Samples as required by the applicable Reference Standards.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Structural shapes, plates and bars unless otherwise noted shall conform to the requirements of ASTM A36.

B. Welding rods shall conform to AWS A5.1.

C. High strength steel bolts shall conform to ASTM A325.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

A. Details of concrete reinforcement steel for fabrication and erection shall conform to ACI 315, unless otherwise specified.

All members shall fit closely together and shall be straight and true; the finished work shall be free from burrs, bends, twists and open joints.

Materials for welding shall be the best available as recommended by the manufacturer of the materials to be welded, and in accordance with AWS Standards.

B. All holes, angles, supports, and braces shall be provided as required. Any unmatched holes in shop assembly of field connections shall be reamed and the pieces match marked before disassembly.

Drift pins shall be used only for bringing members into position and not to enlarge or distort holes.

Any piece weakened by reaming to compensate for eccentricity to a point where the strength of the joint is impaired will be rejected and a new and satisfactory piece shall be provided by the Contractor at his own expense.

Slotted holes and washers shall be provided for truing-up steel requiring accurate alignment.

C. Anchor bolts shall be accurately located on the base plates and welded in position.

3.2 FIELD CONNECTIONS

Base plates where required shall be accurately placed in position.

Field connections shall be made by welding or high strength bolting.

3.3 WELDING

Welding of parts shall be in accordance with the Structural Welding Code D1.1 of the AWS and shall only be done by welders certified as to their ability to perform welding in accordance with the locally accepted requirements.

The Contractor may substitute field bolting where field welding is shown, provided bolting details have been approved by the Engineer.

3.4 BOLTING

High-strength bolts shall conform to ASTM A325.

Anchor bolts shall be of mild steel with hexagonal nuts. Threads shall be clean cut and conform to ISO 261. Anchor bolts shall be hot-dip galvanized and shall be accurately set before the concrete is poured unless specifically permitted otherwise by the Engineer. To facilitate the setting of anchor bolts, the Contractor shall use screed plates, or may substitute wooden templates instead of screed plates upon written approval of the Engineer.

Anchor bolts with pipe sleeves shall be in accordance with the details shown on the Drawings.

3.5 PAINTING

A. Shop Painting

All structural steel shall be shop primed in accordance with Section 33035 after fabrication and cleaning.

All steelwork shall be thoroughly cleaned of all loose mill scale, rust, and foreign matter before shop painting.

Each individual piece shall be painted before assembly. Paint shall be applied only to dry surfaces.

Edges where field welding is required shall not be painted.

B. Field Painting

After erection, the Contractor shall thoroughly prepare and clean the structural steel surfaces of all dirt, grease, rust or other foreign matter.

**** END OF SECTION ****

SECTION 33015A
RETROFITTING (USING CARBON FIBER)

PART 1 – GENERAL

1.1 SCOPE OF WORK

The WORK includes furnishing all labor, materials, equipment and incidentals necessary for the completion of the steel piles corrosion protection system.

1.2 RELATED SECTIONS

Not Used

1.3 SUBMITTALS *(to be submitted during implementation stage)*

A. Samples / test reports / certificates as required.
B. Detailed working drawings.

1.4 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Composite Strengthening System

1. Carbon fabric or the approved equivalent.

   A material which is used where additional strength, modulus or environmental durability is required and is compatible with all commonly used epoxy resin systems.

Table 1 – Graphite Fiber Properties

Number of Filaments	12,000
Tensile strength (ksi)	550
Tensile modulus (msi)	34
Density (g/cc)	1.80
Elongation (%)	1.5

2. Epoxy Resin or the approved equivalent.

Clear Epoxy Resin Laminating Properties – Solvent Free Type

Component Properties		Resin	Hardener
Mix Ration (by weight)		100	33.3
Mix Ratio (by volume)		100	40
Viscosity @ 15 ◦C	mPAs	1869	231
Viscosity @ 20 ◦C	mPAs	1166	173
Viscosity @ 25 ◦C	mPAs	723	131
Viscosity @ 30 ◦C	mPAs	451	98
Shelf Life (month)		24	12
Color (Gadner)		Pale Violet	1
Mixed Color (Gadner)		1.163	0.969
Mixed Density	g/cm3		1.115
Hazard Definition		Xi, N	C

Cured System Properties		Cured 28 days @ 21 ◦C	Cured 24 hrs @ 21 ◦C + 16 hrs @ 50 ◦C
Tg DMTA (Peak Tan□□)	◦C	64.4	84.2
Tg Ult – DMTA	◦C	97.5	97.5
□H – DSC	J/g	39	5
Tg1 – DMTA	◦C	54.4	74.2
Est. HDT	◦C	49	69
Moisture Absorption	%	1.37	1.20
Cured Density	g/cm3	1.161	1.16
Linear Shrinkage	%	1.6	1.6
Barcol Hardness		30	37
Cast Tensile Strength	Mpa	70.3	75.9
Cast Tensile Modulus	Gpa	3.67	3.70
Cast Strain to Failure	%	1.9	4.7
Laminates Comp. Strength	Mpa	398	444
Laminates T.V.M Strain	%	2.1	2.0
Laminates ILSS	Mpa	49.9	60.2
ILSS Wet Retention	%	76	77

	Resin/ Hardener			
Working Prop. Vs. Temp.	15 ◦C	20 ◦C	25 ◦C	30 ◦C
Initial Mixed Viscosity (cP)	1265	856	576	384
Gel Time – 150g Mix in water (hours : min)	-	0:58	0:35	0:21
Pot Life – 500g Mix in water (hours : min)	0:45	0:33	0:23	0:16
Latest Vacuum Flow Time (hours : min)	2:50	2:10	1:45	1:25
Earliest Vacuum Off Time (hours : min)	4:00	3:10	2:30	2:00
Demould Time (hours : min)	4:40	3:40	2:50	2:10

Resin Properties or the approved equivalent:

Table 2 - Mechanical properties – 1/8 inch castings with 72hr 140 ◦F cure

Test	Value	ASTM Test Method
Heat Deflection Temperature (HDT)	170□◦F	D648
Tensile Strength	10,500 psi	D638
Tensile Modulus	459,000 psi	D638
Elongation at Break	4.8%	D638
Flexural Strength	17,900 psi	D790

Flexural Modulus	452,000 psi	D790
Density	1.1567 g/cc	D792
Specific Gravity	1.1597	D792
Glass Transition Temperature (Tg) (ultimate 250□◦F cure)	188□◦F	D4065
Glass Transition Temperature (Tg) DMTA	174□◦F	D4065

PART 3 - EXECUTION

3.1 SAFETY

A. Safety policy issued shall be posted at a noticeable place in the site.

B. All personal protective equipment required for safe completion of the job shall be worn properly.

3.2 PRE – PROJECT PREPARATION

A. Obtain all equipment and materials as per checklist and any special project requirements.

3.3 SURFACE PREPARATION

A. Surfaces where the Composite Strengthening System is to be applied must be sound.

B. Rust scales, oil or grease, old paint coating, and other contaminants must be removed by any applicable method approved by the Engineer.

C. Inject cracks. Cracks greater than 0.25mm (0.010 in.) must be stabilized using epoxy injection methods.

D. Honeycombs and bug holes shall be filled up.

E. Remove form lines, sharp edges and protrusions by grinding or filling with putty. Ridges greater than 5mm may need to be ground down as per engineer's inspection.

F. Sharp edges, fins, and protrusions that can cause voids between the wrap and the steel girder surface or those that are injurious to the fibers shall be removed by grinding or any approved method approved by the Engineer. Ridges greater than 5mm may need to be ground down as per engineer's inspection.

G. Smoothen any surface undulations greater than 15mm over 1m as per the inspection of the engineer.

H. Radius corners perpendicular to the fiber orientation by grinding as per the project specifications.

I. Ensure and open pore structure of the substrate by either sandblasting, high-pressure water blasting or wire brushing.

J. Surfaces must be cleaned of dust and debris by blowing with air or broom cleaning.

K. The substrate should be dry before the application of the Composite Strengthening System.

L. All other method of surface preparation equal to the above standard maybe permitted subject for approval by the Engineer.

3.4 PREPARATION WORK FOR PROJECT

A. Review project specifications in detail.

B. Pre-cut fabric with off-site labor where possible.

C. Check surface-prep of substrate to make sure all patchwork is complete and cured.

3.5 SET – UP OF SATURATOR AND AUTOMATIC MIXING UNIT

A. When using automatic mixing unit, setting up shall be supervised and meticulously checked by the properly trained foreman or supervisor.

B. When using saturator, setting up shall be supervised and meticulously checked by the properly trained foreman or supervisor as per the manufacturer's instructions. Gap to be measured and set for a ratio of 0.8:1.0 of epoxy to fabric by weight.

C. Equipment should be located in a well-ventilated and well lighted area.

3.6 EPOXY MIXING

A. Hand mix or use the automatic mixing unit to obtain proper mix ratio of 100 parts A to 40 parts B by volume OR 100 parts A to 33 parts B by weight from Epoxy Resin component container. The batch ratio tolerance is 5%.

NOTE: Batching down from the pre-packaged units is not recommended.

B. Mix thoroughly as per instructions, for 5 minutes on low using a paddle-style mixer until uniformly blended.

3.7 SATURATION

A. Hand Saturation.

1. Cover a smooth flat level surface with polyethylene sheeting, i.e., VISQUEEN™ or 0.5mm (20 mil) plastic film, approximately the length and width of the average size of the Carbon Fabric sheet to be applied.

2. Prime the surface of the plastic sheeting by pouring a bead of the mixed Epoxy down the center, then spreading it out the epoxy with a spatula.

3. Lay the pre-cut Carbon Fabric sheet down onto the epoxy covered plastic sheet and then pour another bead of Resin Epoxy directly on top.

4. "Saturate" the Carbon Fabric sheet by applying smooth, even pressure with a spatula or roller to the fabric surface. The surface of the carbon fabric will have sheen to it and yet still appear to have some texture.

5. A good way to check proper saturation is to periodically check the resin/fabric usage ratios. All of the epoxy that is recommended for a given square meters (footage) of fabric should be used up.

6. Carefully roll-up the saturated Carbon Fabric onto a take-up roller (PVC tube) and use immediately.

3.8 APPLICATION

A. Beginning with a clean work area (free of dust and debris), place VISQUEEN™ or paper a minimum of four (4) feet around or under the element where the strengthening system is to be applied.

B. Using a roller, prime the area to be wrapped by applying Resin Epoxy. Wait approximately 1 hour to allow the epoxy to penetrate the substrate pores and to become "tacky".

C. Apply the saturated Carbon Fabric to the element to be strengthened as indicated on the drawings.

D. For maximum adhesion of vertical or overhead applications, apply the layers of Carbon Fabric individually, waiting approximately 1 hour in between layers. Columns may be continuously wrapped.

E. Apply Carbon Fabric with uniform and smooth pressure either with a stiff spatula or a surface roller removing and air bubbles caught beneath the fabric surface. More resin may be added to the applied Carbon Fabric with a wetted roller if necessary.

F. For Columns:

- Wrap the column with the specified number of wraps as calculated and indicated on the specification. Wrap TOP first; BOTTOM second or as per project specifications. Sequence to be advised on daily work sheet for each column. Follow the approved drawings.
- While continuously wrapping, apply Carbon Fabric with uniform and smooth pressure either with a stiff spatula or a surface roller, securing and smoothing each layer.

G. For Beams (including shear strengthening):

- Wrap the beam with the specified number of wraps as calculated and indicated on the specification. Sequence to be advised on daily work sheet for each beam. Follow the approved drawings.
- Apply shear strengthening layers on top of the flexural strengthening layers or as per engineering drawings. This method helps to secure the ends of the flexural strengthening.
- Install FibrAnchors as per specifications if required.

H. For Walls (including URM walls):

- Apply specified number of layers as calculated and indicated on the specification. Application sequence to be advised on daily work sheet. Follow the approved drawings.
- Install FibrAnchors as per specifications if required.

I. For Slabs

- Apply specified number of layers as calculated and indicated on the specification. Application sequence to be advised on daily work sheet. Follow the approved drawings.
- Additional set time may be necessary to properly adhere large sheets of Carbon Fabric in overhead applications.
- Install FibrAnchors as per specifications if required.

J. At Wall / Slab Connections:

- Install specified radius bedding of Epoxy Putty at joint of wall and slab, insuring that radius extends equally between the wall and slab as per drawings. Allow the Epoxy Putty to cure overnight to a tacky, firm state.
- Apply primer coat as per section "3.8."
- Apply Carbon Fabric with uniform and smooth pressure, either with a stiff spatula or a surface roller, onto the wall/slab and over the joint as per the drawings.
- Install FibrAnchors as per specifications if required.

3.9 FINISH

A. Cover the top and bottom of fiber or cut trim for aesthetics.

B. Paint as specified. Always wait until epoxy final coat is dry-tacky to touch. If over 72 hours, surface must be brush blasted.

3.10 CLEAN UP

A. Clean all equipment each day. Uncured epoxy should be wiped up with a rags wetted with MEK solvent or the equivalent.

B. If there is any uncured epoxy left at the end of the day, pour it out thinly on a flat polyethylene lined surface where it will cure safely overnight.

3.11 FIELD CONTROL

A. The Contractor shall assist, cooperate, and provide the necessary material samples and such auxiliary personnel and equipment needed to procure the test specimens.

B. The Contractor shall protect all retrofitting works against injury from the elements and defacements of any nature during construction operations.

3.12 INSPECTION

All finished works related to this section shall at all times be subject to the inspection and approval of the Engineer. Any defects found shall be repaired or restored by the contractor to the satisfaction of the Engineer.

3.13 FIELD TESTING

A. All samples selected shall undergo testing by an independent testing laboratory duly approved or recommended by the Engineer for verification.

B. Laboratory should precondition procured samples 48 hours at 60°C (140°F) before testing.

C. Laboratory must return results within ten days maximum.

**** END OF SECTION ****

Section VII. Drawings

GENERAL RETROFITTING NOTES

A. GENERAL

1. CONSTRUCTION NOTES AND TYPICAL DETAILS APPLY TO ALL DRAWINGS UNLESS OTHERWISE SHOWN OR NOTED. MODIFY TYPICAL DETAILS AS DIRECTED TO MEET SPECIAL CONDITIONS.

2. SHOP DRAWINGS WITH ERECTION AND PLACING DIAGRAMS OF ALL STRUCTURAL STEEL, MISCELLANEOUS IRON, PRE-CAST CONCRETE ETC. SHALL BE SUBMITTED FOR ENGINEER'S APPROVAL BEFORE FABRICATION.

3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE ALL WORK IS TO BEGIN, CHECK WITH MECHANICAL AND ELECTRICAL CONTRACTORS FOR CONDUITS, PIPE SLEEVES, ETC. TO BE EMBEDDED IN THE CONCRETE.

4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE SHORINGS AND BRACINGS OF THE STRUCTURE FOR ALL LOADS THAT MAY BE IMPOSED DURING CONSTRUCTION.

5. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS (MM) UNLESS NOTED OTHERWISE. ELEVATIONS ARE EXPRESSED IN METER (M). THE ELEVATION SYSTEM USED IS "EL+XX.XXX".

B. RETROFITTING NOTES

1. CRACKS, HONEYCOMBS AND WALL VERTICAL SEPARATIONS
ALL CRACKS AND HONEYCOMBS IN MASONRY WALL AND STRUCTURAL ELEMENTS SHALL BE FILLED AND REPAIRED WITH STRUCTURAL GROUT, MATERIAL TO BE APPROVED BY ENGINEER UNDERSIGNED, ALL CRACKS SHALL BE PROPERLY FILLED AND SEALED.

2. RETROFITTING OF CRACKED AND DEFLECTED SLAB
CRACKED AND DEFLECTED SLAB SHALL BE FILLED AND SEALED WITH STRUCTURAL EPOXY, MATERIAL TO BE APPROVED BY ENGINEER UNDERSIGNED, ADDITIONAL CHANNEL SUPPORT SHALL BE INSTALLED TO PREVENT FURTHER DEFLECTION.

3. WATERPROOFING
APPLICATION OF WATERPROOFING FOR DECKS. SEALING OFF OF ALL EXISTING CRACKS.

4. ALL EXPOSED STEEL MEMBERS SHALL BE PROPERLY MAINTAINED W/ RUST PROOFING MATERIAL.

5. PRIOR TO APPLICATION OF CFRP FIBER & PLATES, CONCRETE SURFACE MUST BE PROPERLY PREPARED.

C. MATERIAL SPECIFICATION

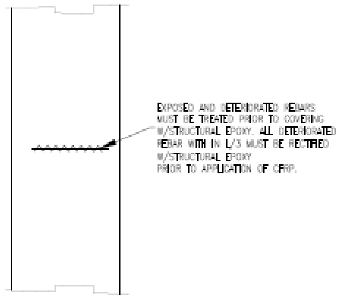
1. CARBON FIBER/WRAP
MAXICARB 600G OR ANY APPROVED EQUAL
SEALBOND NUVOXIBOND Clear C6

2. CARBON PLATES
MAXICARB PLATE 1.2 THICKNESS OR ANY APPROVED EQUAL

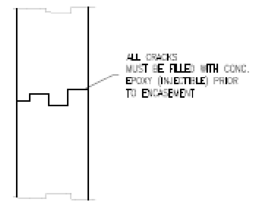
3. STRUCTURAL EPOXY
SEALBOND EPOXY UNDERWATER (385-UE)

4. HOT APPLIED WATERPROOFING
LARIBIT TORCH-ON APPLIED WATERPROOFING MEMBRANE
OR ANY APPROVED EQUAL

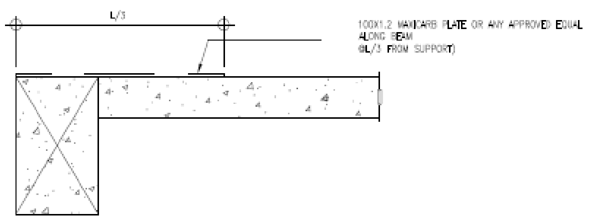
SEALPROOF NON-SHRINK CEMENTITIOUS
GROUT 800B



1 EXPOSED REBAR
RP-1



2 CRACK RETROFIT
RP-1



3 BEAM RETROFITTING DETAILS
RP-1

ADAMANTEM CONSULTING ENGINEERS

PROJECT OWNER: SOCIAL SECURITY SYSTEM
CLIENT

PROJECT ENGINEER: JULIE ANNE B. CAIMOL, M.ASEP, M.PICE
STRUCTURAL ENGINEER
PTR NO.: 8104491 DATE: JANUARY 6, 2022
PRC REG. NO.: 0106509 TIN: 306-812-612

PROJECT TITLE: RETROFIT PLANS OF SSS NAGA BRANCH
LOCATION: CONCEPCION, PEQUEÑA, NAGA CITY

SHEET CONTENTS: GENERAL RETROFITTING NOTES
RETROFITTING DETAILS

DESIGN BY: RSBC
DRAWN BY: MGHD
CHECKED BY: --
APPROVED BY: JABC
FILENAME: ACE_SSS_NAGA BRANCH
PLOT SCALE: AS SHOWN

REVISIONS				
MARK	DESCRIPTION	DATE	DRAWN	APPROVED
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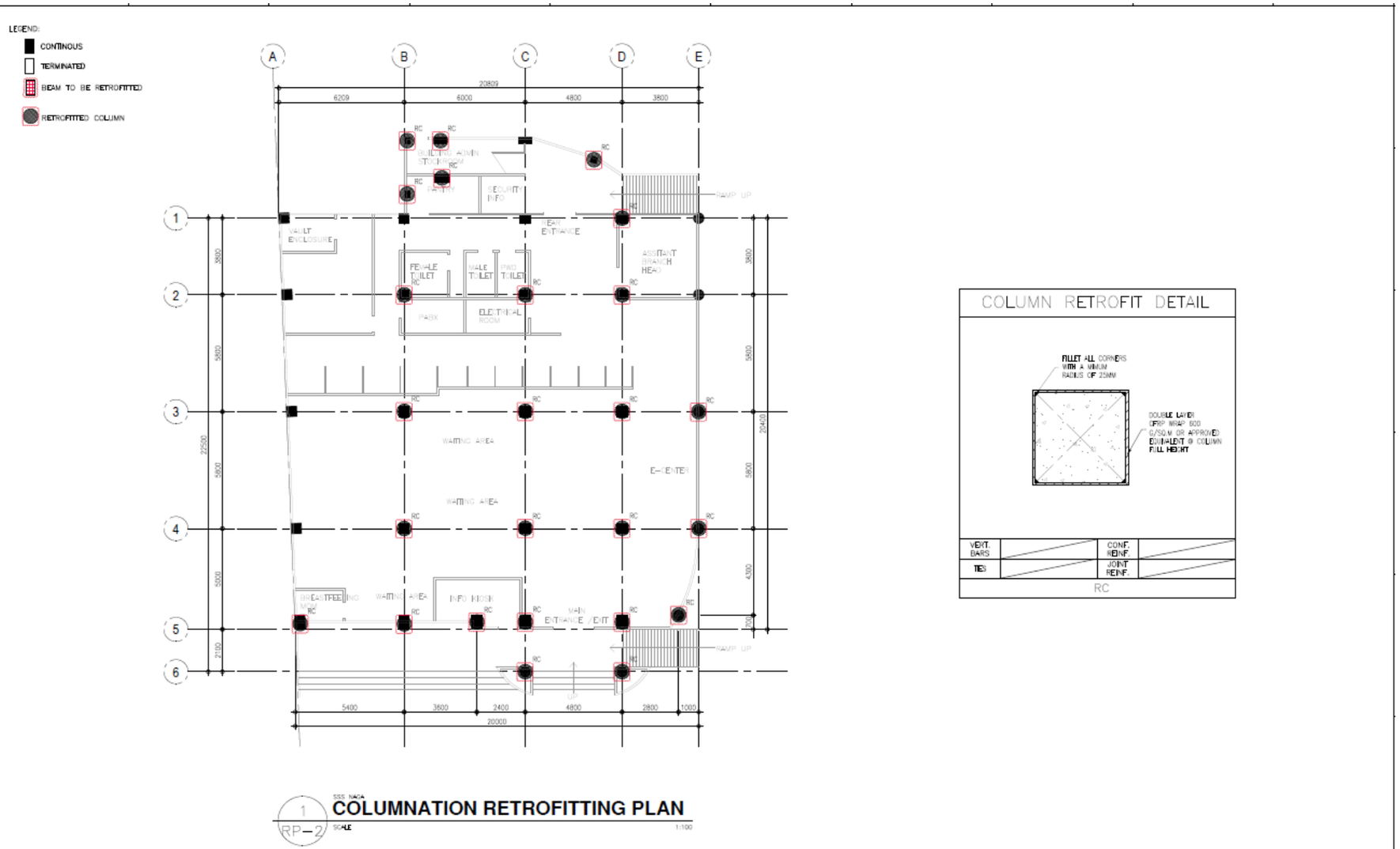
SHEET NO. 01 OF 05



1 / RP–2 SSS NAGA
COLUMNATION RETROFITTING PLAN
SCALE 1:100

ADAMANTEM CONSULTING ENGINEERS	PROJECT OWNER: SOCIAL SECURITY SYSTEM (CLIENT)	PROJECT ENGINEER: JULIE ANNE B. CAIMOL, MASEP, MPWE (STRUCTURAL ENGINEER)	PROJECT TITLE: RETROFIT PLANS OF SSS NAGA BRANCH	SHEET CONTENTS: COLUMNATION RETROFITTING PLAN; RETROFITTING DETAILS	DESIGN BY: RSBC; DRAWN BY: MCHD; CHECKED BY: ---; APPROVED BY: JABC; FILENAME: ADE_SSS_NAGA BRANCH; PLOT SCALE: AS THEM

REVISIONS

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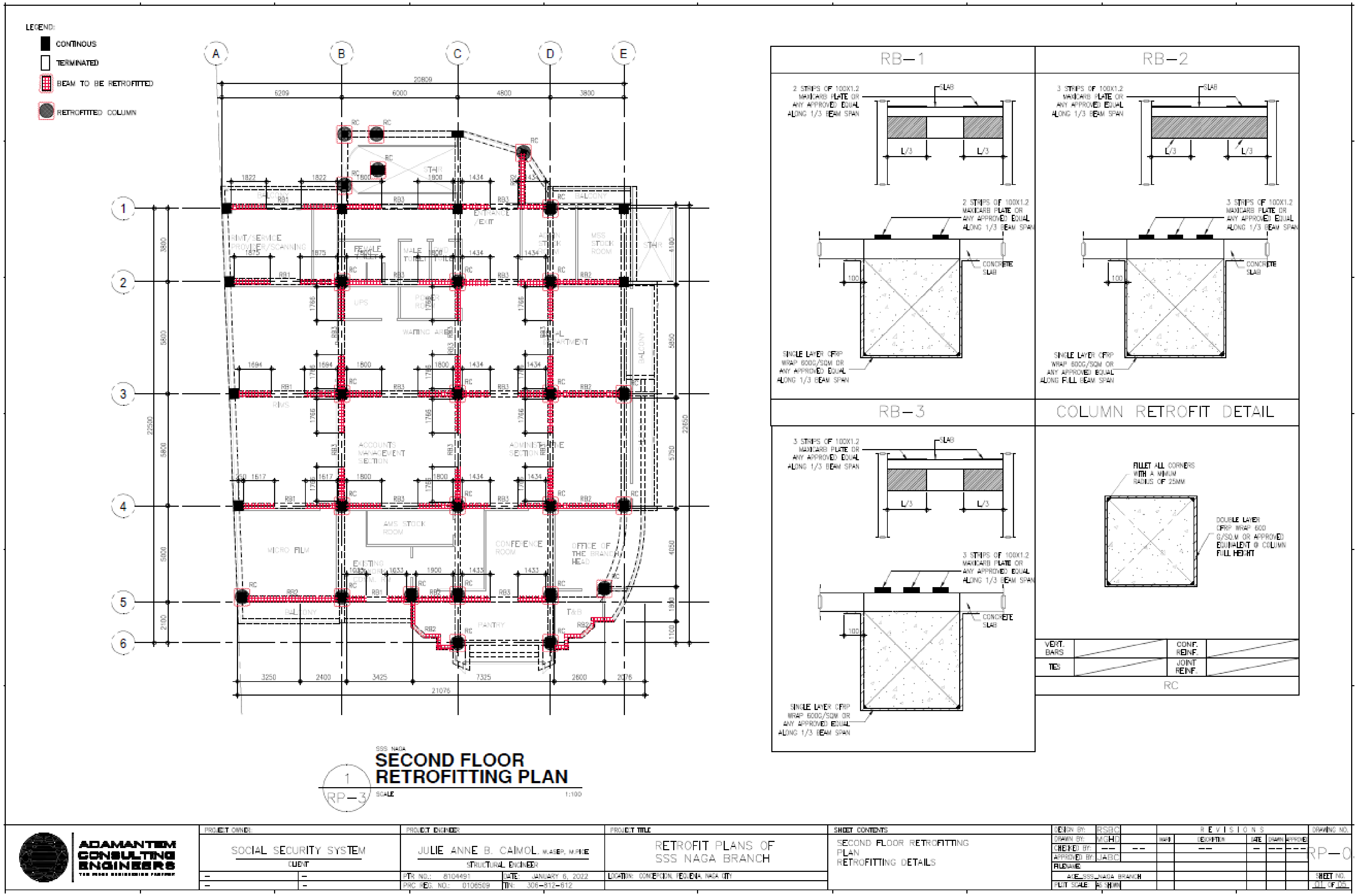
SHEET NO. 11 OF 22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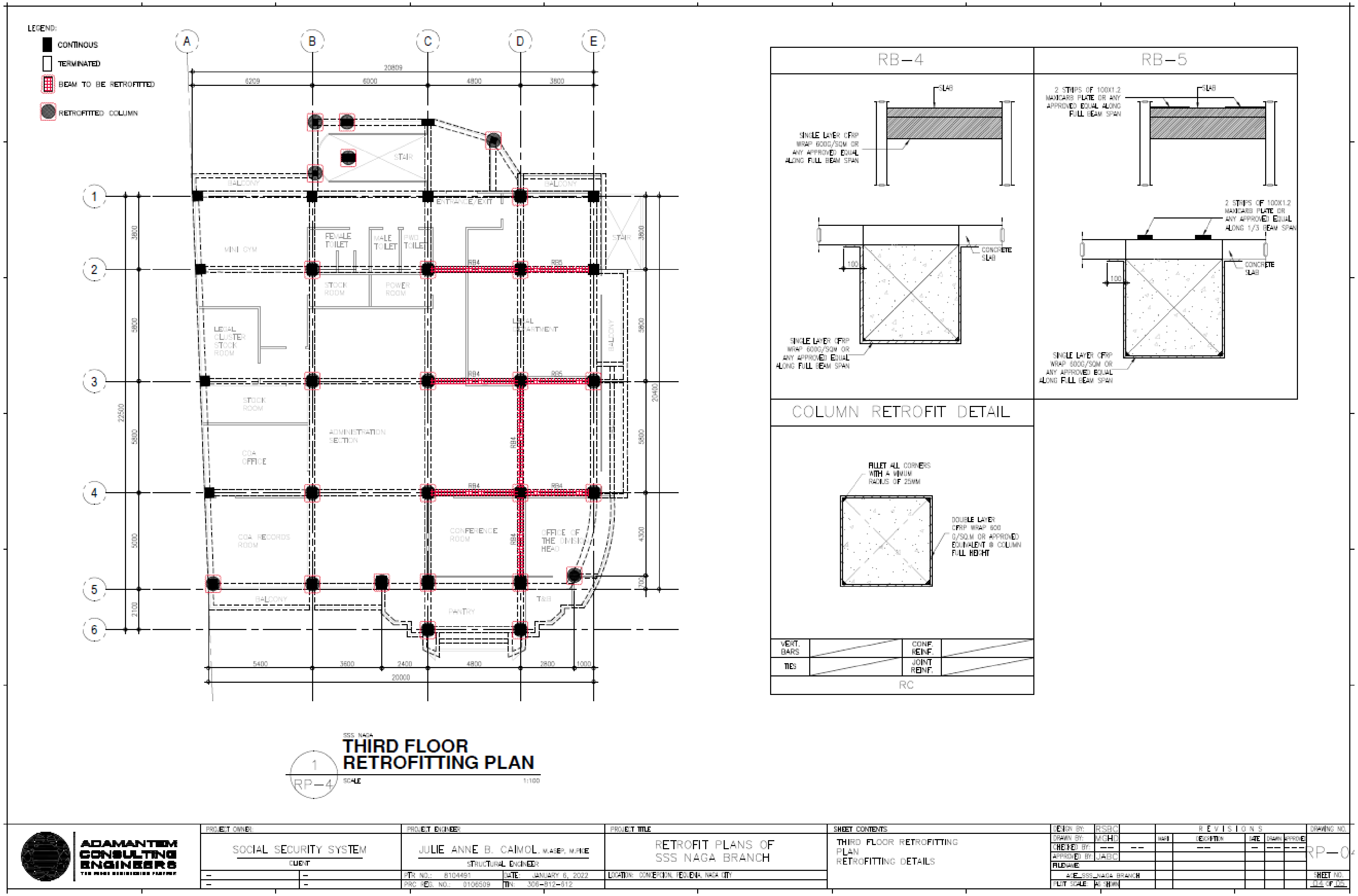
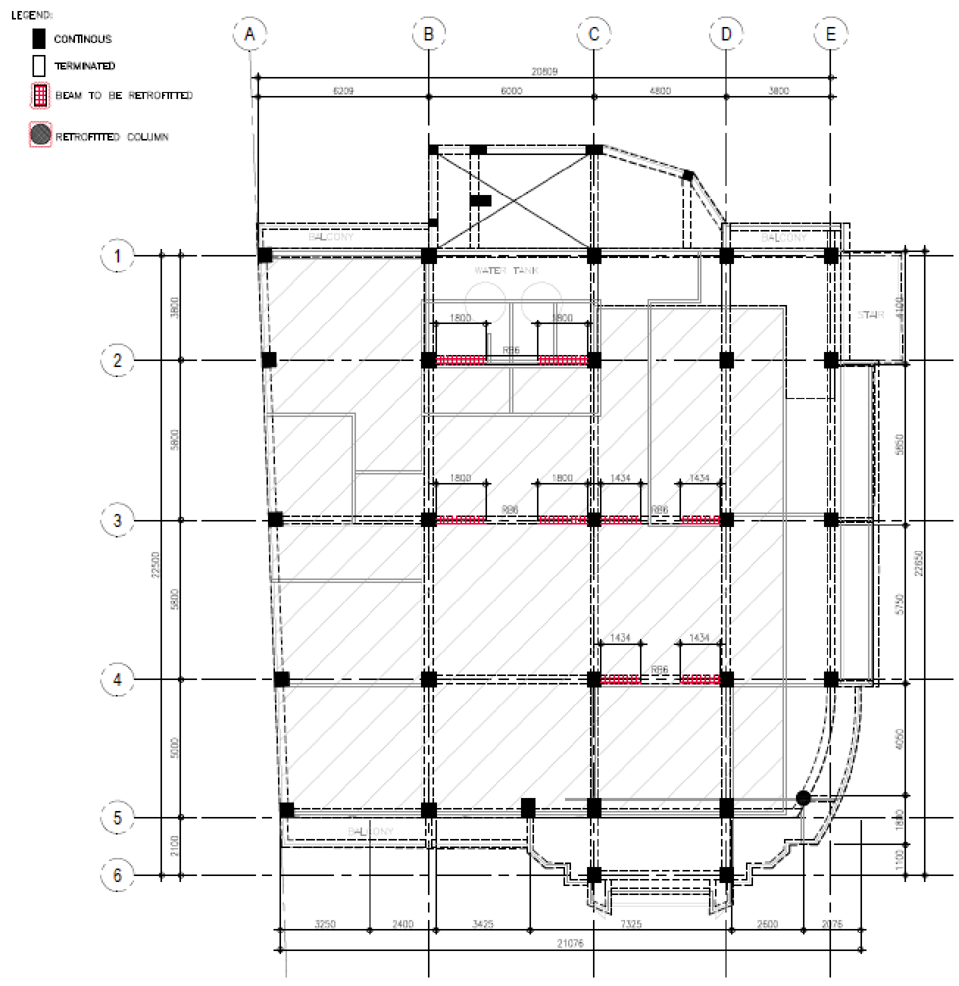
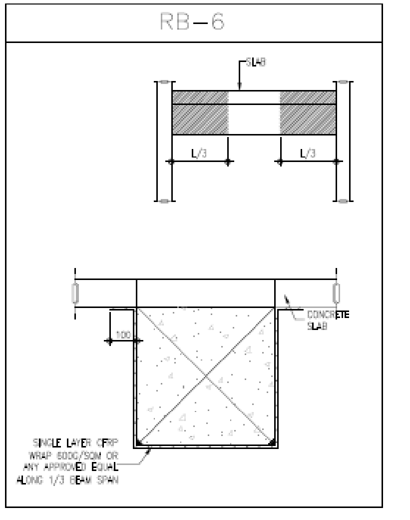
CONTINOUS
TERMINATED
BEAM TO BE RETROFITTED
RETROFITTED COLUMN
SSS NAGA
SECOND FLOOR
RETROFITTING PLAN
SCALE
1:100
RB-1
RB-2
RB-3
COLUMN RETROFIT DETAIL
SLAB
L/3
CONCRETE SLAB
FILLET ALL CORNERS WITH A MINIMUM RADIUS OF 25MM
DOUBLE LAYER CFRP WRAP 600 G/SQ.M OR APPROVED EQUIVALENT @ COLUMN FULL HEIGHT
VERT. BARS
TIES
CONF. REINF.
JOINT REINF.
RC
ADAMANTEM CONSULTING ENGINEERS
PROJECT OWNER:
SOCIAL SECURITY SYSTEM
CLIENT
PROJECT ENGINEER:
JULIE ANNE B. CAIMOL
STRUCTURAL ENGINEER
DATE: JANUARY 6, 2022
PROJECT TITLE:
RETROFIT PLANS OF SSS NAGA BRANCH
SHEET CONTENTS:
SECOND FLOOR RETROFITTING PLAN
RETROFITTING DETAILS
REVISIONS
DRAWING NO.
SHEET NO.


LEGEND:
CONTINOUS
TERMINATED
BEAM TO BE RETROFITTED
RETROFITTED COLUMN
RB-4
RB-5
SLAB
SINGLE LAYER CFRP WRAP 600G/SQM OR ANY APPROVED EQUAL ALONG FULL BEAM SPAN
2 STRIPS OF 100X1.2 MAXICARB PLATE OR ANY APPROVED EQUAL ALONG FULL BEAM SPAN
2 STRIPS OF 100X1.2 MAXICARB PLATE OR ANY APPROVED EQUAL ALONG 1/3 BEAM SPAN
CONCRETE SLAB
COLUMN RETROFIT DETAIL
FILLET ALL CORNERS WITH A MINIMUM RADIUS OF 25MM
DOUBLE LAYER CFRP WRAP 600 G/SQ.M OR APPROVED EQUIVALENT @ COLUMN FULL HEIGHT
VERT. BARS
CONF. REINF.
TIES
JOINT REINF.
RC
SSS NAGA
THIRD FLOOR RETROFITTING PLAN
SCALE 1:100
ADAMANTEM CONSULTING ENGINEERS
PROJECT OWNER: SOCIAL SECURITY SYSTEM
CLIENT
PROJECT ENGINEER: JULIE ANNE B. CAIMOL, M.ASEP, M.PICE
STRUCTURAL ENGINEER
PTR NO.: 8104491
DATE: JANUARY 6, 2022
PRC REG. NO.: 0106509
TIN: 306-812-512
PROJECT TITLE: RETROFIT PLANS OF SSS NAGA BRANCH
LOCATION: CONCEPCION, PEQUENA, NAGA CITY
SHEET CONTENTS: THIRD FLOOR RETROFITTING PLAN RETROFITTING DETAILS
DESIGN BY: RSBC
DRAWN BY: MGHC
APPROVED BY: JABC
FILENAME: ACE_SSS_NAGA BRANCH
PLOT SCALE: AS SHOWN
REVISIONS
DRAWING NO.
SHEET NO. 04 OF 05





SSS NAGA

ROOF DECK RETROFITTING PLAN

1 RP-5 SCALE 1:100

ADAMANTEM CONSULTING ENGINEERS

PROJECT OWNER: SOCIAL SECURITY SYSTEM — CLIENT

PROJECT ENGINEER: JULIE ANNE B. CAIMOL, M.ASEP, M.PICE — STRUCTURAL ENGINEER

PTR NO.: 8104491 DATE: JANUARY 6, 2022

PRC REG. NO.: 0106509 TIN: 306-812-612

PROJECT TITLE: RETROFIT PLANS OF SSS NAGA BRANCH

LOCATION: CONCEPCION, PEQUEÑA, NAGA CITY

SHEET CONTENTS: ROOF DECK RETROFITTING PLAN, RETROFITTING DETAILS

DESIGN BY: RSBC
DRAWN BY: MGHD
CHECKED BY: --
APPROVED BY: JABC
FILENAME: ACE_SSS_NAGA BRANCH
PLOT SCALE: AS SHOWN

REVISIONS: MARK | DESCRIPTION | DATE | DRAWN | APPROVED

DRAWING NO. RP-0

SHEET NO. 05 OF 05

GENERAL RETROFITTING NOTES

A. GENERAL

1. CONSTRUCTION NOTES AND TYPICAL DETAILS APPLY TO ALL DRAWINGS UNLESS OTHERWISE SHOWN OR NOTED. MODIFY TYPICAL DETAILS AS DIRECTED TO MEET SPECIAL CONDITIONS.
2. SHOP DRAWINGS WITH ERECTION AND PLACING DIAGRAMS OF ALL STRUCTURAL STEEL, MISCELLANEOUS IRON, PRE-CAST CONCRETE ETC. SHALL BE SUBMITTED FOR ENGINEER'S APPROVAL BEFORE FABRICATION.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE ALL WORK IS TO BEGIN, CHECK WITH MECHANICAL AND ELECTRICAL CONTRACTORS FOR CONDUITS, PIPE SLEEVES, ETC. TO BE EMBEDDED IN THE CONCRETE.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE SHORINGS AND BRACINGS OF THE STRUCTURE FOR ALL LOADS THAT MAY BE IMPOSED DURING CONSTRUCTION.
5. ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS (MM) UNLESS NOTED OTHERWISE. ELEVATIONS ARE EXPRESSED IN METER (M). THE ELEVATION SYSTEM USED IS "EL+XX.XXX".

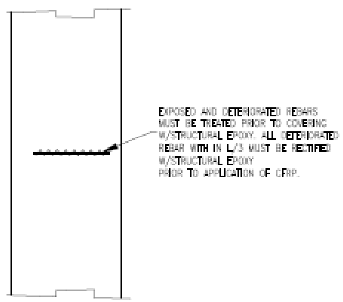
B. RETROFITTING NOTES

1. CRACKS, HONEYCOMBS AND WALL VERTICAL SEPARATIONS
   ALL CRACKS AND HONEYCOMBS IN MASONRY WALL AND STRUCTURAL ELEMENTS SHALL BE FILLED AND REPAIRED WITH STRUCTURAL GROUT. MATERIAL TO BE APPROVED BY ENGINEER UNDERSIGNED. ALL CRACKS SHALL BE PROPERLY FILLED AND SEALED.
2. RETROFITTING OF CRACKED AND DEFLECTED SLAB
   CRACKED AND DEFLECTED SLAB SHALL BE FILLED AND SEALED WITH STRUCTURAL EPOXY. MATERIAL TO BE APPROVED BY ENGINEER UNDERSIGNED. ADDITIONAL CHANNEL SUPPORT SHALL BE INSTALLED TO PREVENT FURTHER DEFLECTION.
3. WATERPROOFING
   APPLICATION OF WATERPROOFING FOR DECKS. SEALING OFF OF ALL EXISTING CRACKS.
4. ALL EXPOSED STEEL MEMBERS SHALL BE PROPERLY MAINTAINED W/ RUST PROOFING MATERIAL.
5. PRIOR TO APPLICATION OF CFRP FIBER & PLATES, CONCRETE SURFACE MUST BE PROPERLY PREPARED.

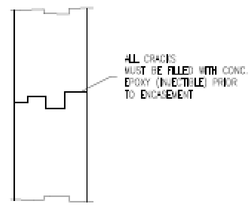
C. MATERIAL SPECIFICATION

1. CARBON FIBER
   MAXICARB 600G OR ANY APPROVED EQUAL
   SEALBOND NUVOXIBOND Clear C6
2. CARBON PLATES
   MAXICARB PLATE 1.2 THICKNESS OR ANY APPROVED EQUAL
3. STRUCTURAL EPOXY
   SEALBOND EPOXY UNDERWATER (385-UE)
4. HOT APPLIED WATERPROOFING
   LARIBIT TORCH-ON APPLIED WATERPROOFING MEMBRANE
   OR ANY APPROVED EQUAL

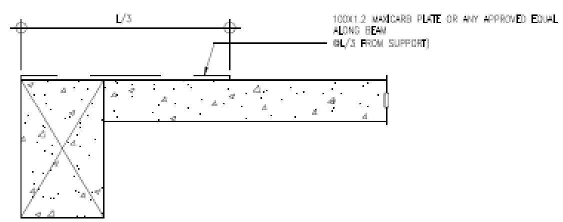
   SEALPROOF NON-SHRINK CEMENTITIOUS
   GROUT 800B



1 RP-1 EXPOSED REBAR



2 RP-1 CRACK RETROFIT



3 RP-1 BEAM RETROFITTING DETAILS

ADAMANTEM CONSULTING ENGINEERS

PROJECT OWNER: SOCIAL SECURITY SYSTEM
CLIENT

PROJECT ENGINEER: JULIE ANNE B. CAIMOL, M.ASEP, M.PICE
STRUCTURAL ENGINEER
PTR NO.: 8104491 DATE: JANUARY 6, 2022
PRC REG. NO.: 0106509 TIN: 306-812-612

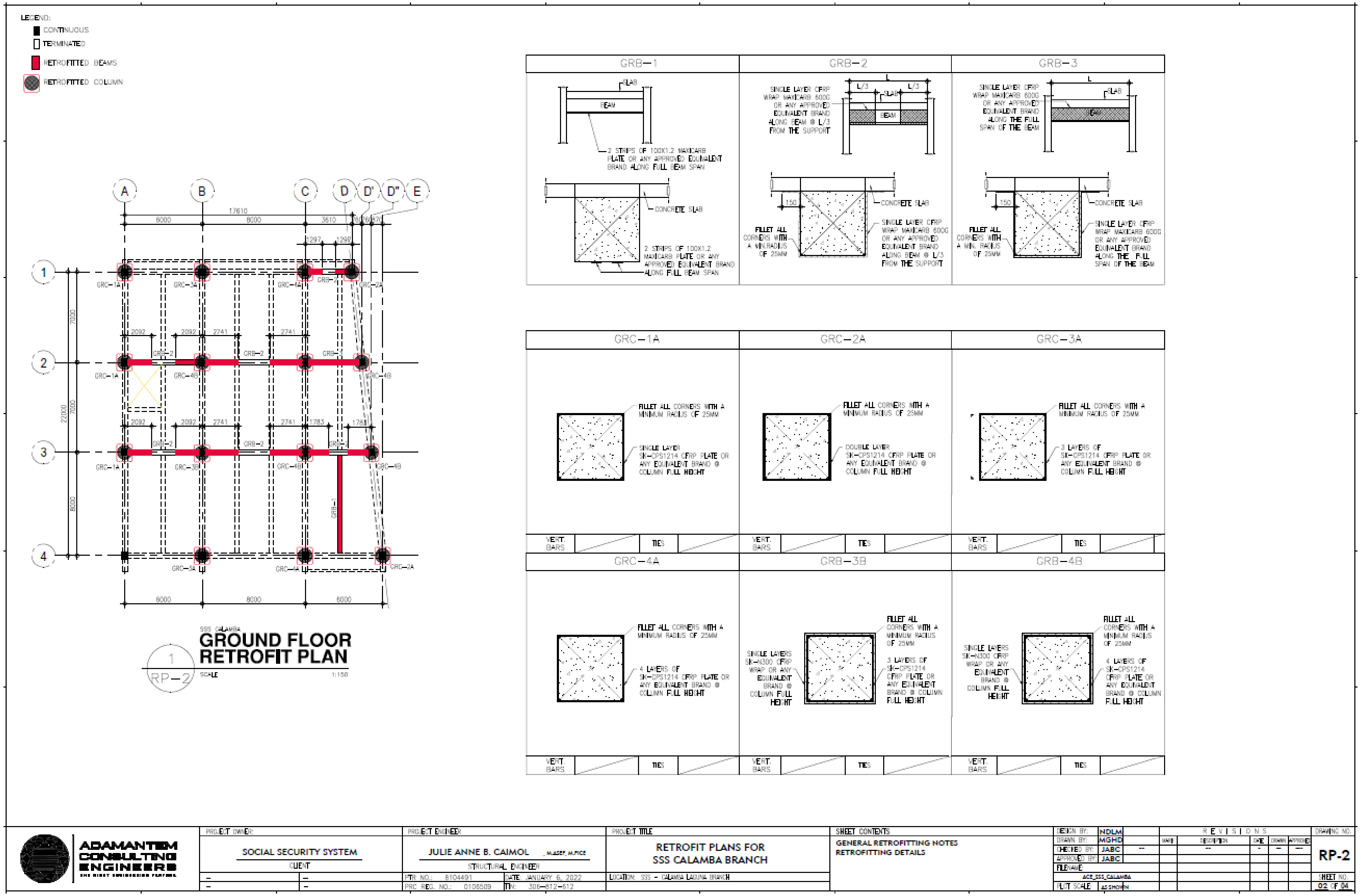
PROJECT TITLE: RETROFIT PLANS FOR SSS CALAMBA BRANCH
LOCATION: SSS - CALAMBA LAGUNA BRANCH

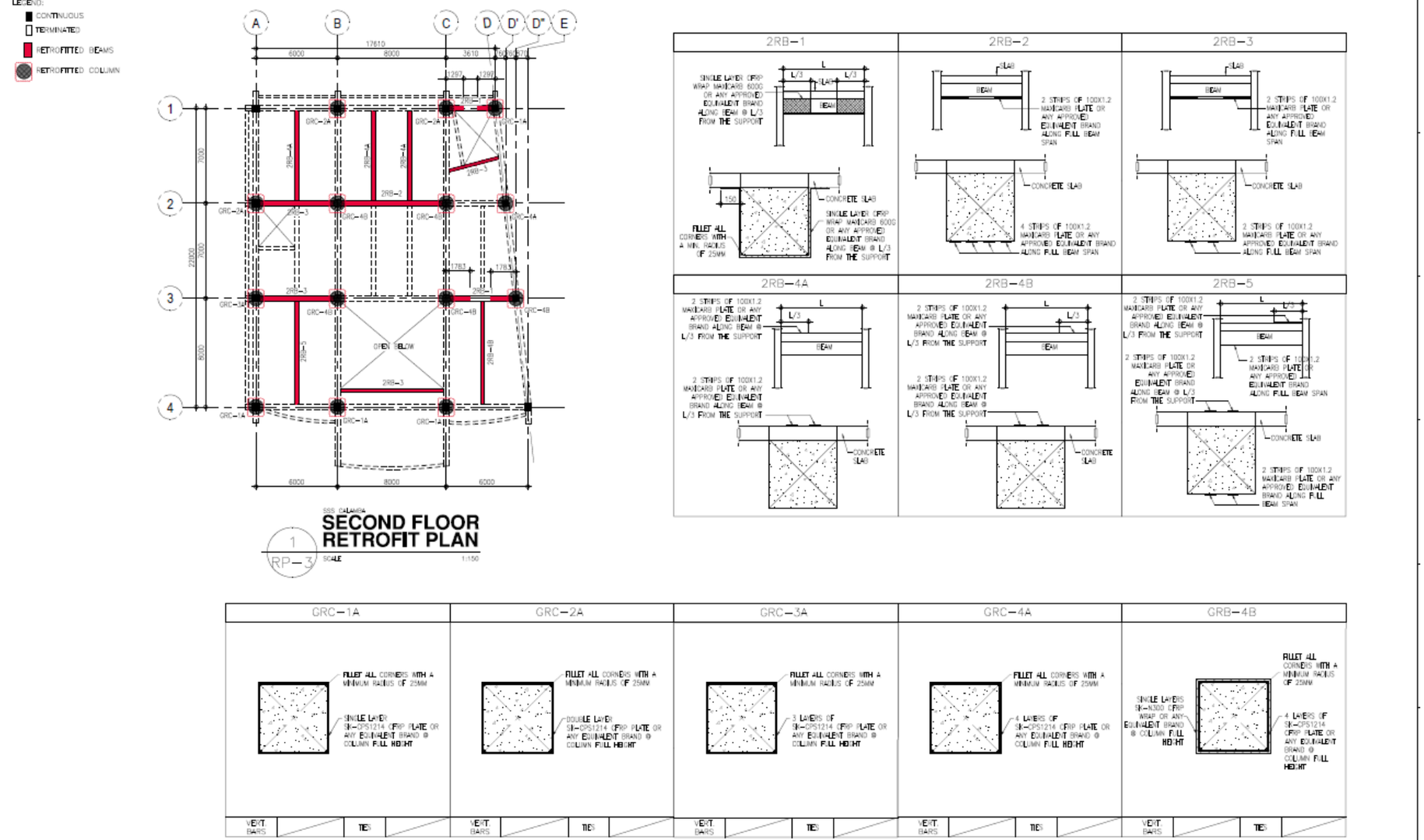
SHEET CONTENTS: GENERAL RETROFITTING NOTES, RETROFITTING DETAILS

DESIGN BY: NDLM
DRAWN BY: MGHD
CHECKED BY: JABC
APPROVED BY: JABC
FILENAME: ACE_SSS_CALAMBA
PLOT SCALE: AS SHOWN

REVISIONS: MARK | DESCRIPTION | DATE | DRAWN | APPROVED

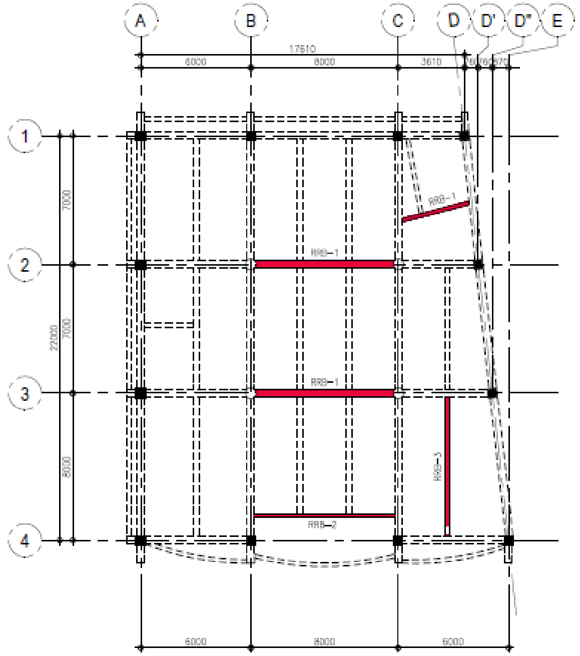
DRAWING NO.: RP-1
SHEET NO.: 01 OF 04


LEGEND:
CONTINUOUS
TERMINATED
RETROFITTED BEAMS
RETROFITTED COLUMN
GRB-1
2 STRIPS OF 100X1.2 MAXICARB PLATE OR ANY APPROVED EQUIVALENT BRAND ALONG FULL BEAM SPAN
CONCRETE SLAB
GRB-2
SINGLE LAYER CFRP WRAP MAXICARB 600G OR ANY APPROVED EQUIVALENT BRAND ALONG BEAM @ L/3 FROM THE SUPPORT
FILLET ALL CORNERS WITH A MIN.RADIUS OF 25MM
GRB-3
SINGLE LAYER CFRP WRAP MAXICARB 600G OR ANY APPROVED EQUIVALENT BRAND ALONG THE FULL SPAN OF THE BEAM
GRC-1A
FILLET ALL CORNERS WITH A MINIMUM RADIUS OF 25MM
SINGLE LAYER SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
GRC-2A
DOUBLE LAYER SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
GRC-3A
3 LAYERS OF SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
GRC-4A
4 LAYERS OF SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
GRB-3B
SINGLE LAYERS SK-N300 CFRP WRAP OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
3 LAYERS OF SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
GRB-4B
4 LAYERS OF SK-CPS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
VERT. BARS
TIES
SSS CALAMBA
GROUND FLOOR RETROFIT PLAN
SCALE 1:150
1 RP-2
ADAMANTEM CONSULTING ENGINEERS
PROJECT OWNER: SOCIAL SECURITY SYSTEM
CLIENT
PROJECT ENGINEER: JULIE ANNE B. CAIMOL
STRUCTURAL ENGINEER
DATE: JANUARY 6, 2022
PROJECT TITLE: RETROFIT PLANS FOR SSS CALAMBA BRANCH
LOCATION: SSS - CALAMBA LAGUNA BRANCH
SHEET CONTENTS: GENERAL RETROFITTING NOTES
RETROFITTING DETAILS
DESIGN BY: NDLM
DRAWN BY: MGHD
CHECKED BY: JABC
APPROVED BY: JABC
REVISIONS
DRAWING NO. RP-2
SHEET NO. 02 OF 04

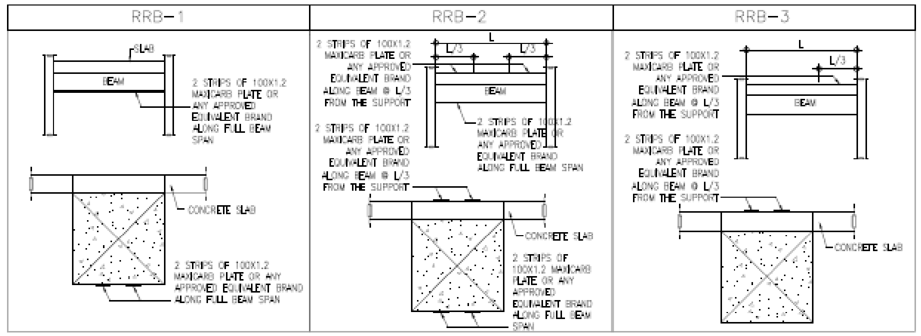

LEGEND:
CONTINUOUS
TERMINATED
RETROFITTED BEAMS
RETROFITTED COLUMN
A
B
C
D
D'
D"
E
1
2
3
4
OPEN BELOW
SSS CALAMBA
SECOND FLOOR
RETROFIT PLAN
1
RP-3
SCALE
1:150
2RB-1
2RB-2
2RB-3
2RB-4A
2RB-4B
2RB-5
SINGLE LAYER CFRP WRAP MAXCARB 600G OR ANY APPROVED EQUIVALENT BRAND ALONG BEAM @ L/3 FROM THE SUPPORT
FILLET ALL CORNERS WITH A MIN. RADIUS OF 25MM
CONCRETE SLAB
2 STRIPS OF 100X1.2 MAXCARB PLATE OR ANY APPROVED EQUIVALENT BRAND ALONG FULL BEAM SPAN
4 STRIPS OF 100X1.2 MAXCARB PLATE OR ANY APPROVED EQUIVALENT BRAND ALONG FULL BEAM SPAN
2 STRIPS OF 100X1.2 MAXCARB PLATE OR ANY APPROVED EQUIVALENT BRAND ALONG BEAM @ L/3 FROM THE SUPPORT
GRC-1A
GRC-2A
GRC-3A
GRC-4A
GRB-4B
FILLET ALL CORNERS WITH A MINIMUM RADIUS OF 25MM
SINGLE LAYER SK-CFS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
DOUBLE LAYER SK-CFS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
3 LAYERS OF SK-CFS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
4 LAYERS OF SK-CFS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
SINGLE LAYERS SK-N300 CFRP WRAP OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
4 LAYERS OF SK-CFS1214 CFRP PLATE OR ANY EQUIVALENT BRAND @ COLUMN FULL HEIGHT
VERT. BARS
TIES
ADAMANTIEM CONSULTING ENGINEERS
PROJECT OWNER:
SOCIAL SECURITY SYSTEM
CLIENT
PROJECT ENGINEER:
JULIE ANNE B. CAIMOL, M.ASEP, M.PICE
STRUCTURAL ENGINEER
PTR NO.: 8104491
DATE: JANUARY 6, 2022
PRC REG. NO.: 0106509
TIN: 306-812-612
PROJECT TITLE
RETROFIT PLANS FOR SSS CALAMBA BRANCH
LOCATION: SSS - CALAMBA LAGUNA BRANCH
SHEET CONTENTS
GENERAL RETROFITTING NOTES
RETROFITTING DETAILS
DESIGN BY: NDLM
DRAWN BY: MGHD
CHECKED BY: JABC
APPROVED BY: JABC
FILENAME: ACE_SSS_CALAMBA
PLOT SCALE: AS SHOWN
REVISIONS
DRAWING NO.
RP-3
SHEET NO.
03 OF 04

LEGEND:

- CONTINUOUS
- TERMINATED
- RETROFITTED BEAMS
- RETROFITTED COLUMN



SSS CALAMBA
ROOF DECK RETROFIT PLAN
1
RP-4
SCALE 1:150



ADAMANTEM CONSULTING ENGINEERS	PROJECT OWNER: SOCIAL SECURITY SYSTEM (CLIENT)	PROJECT ENGINEER: JULIE ANNE B. CAIMOL, M.ASEP, M.PICE (STRUCTURAL ENGINEER)	PROJECT TITLE: RETROFIT PLANS FOR SSS CALAMBA BRANCH	SHEET CONTENTS: GENERAL RETROFITTING NOTES, RETROFITTING DETAILS
– / –	– / –	PTR NO.: 8104491; DATE: JANUARY 6, 2022; PRC REG. NO.: 0106509; TIN: 306-812-612	LOCATION: SSS - CALAMBA LAGUNA BRANCH	

DESIGN BY:	NDLM		REVISIONS					DRAWING NO.
DRAWN BY:	MGHD		MARK	DESCRIPTION	DATE	DRAWN	APPROVED	RP-4
CHECKED BY:	JABC	--		--	-	–	—	
APPROVED BY:	JABC							
FILENAME:								
ACE_SSS_CALAMBA								SHEET NO.
PLOT SCALE:	AS SHOWN							04 OF 04

Section VIII. Bill of Quantities

PROJECT : STRUCTURAL RETROFITTING OF SSS NAGA BUILDING
LOCATION : Barangay Concepcion Pequeña Naga City, Camarines Sur

BILL OF QUANTITIES

ITEM NO	DESCRIPTION	QTY	UNIT	MATERIALS		LABOR AND EQUIPMENT		TOTAL	MOB. / DEMOB.	MARK UP	VAT	TOTAL COST
				Unit Cost	AMOUNT	Unit Cost	AMOUNT	DIRECT COST				
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
					C X E		C X G	F + H	1% * (F+H)	% * (I+J)	12% * (I+J+K)	I + J + K + L
A	STRUCTURAL RETROFITTING											
I.	GENERAL REQUIREMENTS											
I.1	Mobilization/ Layout/ Hauling	1.00	lot				-	-	-	-	-	₱ -
I.2	Temporary Facilities/ Barracks	1.00	lot		-		-	-	-	-	-	₱ -
I.3	Construction Bonds and Insurance	1.00	lot		-			-	-	-	-	₱ -
	a Surety Bond											
	b Guarantee Bond											
	c Performance Bond											
	d CARI											
I.4	Safety	1.00	lot		-			-	-	-	-	₱ -
I.5	Permits	1.00	lot		-			-	-	-	-	₱ -
	TOTAL (ITEM I) :				-		-					₱ -
II.	CIVIL WORKS											
	Removal of concrete plaster											
CW.1	Grinding Works	1.00	lot		-		-	-	-	-	-	₱ -
CW.2	Others, Chipping	1.00	lot		-		-	-	-	-	-	₱ -
CW.3	Stripping Off exisitng water proofing	528.10	sq.m.		-		-	-	-	-	-	₱ -
	TOTAL (ITEM II) :				-		-					₱ -
III.	CFRP WRAP 600g/sqm											
	BEAM											
CFRP.1(1)	CFRP Wrap 600g/sqm - Second Floor (1 layer)	135.74	sqm		-		-	-	-	-	-	₱ -
CFRP.1(2)	CFRP Wrap 600g/sqm - Third Floor (1 layer)	49.37	sqm		-		-	-	-	-	-	₱ -
CFRP.1(3)	CFRP Wrap 600g/sqm - Roof Deck (1 layer)	18.76	sqm		-		-	-	-	-	-	₱ -
	COLUMN											
CFRP.1(4)	CFRP Wrap 600g/sqm - Ground Floor (2 layer)	348.15	sqm		-		-	-	-	-	-	₱ -
CFRP.1(5)	CFRP Wrap 600g/sqm - Second Floor (2 layer)	352.08	sqm		-		-	-	-	-	-	₱ -
CFRP.1(6)	CFRP Wrap 600g/sqm - Third Floor (2 layer)	334.59	sqm		-		-	-	-	-	-	₱ -
	TOTAL (ITEM III) :				-		-					₱ -
IV	CFRP PLATE 100x1.2mm THK (Beams/Slabs)											
CFRP.2(1)	CFRP plate 100x1.2mm THK - Second Floor	506.47	lm		-			-	-	-	-	₱ -
CFRP.2(2)	CFRP plate 100x1.2mm THK - Third Floor	54.73	lm		-			-	-	-	-	₱ -
CFRP.2(3)	CFRP plate 100x1.2mm THK - Roof Deck	25.87	lm		-			-	-	-	-	₱ -

ITEM NO	DESCRIPTION	QTY	UNIT	MATERIALS		LABOR AND EQUIPMENT		TOTAL	MOB. / DEMOB.	MARK UP	VAT	TOTAL COST
				Unit Cost	AMOUNT	Unit Cost	AMOUNT	DIRECT COST				
(A)	(B)	(C)	(D)	(E)	(F) C X E	(G)	(H) C X G	(I) F + H	(J) 1% * (F+H)	(K) % * (I+J)	(L) 12% * (I+J+K)	(M) I + J + K + L
	TOTAL (ITEM IV) :				-			-				₱ -
V	CEILING WORKS											
	CLW.1 Acoustic Board	70.30	sqm		-		-	-	-		-	₱ -
	CLW.2 Metal Furring	273.00	pcs		-		-	-	-		-	₱ -
	CLW.3 Wall angle	111.00	pcs		-		-	-	-		-	₱ -
	CLW.4 Metal Screw	5.00	kg		-		-	-	-		-	₱ -
	TOTAL (ITEM V) :				-			-				₱ -
VI	ELECTRICAL WORKS											
	EW.1 Wire and Wiring Devices	1.00	l.s.		-		-	-	-		-	₱ -
	TOTAL (ITEM VI) :				-			-				₱ -
VII	STRUCTURAL EPOXY (Cracks)											
	C.1 Structural Epoxy for Cracks	40.00	gals		-		-	-	-		-	₱ -
	TOTAL (ITEM VII) :				-			-				₱ -
VIII	WATERPROOFING WORKS											
	WP.1 Waterproofing - Roof Deck	528.10	sq.m		-		-	-	-		-	₱ -
	TOTAL (ITEM VIII) :				-			-				₱ -
IX	RESTORATION AND PAINTING WORKS											
	F.1 Restoration of Plastering	1.00	lot		-			-	-		-	₱ -
	F.2 Restoration of Paints	25.00	gal		-			-	-		-	₱ -
	TOTAL (ITEM IX) :				-		-	-				₱ -
								TOTAL AMOUNT A - STRUCTURAL RETROFITTING (ITEM I-IX):				₱ -
B	OTHER WORKS (RELOCATION OF AFFECTED EMPLOYEES)											
	1. Dismantling & relocation of employees' workstations including equipment and documents	93.00	units				-	-	-		-	₱ -
	2. Provision of new power outlets	93.00	sets		-		-	-	-		-	₱ -
	3. Provision of Data & Voice outlets	93.00	sets		-		-	-	-		-	₱ -
									TOTAL AMOUNT B - OTHER WORKS :			₱ -
	TOTAL AMOUNT RETROFITTING OF SSS NAGA BUILDING										₱	-

Ceiling Amount is P 13,325,000.00. Any bid with financial component exceeding this amount shall be considered non-responsive.

GENERAL CONDITIONS:

1. For uniformity and evaluation purposes, a bidder shall adhere to the herein prescribed format of BOQ, specifically in the formula for computation, given quantity and exclusive pay items. Any deviation from the format shall be a ground for disqualification of bid.

   1.1 Fill out all required items/field in the BOQ. Failure to indicate any of the following shall mean outright disqualification since bid is considered Non-responsive:
      a) if item is given for free, indicate
2. Each bidder shall be provided with hard copy of the BOQ Form (attached in the PBD) and an electronic copy for faster and easier encoding. The hard copy shall serve as the bidder's reference as to completeness of work items, quantity, formula, format, etc. in the BOQ Form considering that the electronic copy is prone to alterations during encoding. Any discrepancy on the contents (specially on the quantity and inclusive pay items) between the hard copy and electronic, the contents of the hard copy shall prevail.

3. Bidder are not allowed to include any pay items that were not indicated in the form supplied Bill of Quantities. In instances where necessary work items are inadvertently left out in BOQ Form, a bidder should make a written query to the Bids and Awards Committee so that the same shall be addressed in the Bid Bulletin which will be issued to all participating bidders.
4. Bidders shall include in the detailed estimate the breakdown of materials & labor for quantities specified in LOT, l.s., sqm, Lm (unit of measure) in BOQ
5. All documents must be signed, and each and every page thereof must be initialed by the duly authorized representative/s of the Bidder
6. Mark-up shall include the following:
   6.1 Overhead expenses such as office expenses, supervision, transportation allowances, and financing costs (Premium on CARI, Bid Security, Performance Security, Surety for advance payment, Warranty bond)
   6.2 Contingencies, Miscellaneous Expenses and Contractor's Profit margin
7. It is the responsibility of the Bidder to check the arithmetical computation provided herein.

Submitted by: _____
(Name of Bidder / Company Name)

Prepared by: _____
(Company Representative - Signature over printed name)

Address: _____

Telephone #: _____

Date: _____

PROJECT : RETROFITTING OF SSS CALAMBA BUILDING
LOCATION : MANILA S.RD, CALAMBA LAGUNA

BILL OF QUANTITIES

ITEM NO	DESCRIPTION	QTY	UNIT	MATERIALS		LABOR AND EQUIPMENT		TOTAL DIRECT COST	MOB. / DEMOB.	MARK UP	VAT	TOTAL COST
				Unit Cost	AMOUNT	Unit Cost	AMOUNT					
(A)	(B)	(C)	(D)	(E)	(F) C X E	(G)	(H) C X G	(I) F + H	(J) 1% * (F+H)	(K) % * (I+J)	(L) 12% * (I+J+K)	(M) I + J + K + L
A	STRUCTURAL RETROFITTING											
I.	GENERAL REQUIREMENTS											
I.1	Mobilization/ Layout/ Hauling	1.00 lot					-	-	-	-	-	₱ -
I.2	Temporary Facilities/ Barracks	1.00 lot			-		-	-	-	-	-	₱ -
I.3	Construction Bonds and Insurance	1.00 lot			-			-	-	-	-	₱ -
	a Surety Bond											
	b Guarantee Bond											
	c Performance Bond											
	d CARI											
I.4	Safety	1.00 lot			-			-	-	-	-	₱ -
I.5	Permits	1.00 lot			-			-	-	-	-	₱ -
	TOTAL (ITEM I) :				-		-	-				₱ -
II.	EARTHWORKS											
SE.1	Structure Excavation	2342.853 cu.m.					-	-	-	-	-	₱ -
SE.2	Embankment from Structure Excavation	2197.98 cu.m.					-	-	-	-	-	₱ -
SE.3	Gravel Fill	20.89 cu.m.			-		-	-	-	-	-	₱ -
SE.4	Removal of Structure and Obstruction	1.00 l.s.					-	-	-	-	-	₱ -
	TOTAL (ITEM II) :				-		-	-				₱ -
III.	CIVIL WORKS											
	Removal of concrete plaster											
CW.1	Grinding Works	335.71 sqm					-	-	-	-	-	₱ -
CW.2	Others, Chipping	335.71 sqm					-	-	-	-	-	₱ -
CW.3	Dismantling of Existing Ceiling	129.97 sqm					-	-	-	-	-	₱ -
CW.4	Dismantling of Existing MEPF	1.00 l.s.					-	-	-	-	-	₱ -
CW.5	Stripping of Existing Waterproofing	456.24 sqm					-	-	-	-	-	₱ -
	TOTAL (ITEM III) :				-		-	-				₱ -
IV.	JACKETING											
RC.1	Reinforcing Steel	11657.60 kgs.			-		-	-	-	-	-	₱ -
RC.2(1)	Structural Concrete (Footing) 4000psi 28days	125.32 cu.m.			-		-	-	-	-	-	₱ -
RC.2(2)	Structural Concrete (Column) 4000psi 28days	9.29 cu.m.			-		-	-	-	-	-	₱ -
FW.1	Forms and Falseworks	1.00 l.s.			-		-	-	-	-	-	₱ -
	TOTAL (ITEM IV) :				-		-	-				₱ -
IV.	CFRP WRAP 600g/sqm											
CFRP.1(1)	CFRP Wrap 600g/sqm - Beams	53.77 sq.m.			-		-	-	-	-	-	₱ -
	TOTAL (ITEM V) :				-		-	-				₱ -
V	CFRP PLATE 100x1.2mm THK (Beams/Slabs)											
CFRP.2(1)	CFRP plate 100x1.2mm THK - Beams	191.14 l.m.			-		-	-	-	-	-	₱ -
	TOTAL (ITEM VI) :				-		-	-				₱ -

ITEM NO	DESCRIPTION	QTY	UNIT	MATERIALS		LABOR AND EQUIPMENT		TOTAL DIRECT COST	MOB. / DEMOB.	MARK UP	VAT	TOTAL COST
				Unit Cost	AMOUNT	Unit Cost	AMOUNT					
VI	STRUCTURAL EPOXY (Cracks)											
C.1	Structural Epoxy for Cracks	20.00	gal.		-		-	-	-		-	₱ -
	TOTAL (ITEM VII) :				-		-	-				₱ -
VI	WATERPROOFING WORKS											
WP.1	Waterproofing - Roof Deck	456.24	sq.m		-		-	-	-		-	₱ -
	TOTAL (ITEM VI) :				-		-	-				₱ -
VIII	RESTORATION AND PAINTING WORKS											
F.1	Restoration of Plastering	503.56	sq.m.		-		-	-	-		-	₱ -
F.2	Restoration of Paints	503.56	sq.m.		-		-	-	-		-	₱ -
F.3	Restoration of Existing Ceiling	129.97	sq.m.		-		-	-	-		-	₱ -
F.4	Restoration of MEPF	1.00	l.s.		-		-	-	-		-	₱ -
	TOTAL (ITEM VIII) :				-		-	-				₱ -
								TOTAL AMOUNT A - STRUCTURAL RETROFITTING (ITEM I-VIII):				₱ -
B	OTHER WORKS (RELOCATION OF EMPLOYEES)											
1.	Dismantling & relocation of employees' workstations including equipment and documents	48.00	units				-	-	-		-	₱ -
2.	Provision of new power outlets	48.00	sets		-		-	-	-		-	₱ -
3.	Provision of Data & Voice outlets	48.00	sets		-		-	-	-		-	₱ -
									TOTAL AMOUNT B - OTHER WORKS:			₱ -
	TOTAL AMOUNT RETROFITTING OF SSS CALAMBA BUILDING										₱	-

Ceiling Amount is P 9,950,500.00. Any bid with financial component exceeding this amount shall be considered non-responsive.

GENERAL CONDITIONS:

1. For uniformity and evaluation purposes, a bidder shall adhere to the herein prescribed format of BOQ, specifically in the formula for computation, given quantity and exclusive pay items. Any deviation from the format shall be a ground for disqualification of bid.
   1.1 Fill out all required items/field in the BOQ. Failure to indicate any of the following shall mean outright disqualification since bid is considered Non-responsive:
   a) if item is given for free, indicate dash (-), zero (0) or fi
2. Each bidder shall be provided with hard copy of the BOQ Form (attached in the PBD) and an electronic copy for faster and easier encoding. The hard copy shall serve as the bidder's reference as to completeness of work items, quantity, formula, format, etc. in the BOQ Form considering that the electronic copy is prone to alterations during encoding. Any discrepancy on the contents (specially on the quantity and inclusive pay items) between the hard copy and electronic, the contents of the hard copy shall prevail.
3. Bidder are not allowed to include any pay items that were not indicated in the form supplied Bill of Quantities. In instances where necessary work items are inadvertently left out in BOQ Form, a bidder should make a written query to the Bids and Awards Committee so that the same shall be addressed in the Bid Bulletin which will be issued to all participating bidders.
4. Bidders shall include in the detailed estimate the breakdown of materials & labor for quantities specified in LOT, sqm, Lm (unit of measure) in BOQ
5. All documents must be signed, and each and every page thereof must be initialed by the duly authorized representative/s of the Bidder
6. Mark-up shall include the following:
   6.1 Overhead expenses such as office expenses, supervision, transportation allowances, and financing costs (Premium on CARI, Bid Security, Performance Security, Surety for advance payment, Warranty bond)
   6.2 Contingencies, Miscellaneous Expenses and Contractor's Profit margin
7. It is the responsibility of the Bidder to check the arithmetical computation provided herein.

Section IX. Checklist of Technical and Financial Documents

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);
or

☐ (b) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document;
and

☐ (c) Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;
and

☐ (d) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

☐ (e) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**

☐ (f) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules;
and

☐ (g) Philippine Contractors Accreditation Board (PCAB) License;
or
Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**

☐ (h) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission;
or
Original copy of Notarized Bid Securing Declaration; **and**

(i) Project Requirements, which shall include the following:

☐ a. Organizational chart for the contract to be bid;

☐ b. List of contractor's key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data;

☐ c. List of contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be; **and**

☐ (j) Original duly signed Omnibus Sworn Statement (OSS);
and if applicable, Original Notarized Secretary's Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

Financial Documents

☐ (k) The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and**

☐ (l) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

☐ (m) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence;

or

duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

II. FINANCIAL COMPONENT ENVELOPE

☐ (n) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

☐ (o) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (p) Duly accomplished Detailed Estimates Form, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (q) Cash Flow by Quarter.

IMPORTANT REMINDERS

A) Each and every page of the Bid Forms, under Section VIII: Checklist of Technical and Financial Documents hereof, shall be signed by the duly authorized representative/s of the Bidder. Failure to do so shall be a ground for the rejection of the bid.

B) Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the duly authorized representative/s of the Bidder.

C) Bid documents shall be compiled in a folder/binder with the Annexes properly labeled with tabs/separators.

D) Bidders shall submit their bids through their duly authorized representative enclosed in separate sealed envelopes, which shall be submitted simultaneously:

a) The first three individually sealed envelopes shall contain the folder/binder of the Eligibility Requirements and Technical Component of the bid; prepared in three copies labeled as follows:

Envelop (1): ORIGINAL – Eligibility Requirements and Technical Component
Envelop (2): COPY1 – Eligibility Requirements and Technical Component
Envelop (3): COPY2 – Eligibility Requirements and Technical Component

b) The next three individually sealed envelopes shall contain the folder/binder of the Financial Component of the bid; prepared in three copies labeled as follows:

Envelop (4): ORIGINAL – Financial Component
Envelop (5): COPY1 – Financial Component
Envelop (6): COPY2 – Financial Component

c) Bidders shall enclose, seal and mark the following:

Envelop (7): Envelope (1) and Envelope (4) enclosed in one sealed envelope marked “ORIGINAL–BID”

Envelop (8): Envelope (2) and Envelope (5) enclosed in one sealed envelope marked “COPY1–BID”

Envelop (9): Envelope (3) and Envelope (6) enclosed in one sealed envelope marked “COPY2–BID”

d) Envelopes (7) to (9) shall then be enclosed in a single sealed, signed final/outer envelope/package/box

e) All envelopes (Envelopes (1) to (9) and the final/outer envelope/package/box) shall indicate the following:

- addressed to the Procuring Entity’s BAC
- name and address of the Bidder in capital letters
- name of the contract/project to be bid in capital letters
- bear the specific identification/reference code of this bidding process
- bear a warning “DO NOT OPEN BEFORE…” the date and time for the opening of bids

THE CHAIRPERSON

BIDS AND AWARDS COMMITTEE

2ND FLOOR, SSS MAIN BUILDING

EAST AVENUE, DILIMAN, QUEZON CITY

NAME OF BIDDER : _____

ADDRESS : _____

E) Bids submitted after the deadline shall only be marked for recording purpose, shall not be included in the opening of bids, and shall be returned to the bidder unopened.

F) Bidders shall submit a copy of the Authority to Notarize issued by the Regional Trial Court to the Notarial Public.

FORMS

FORM-01

Bid Form for the Procurement of Infrastructure Projects

BID FORM

RETROFITTING OF SSS NAGA AND CALAMBA BUILDINGS
(RE-ADVERTISEMENT)

Date:_____
Project Identification No.: _____

To: **SOCIAL SECURITY SYSTEM**
East Avenue, Diliman, Quezon City

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers [insert numbers], the receipt of which is hereby duly acknowledged, we, the undersigned, declare that:

a. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: (Insert name of contract);

b. We offer to execute the Works for this Contract in accordance with the PBDs;

c. The total price of our Bid in words and figures, excluding any discounts offered below is: (insert information);

d. The discounts offered and the methodology for their application are: (insert information);

e. The total bid price includes the cost of all taxes, such as, but not limited to: [specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties], which are itemized herein and reflected in the detailed estimates,

f. Our Bid shall be valid within the period stated in the PBDs, and it shall remain binding upon us at any time before the expiration of that period;

g. If our Bid is accepted, we commit to obtain a Performance Security in the amount of [insert percentage amount] percent of the Contract Price for the due performance of the Contract, or a Performance Securing Declaration in lieu of the allowable forms of Performance Security, subject to the terms and conditions of issued GPPB guidelines for this purpose;

h. We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;

i. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and

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

k. We likewise certify/conform that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the (Name of Project) of the [Name of the Procuring Entity].

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

Name: _____

Legal capacity:_____

Signature:_____

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

Date: _____

GPPB Resolution No. 16-2020, dated 16 September 2020

FORM-02

Bid Securing Declaration Form

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

BID SECURING DECLARATION

Project Identification No.: *[Insert number]*

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

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid Securing Declaration.

2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any procurement contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1(b), 34.2, 40.1 and 69.1, except 69.1(f),of the IRR of RA No. 9184; without prejudice to other legal action the government may undertake.

3. I/We understand that this Bid Securing Declaration shall cease to be valid on the following circumstances:

    a. Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
    b. I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right; and
    c. I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

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

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity] Affiant

[Jurat]

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

GPPB Resolution No. 16-2020, dated 16 September 2020

FORM-03

Contract Agreement Form for the

Procurement of Infrastructure Projects (Revised)

[not required to be submitted with the Bid, but it shall be submitted within ten (10) days after receiving the Notice of Award]

CONTRACT AGREEMENT

ITB-SSS-CIVIL-2023-___

THIS AGREEMENT made between:

SOCIAL SECURITY SYSTEM, a government-owned and controlled corporation created pursuant to Republic Act No. 11199, with principal office address at SSS Building, East Avenue, Diliman, Quezon City, represented herein by its Approving Authority and (Position of Approving Authority), (Name of Approving Authority) and (Position of Signatory), (Name of signatory), duly authorized pursuant to Administrative Order _____, _____ (pertaining to Approving Authority) (Annex "A") and Office Order _____ , _____ (Annex "B") (pertaining to signatories), hereinafter referred to as the "SSS";

- a n d -

(NAME OF CONTRACTOR), of legal age, Filipino, single/married, with principal address at _____, hereinafter referred to as the "Contractor".

If corporation

(NAME OF CONTRACTOR), a corporation duly created and existing pursuant to the laws of the Republic of the Philippines, with principal office address at _____, represented herein by its (Position of Signatory), (Name of Signatory), duly authorized pursuant to _____, _____, hereinafter referred to as the "Contractor".

WHEREAS, the Entity is desirous that the Contractor execute [name and identification number of contract] (hereinafter called "the Works") and the Entity has accepted the Bid for [contract price in words and figures in specified currency] by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents as required by the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184 shall be deemed to form and be read and construed as integral part of this Agreement, *viz.*:

   a. Philippine Bidding Documents (PBDs);
      i. Drawings/Plans;
      ii. Specifications;

iii. Bill of Quantities;
iv. General and Special Conditions of Contract;
v. Supplemental or Bid Bulletins, if any

b. Contractor's bidder's bid, including the Eligibility requirements, Technical and Financial Proposals, and all other documents or statements submitted;

Bid form, including all the documents/statements contained in the Bidder's bidding envelopes, as annexes, and all other documents submitted (*e.g.*, Bidder's response to request for clarifications on the bid), including corrections to the bid, if any, resulting from the Procuring Entity's bid evaluation;

c. Performance Security;

d. Notice of Award of Contract; and the Bidder's conforme thereto; and

e. Other contract documents that may be required by existing laws and/or the Procuring Entity concerned in the PBDs. **Winning bidder agrees thatadditional contract documents or information prescribed by the GPPBthat are subsequently required for submission after the contractexecution, such as the Notice to Proceed, Variation Orders, andWarranty Security, shall likewise form part of the Contract.**

3. In consideration for the sum of *[totalcontract price in words and figures]* or such other sums as may be ascertained, *[Named of the bidder]* agrees to *[state the object of the contract]* in accordance with his/her/its Bid.

4. The *SSS* agrees to pay the above-mentioned sum in accordance with the terms of the Bidding.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of the Republic of the Philippines on the day and year first above written.

[Insert Name and Signature]	*[Insert Name and Signature]*
[Insert Signatory's Legal Capacity]	*[Insert Signatory's Legal Capacity]*
for:	*for:*
SSS	*[Insert Name of Supplier]*

(In case of double acknowledgment)

SIGNED IN THE PRESENCE OF:

_____ _____

(Name of Certifying officer as to availability of funds)
(Position of Certifying Officer)
(Department/Office of Certifying Officer)

FUNDS AVAILABLE:

APP No.: _____

FIRST ACKNOWLEDGMENT

Republic of the Philippines)
_____…….) S.S.

BEFORE ME, a Notary Public for and in _____, Philippines, on this _____ day of _____ personally appeared:

Name	Competent Evidence of Identity	Date/Place of Issue

known to me to be the same person who executed the foregoing Agreement, consisting of _____ (___) pages, including this page and excluding annexes, and he/she/they acknowledged to me that the same is his/her/their free and voluntary act and deed as well as the free and voluntary act and deed of the principal he/she /they represent/s in this instance.

WITNESS MY HAND AND SEAL on the date and place first above written.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of 20__.

SIGNED IN THE PRESENCE OF:

_____ _____

SECOND ACKNOWLEDGMENT

Republic of the Philippines)
_____…….) S.S.

BEFORE ME, a Notary Public for and in _____, Philippines, on this _____ day of _____ personally appeared:

Name	Competent Evidence of Identity	Date/Place of Issue

known to me to be the same person who executed the foregoing Agreement, consisting of _____ (___) pages, including this page and excluding annexes, and he/she/they acknowledged to me that the same is his/her/their free and voluntary act and deed (if corporation to include succeeding phrase) as well as the free and voluntary act and deed of the principal he/she /they represent/s in this instance.

WITNESS MY HAND AND SEAL on the date and place first above written.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of 20__.

FORM-04

Omnibus Sworn Statement (Revised)

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

AFFIDAVIT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

   a) Carefully examining all of the Bidding Documents;

   b) Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;

   c) Making an estimate of the facilities available and needed for the contract to be bid, if any; and

   d) Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Contractor]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. **In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duly to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s.1930, as amended, or the Revised Penal Code.**

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

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

[Jurat]

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

GPPB Resolution No. 16-2020, dated 16 September 2020

REPUBLIC OF THE PHILIPPINES]

NAME OF CITY] S.S

SECRETARY'S CERTIFICATE

I, **<NAME OF CORPORATE SECRETARY>**, of legal age, **<Civil Status>**, Filipino citizen and with business at **<Company Address>,** after being duly sworn, hereby depose and state that:

1. I am the Corporate Secretary of **<COMPANY NAME>,** a Corporation duly organized and existing under and by virtue of the laws of the Philippines, with principal office at <**Office Address>.**

2. As the Corporate Secretary, I have custody and access to the records of the Corporation.

3. I am familiar with the facts herein certified and duly authorized to certify the same.

4. I hereby certify that during a regular meeting of the Board of Directors of the Corporation held on **<Date of Meeting>,** at which meeting a quorum was present, the following Resolution**/s was/were** unanimously passed, approved and adopted:

    a) RESOLVED that **<COMPANY NAME>**, authorized and empowered the following to participate in the bidding for the <**PROJECT NAME>** of the **SOCIAL SECURITY SYSTEM:**

	NAME	POSITION/DESIGNATION	SIGNATURE
1.			
2.			

    b) **RESOLVED FURTHER that**, if awarded the Contract, the following **is/are** granted full power and authority to enter into contract with the S**OCIAL SECURITY SYSTEM:**

	NAME	POSITION/DESIGNATION	SIGNATURE
1.			
2.			

    c) **RESOLVED FURTHERMORE** that, the designated representative**/s** of the Corporation has/have the full power to perform any and all acts necessary and/or to represent the Corporation as fully and effectively as the Corporation might do if personally present, and hereby satisfying and confirming all the said representative**/s** shall lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ____ at **<CITY>.**

_____
NAME & SIGNATURE of Corporate Secretary

SUBSCRIBE AND SWORN to before me this ___ day of _____ at **<CITY>**, affiant having exhibited to me his/her <Government Issued ID and details [issued by, date and place issued if applicable]).

Doc No. _____
Page No. _____
Book No. _____
Series of _____

FORM-05

STATEMENT OF ALL ITS ON-GOING GOVERNMENT AND PRIVATE CONTRACTS, INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED

NAME OF CONTRACT	DATE OF CONTRACT	CONTRACT DURATION	CONTACT PERSON, CONTACT NO., ADDRESS, AND EMAIL ADDRESS	KINDS OF GOODS	AMOUNT OF CONTRACT	VALUE OF OUTSTANDING CONTRACT

FORM-06

STATEMENT OF SINGLE LARGEST COMPLETED CONTRACT SIMILAR TO THE PROJECT TO BE BID EQUIVALENT TO AT LEAST 50% OF THE ABC WITH ATTACHED CERTIFICATE OF FINAL COMPLETION OR CPES EVALUATION

NAME OF CONTRACT	COMPLETION PERIOD	AMOUNT OF CONTRACT	CONTACT PERSON, CONTACT NO., ADDRESS, AND EMAIL ADDRESS

NOTE: SLCC SHOULD BE PROJECTS WITHOUT NON-DISCLOSURE AGREEMENT (NDA)

FORM-07

Formula in the Computation of NFCC

_____

NAME OF PROJECT

_____

NAME OF COMPANY

NFCC = 15 (Current Assets – Current Liabilities) – Value of All Outstanding Works under On-going Contracts including Awarded Contracts yet to be started)

YEAR	CURRENT ASSETS	CURRENT LIABILITIES
TOTAL		

Value of Outstanding Works under On-going Contracts:

CONTRACT DESCRIPTION	TOTAL CONTRACT AMOUNT AT AWARD	PERCENTAGE OF PLANNED AND ACTUAL ACCOMPLISHMENT	ESTIMATED COMPLETION TIME
TOTAL			

Use additional sheet/s, if necessary

FORMULA:

15 (_____ – _____) – _____ = _____

Current Assets minus Current Liabilities minus Total Outstanding Works **NFCC**

P_____
NFCC

Prepared and Submitted by:

_____

Signature over Printed Name

FORM-08

(Name of Bank)

COMMITTED LINE OF CREDIT CERTIFICATE

Date: _____

Social Security System (SSS)
SSS Main Building, East Avenue
Diliman, Quezon City

CONTRACT PROJECT	:	_____
COMPANY/FIRM	:	_____
ADDRESS	:	_____
BANK/FINANCING INSTITUTION	:	_____
ADDRESS	:	_____
AMOUNT	:	_____

This is to certify that the above Bank/Financing Institution with business address indicated above, commits to provide the (Supplier/Distributor/Manufacturer/Contractor), if awarded the above-mentioned Contract, a credit line in the amount specified above which shall be exclusively used to finance the performance of the above-mentioned contract subject to our terms, conditions and requirements.

The credit line shall be available within fifteen (15) calendar days after receipt by the (Supplier/Distributor/Manufacturer/Contractor) of the Notice of Award and such line of credit shall be maintained until issuance of Certificate of Acceptance by the Social Security System.

This Certification is being issued in favor of said (Supplier/Distributor/Manufacturer/Contractor) in connection with the bidding requirement of (Name of Procuring Entity) for the above-mentioned Contract. We are aware that any false statements issued by us make us liable for perjury.

The committed line of credit cannot be terminated or cancelled without the prior written approval of Social Security System.

Name and Signature of Authorized Financing Institution Office

Office Designation

Concurred by:

Name & Signature of (Supplier/Distributor/Manufacturer/Contractor) Authorized Representative

Official Designation

SUBSCRIBED AND SWORN TO BEFORE ME this _____ day of _____ at _____ Philippines, Affiant exhibited to me his/her competent Evidence of Identity (as defines by the 2004 Rules on Notarial Practice _____issued on _____ at _____, Philippines.

NOTARY PUBLIC

Doc No. : _____
Page No. : _____
Book No. : _____
Series of : _____

(Note: The amount committed should be machine validated in the Certificate itself)


Republic of the Philippines
gppb
Government Procurement Policy Board