Dear Prospective Offeror:

Subject: Request for Quotes 19EG3022Q0028

Enclosed is a Request for Quotes (RFQ) for **Maadi House Safe Sanctuary**. If you would like to submit a quotation, follow the instructions in Section J of the solicitation, complete the required portions of the attached document, and submit it to the address shown on the Standard Form that follows this letter.

The U.S. Government intends to award a contract/purchase order to the responsible company submitting an acceptable offer at the lowest price. We intend to award a contract/purchase order based on initial proposals, without holding discussions, although we may hold discussions with companies in the competitive range if there is a need to do so.

In order to attend the site visit, you are kindly requested to provide the name and Egyptian ID number /Passport # of each of your representatives that will attend maximum by 10:00AM, 9/7/2022. Please e-mail this information to abdelseedaa@state.gov to prepare for your access to the Embassy premises, mentioning the solicitation number and project title in the email subject field noting that each company has the right to send only two representatives.

Quotations are due by **9/15/2022 – 2:00 PM**. No quotations will be accepted after this time. Quotations must be in English and incomplete quotations will not be accepted.

**Deadline for technical questions is 9/12/2022 – 1:00 PM**

Your quotation must be submitted electronically to cairocontracts@state.gov

In order for a quotation to be considered, you must also complete and submit the following:

1. SF-1442
2. Section A, Pricing
3. Section L Representations and Certifications
4. Additional information as required in Section J
5. Proof of SAM Registration

Offerors shall be registered in the SAM (System for Award Management) database at https://www.sam.gov prior to submittal of their offer/proposal as prescribed under FAR 4.1102. Failure to be registered at time of proposal submission may deem the offeror’s proposal to be considered non-responsible and no further consideration will be given. Therefore, offerors are highly encouraged to register immediately if they are interested in submitting a response to this requirement.

Sincerely,

Contracting Officer
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L. REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS
**SOLICITATION, OFFER, AND AWARD**

(Construction, Alteration, or Repair)

---

1. **SOLICITATION NUMBER**
   19EG3022Q0028

2. **TYPE OF SOLICITATION**
   - SEALLED BID (IFB)
   - NEGOTIATED (RFP)

3. **DATE ISSUED**
   08/31/2022

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### IMPORTANT

- The "offer" section on the reverse must be fully completed by offeror.

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4. **CONTRACT NUMBER**

5. **REQUISITION/PURCHASE REQUEST NUMBER**
   PR11021329

6. **PROJECT NUMBER**

---

7. **ISSUED BY CODE**
   EG300

8. **ADDRESS OFFER TO**
   AMERICAN EMBASSY CAIRO
   US EMBASSY CAIRO 8 KAMAL EL DIN SALAH, ATTN:
   PROCUREMENT/CONTRACTING OFFICE
   CAIRO 11519
   EGYPT

---

9. **FOR INFORMATION CALL:**
   a. NAME: Tamer Daoud
   b. TELEPHONE NUMBER (Include area code) (NO COLLECT CALLS)

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### SOLICITATION

**NOTE:** In sealed bid solicitations "offer" and "offeror" mean "bid and "bidder".

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10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying number, date)
    Maadi House Safe Sanctuary

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11. The contractor shall begin performance within 30 calendar days and complete it within 100 calendar days after receiving award, notice to proceed. This performance period is mandatory negotiable. (See ).

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.)

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

   **CALENDARY DAYS**
   10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

   a. Sealed offers in original and copies to perform the work required are due at the place specified in Item 8 by 14:00 (hour)
      local time 09/14/2022 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

   b. An offer guarantee is not required.

   c. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

   d. Offers providing less than calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.
14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NUMBER (Include area code)

16. REMITTANCE ADDRESS (Include only if different than Item 14.)

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within ________ calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13d. Failure to insert any number means the offeror accepts the minimum in Item 13d.)

AMOUNTS

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS
   (The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

<table>
<thead>
<tr>
<th>AMENDMENT NUMBER</th>
<th>DATE.</th>
<th></th>
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<tbody>
<tr>
<td>20a. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20b. SIGNATURE</td>
<td></td>
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<tr>
<td>20c. OFFER DATE</td>
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</tr>
</tbody>
</table>

AWARD (To be completed by Government)

21. ITEMS ACCEPTED:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>AMOUNT</th>
<th>ACCOUNTING AND APPROPRIATION DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)</td>
<td></td>
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</tr>
<tr>
<td>25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. ADMINISTERED BY</td>
<td></td>
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<tr>
<td>27. PAYMENT WILL BE MADE BY</td>
<td></td>
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</tr>
</tbody>
</table>

28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration slated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

29. AWARD (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN (Type or print)

31A. NAME OF CONTRACTING OFFICER (Type or print)

30B. SIGNATURE

31B. UNITED STATES OF AMERICA, BY

30C. DATE

31C. AWARD DATE
SECTION A - PRICING

A. PRICE

The Contractor shall complete all work, including furnishing all labor, material, equipment, and services required under this purchase order for the following firm fixed price and within the time specified. This price shall include all labor, materials, all insurances, overhead and profit.

| Total Price (including all labor, materials, overhead and profit) |

A.1 VALUE ADDED TAX

The Government will not reimburse the Contractor for VAT under this contract. The Contractor shall not include a line for VAT on Invoices as the U.S. Embassy has a tax exemption certificate with the host government.
SECTION B - STATEMENT OF WORK

The character and scope of the work are set forth in the contract. The Contractor shall furnish and install all materials required by this contract.

In case of differences between small and large-scale drawings, the latter will govern. Where a portion of the work is drawn in detail and the remainder of the work is indicated in outline, the parts drawn in detail shall apply also to all other portions of the work.
SECTION C - PACKAGING AND MARKING

Mark materials delivered to the site as follows:

N/A
SECTION D - INSPECTION AND ACCEPTANCE

The COR, or his/her authorized representatives, will inspect from time to time the services being performed and the supplies furnished to determine whether work is being performed in a satisfactory manner, and that all supplies are of acceptable quality and standards.

The Contractor shall be responsible for any countermeasures or corrective action, within the scope of this contract, which may be required by the Contracting Officer as a result of such inspection.

D.1 SUBSTANTIAL COMPLETION

(a) "Substantial Completion" means the stage in the progress of the work as determined and certified by the Contracting Officer in writing to the Contractor, on which the work (or a portion designated by the Government) is sufficiently complete and satisfactory. Substantial completion means that the property may be occupied or used for the purpose for which it is intended, and only minor items such as touch-up, adjustments, and minor replacements or installations remain to be completed or corrected which:

(1) do not interfere with the intended occupancy or utilization of the work, and
(2) can be completed or corrected within the time period required for final completion.

(b) The "date of substantial completion" means the date determined by the Contracting Officer or authorized Government representative as of which substantial completion of the work has been achieved.

Use and Possession upon Substantial Completion - The Government shall have the right to take possession of and use the work upon substantial completion. Upon notice by the Contractor that the work is substantially complete (a Request for Substantial Completion) and an inspection by the Contracting Officer or an authorized Government representative (including any required tests), the Contracting Officer shall furnish the Contractor a Certificate of Substantial Completion. The certificate will be accompanied by a Schedule of Defects listing items of work remaining to be performed, completed, or corrected before final completion and acceptance. Failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use upon substantial completion shall not be deemed an acceptance of any work under the contract.

D.2 FINAL COMPLETION AND ACCEPTANCE

D.2.1 "Final completion and acceptance" means the stage in the progress of the work as determined by the Contracting Officer and confirmed in writing to the Contractor, at which all work required under the contract has been completed in a satisfactory manner, subject to the discovery of defects after final completion, and except for items specifically excluded in the notice of final acceptance.
D.2.2 The "date of final completion and acceptance" means the date determined by the Contracting Officer when final completion of the work has been achieved, as indicated by written notice to the Contractor.

D.2.3 FINAL INSPECTION AND TESTS. The Contractor shall give the Contracting Officer at least five (5) days advance written notice of the date when the work will be fully completed and ready for final inspection and tests. Final inspection and tests will be started not later than the date specified in the notice unless the Contracting Officer determines that the work is not ready for final inspection and so informs the Contractor.

D.2.4 FINAL ACCEPTANCE. If the Contracting Officer is satisfied that the work under the contract is complete (with the exception of continuing obligations), the Contracting Officer shall issue to the Contractor a notice of final acceptance and make final payment upon:

- Satisfactory completion of all required tests,

- A final inspection that all items by the Contracting Officer listed in the Schedule of Defects have been completed or corrected and that the work is finally complete (subject to the discovery of defects after final completion), and

- Submittal by the Contractor of all documents and other items required upon completion of the work, including a final request for payment (Request for Final Acceptance).
SECTION E - DELIVERIES AND PERFORMANCE

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK
(APR 1984)

The Contractor shall be required to:

(a) commence work under this contract within 30 calendar days after the date the Contractor receives the notice to proceed,

(b) prosecute the work diligently, and,

(c) complete the entire work ready for use not later than 100 calendar days.

The time stated for completion shall include final cleanup of the premises.

52.211-12 LIQUIDATED DAMAGES - CONSTRUCTION (SEPT 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay liquidated damages to the Government in the amount of 50 USD for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor’s right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Default clause.

CONTRACTOR’S SUBMISSION OF CONSTRUCTION SCHEDULES

(a) The time for submission of the schedules referenced in FAR 52.236-15, "Schedules for Construction Contracts", paragraph (a), is hereby modified to reflect the due date for submission as 10 calendar days after receipt of an executed contract.

(b) These schedules shall include the time by which shop drawings, product data, samples and other submittals required by the contract will be submitted for approval.

(c) The Contractor shall revise such schedules (1) to account for the actual progress of the work, (2) to reflect approved adjustments in the performance schedule, and (3) as required by the Contracting Officer to achieve coordination with work by the Government and any separate contractors used by the Government. The Contractor shall submit a schedule, which sequences work so as to minimize disruption at the job site.

(d) All deliverables shall be in the English language and any system of dimensions (English or metric) shown shall be consistent with that used in the contract. No extension of time shall be allowed due to delay by the Government in approving such deliverables if the Contractor has failed to act promptly and responsively in submitting its deliverables. The
Contractor shall identify each deliverable as required by the contract.

(e) Acceptance of Schedule: When the Government has accepted any time schedule; it shall be binding upon the Contractor. The completion date is fixed and may be extended only by a written contract modification signed by the Contracting Officer. Acceptance or approval of any schedule or revision thereof by the Government shall not:

(1) Extend the completion date or obligate the Government to do so,
(2) Constitute acceptance or approval of any delay, or
(3) Excuse the Contractor from or relieve the Contractor of its obligation to maintain the progress of the work and achieve final completion by the established completion date.

NOTICE OF DELAY

If the Contractor receives a notice of any change in the work, or if any other conditions arise which are likely to cause or are actually causing delays which the Contractor believes may result in late completion of the project, the Contractor shall notify the Contracting Officer. The Contractor’s notice shall state the effect, if any, of such change or other conditions upon the approved schedule, and shall state in what respects, if any, the relevant schedule, or the completion date should be revised. The Contractor shall give such notice promptly, not more than ten (10) days after the first event giving rise to the delay or prospective delay. Only the Contracting Officer may revise the approved time schedule.

NOTICE TO PROCEED

(a) After receiving and accepting any bonds or evidence of insurance, the Contracting Officer will provide the Contractor a Notice to Proceed. The Contractor must then prosecute the work, commencing and completing performance not later than the time period established in the contract.

(b) It is possible that the Contracting Officer may elect to issue the Notice to Proceed before receipt and acceptance of any bonds or evidence of insurance. Issuance of a Notice to Proceed by the Government before receipt of the required bonds or insurance certificates or policies shall not be a waiver of the requirement to furnish these documents.

WORKING HOURS

All work shall be performed during Sunday through Thursday from 08:00 am to 16:00. Other hours, if requested by the Contractor, may be approved by the Contracting Officer's representative (COR). The Contractor shall give 24 hours in advance to COR who will consider any deviation from the hours identified above. Changes in work hours, initiated by the Contractor, will not be a cause for a price increase.
New Year’s Day American Sunday January 2
Coptic Christmas Egyptian Friday January 7*
Martin Luther King’s Birthday American Sunday January 16
Revolution/Police Day* Egyptian Tuesday January 25*
Washington’s Birthday American Sunday February 20
Sinai Liberation Day Egyptian Monday April 25*
Sham El Nessim Egyptian Monday April 25*
Labor Day Egyptian Sunday May 1
Eid El Fitr** Egyptian Mon/Tues May 2/3**
Memorial Day American Sunday May 29
Juneteenth American Sunday June 19
June 30 Revolution Egyptian Thursday June 30
Independence Day American Monday July 4
Eid Al Adha** Egyptian Fri/Sat/Sun July 8-10**
National Day* Egyptian
Islamic New Year** Egyptian Saturday July 30**
Labor Day American Sunday September 4
Armed Forces Day Egyptian Thursday October 6
Moulid El Nabi** Egyptian Saturday October 8**
Columbus Day American Sunday October 9
Veteran’s Day American Thursday November 10
Thanksgiving Day American Thursday November 24
Christmas Day American Sunday December 25

(*) According to the Egyptian Government Decree No. 1249/2020, the Prime Minister, on a case-by-case basis, has the authority to move holidays in the middle of the week to either Sunday or Thursday. We note that the practice of the Egyptian Government during 2021 was to move these holidays to Thursday. Accordingly, the Embassy will consider moving the observance date of local holidays that fall on weekdays or weekends if the Egyptian Government issues decisions that mandate that both the public and private sectors change the observance day of a local holiday.

(**) Dates of Islamic holidays are subject to the lunar calendar and decisions taken by the religious authorities. Hence, these dates may vary from the above projected dates.

PRECONSTRUCTION CONFERENCE

A preconstruction conference will be held 10 days after contract award at US Embassy to discuss the schedule, submittals, notice to proceed, mobilization and other important issues that effect construction progress. See FAR 52.236-26, Preconstruction Conference.

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Deliver Date</th>
<th>Deliver To</th>
</tr>
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<tbody>
<tr>
<td>Section G. Securities/Insurance</td>
<td>1</td>
<td>10 days after award</td>
<td>CO</td>
</tr>
<tr>
<td>Section E. Construction Schedule</td>
<td>1</td>
<td>10 days after award</td>
<td>COR</td>
</tr>
<tr>
<td>Section E. Preconstruction Conference</td>
<td>1</td>
<td>10 days after award</td>
<td>COR</td>
</tr>
<tr>
<td>Section G. Personnel Biographies</td>
<td>1</td>
<td>10 days after award</td>
<td>COR</td>
</tr>
<tr>
<td>Section F. Payment Request</td>
<td>1</td>
<td>Last calendar day</td>
<td>COR</td>
</tr>
<tr>
<td>Section D. Request for Substantial Completion</td>
<td>1</td>
<td>15 days before</td>
<td>COR</td>
</tr>
<tr>
<td>Section D. Request for Final Acceptance</td>
<td>1</td>
<td>5 days before inspection</td>
<td>COR</td>
</tr>
</tbody>
</table>
652.242-70  CONTRACTING OFFICER'S REPRESENTATIVE (COR) (AUG 1999)

(a) The Contracting Officer may designate in writing one or more Government employees, by name or position title, to take action for the Contracting Officer under this contract. Each designee shall be identified as a Contracting Officer’s Representative (COR). Such designation(s) shall specify the scope and limitations of the authority so delegated; provided, that the designee shall not change the terms or conditions of the contract, unless the COR is a warranted Contracting Officer, and this authority is delegated in the designation.

(b) The COR for this contract is **Engineer inspector**

Payment: The Contractor's attention is directed to Section H, 52.232-5, "Payments Under Fixed-Price Construction Contracts". The following elaborates on the information contained in that clause.

Requests for payment, may be made no more frequently than monthly. Payment requests shall cover the value of labor and materials completed and in place, including a prorated portion of overhead and profit.

After receipt of the Contractor's request for payment, and on the basis of an inspection of the work, the Contracting Officer shall make a determination as to the amount, which is then due. If the Contracting Officer does not approve payment of the full amount applied for, less the retainage allowed by in 52.232-5, the Contracting Officer shall advise the Contractor as to the reasons.

Under the authority of 52.232-27(a), the 14 day period identified in FAR 52.232-27(a)(1)(i)(A) is hereby changed to 30 days.
SECTION G - SPECIAL TERMS AND CONDITIONS

G.1.0 PERFORMANCE/PAYMENT PROTECTION - The Contractor shall furnish some form of payment protection as described in 52.228-13 in the amount of 50% of the contract price.

G.1.1 The Contractor shall provide the information required by the paragraph above within ten (10) calendar days after award. Failure to timely submit the required security may result in rescinding or termination of the contract by the Government. If the contract is terminated, the Contractor will be liable for those costs as described in FAR 52.249-10, Default (Fixed-Price Construction), which is included in this purchase order.

G.1.2 The bonds or alternate performance security shall guarantee the Contractor's execution and completion of the work within the contract time. This security shall also guarantee the correction of any defects after completion, the payment of all wages and other amounts payable by the Contractor under its subcontracts or for labor and materials, and the satisfaction or removal of any liens or encumbrances placed on the work.

G.1.3 The required securities shall remain in effect in the full amount required until final acceptance of the project by the Government. Upon final acceptance, the penal sum of the performance security shall be reduced to 10% of the contract price. The security shall remain in effect for one year after the date of final completion and acceptance, and the Contractor shall pay any premium required for the entire period of coverage.

G.2.0 INSURANCE - The Contractor is required by FAR 52.228-5, "Insurance - Work on a Government Installation" to provide whatever insurance is legally necessary. The Contractor shall at its own expense provide and maintain during the entire performance period the following insurance amounts:

G.2.1 GENERAL LIABILITY (includes premises/operations, collapse hazard, products, completed operations, contractual, independent contractors, broad form property damage, personal injury):

<table>
<thead>
<tr>
<th></th>
<th>Per Occurrence</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) BODILY INJURY, ON OR OFF THE SITE, IN U.S. DOLLARS</td>
<td>$5,000.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>(2) PROPERTY DAMAGE, ON OR OFF THE SITE, IN U.S. DOLLARS</td>
<td>$ 10,000</td>
<td>$ 20,000</td>
</tr>
</tbody>
</table>

G.2.2 The foregoing types and amounts of insurance are the minimums required. The Contractor shall obtain any other types of insurance required by local law or that are ordinarily or customarily obtained in the location of the work. The limit of such insurance shall be as provided by law or sufficient to meet normal and customary claims.

G.2.3 The Contractor agrees that the Government shall not be responsible for personal injuries or for damages to any property of the Contractor, its officers, agents, servants, and employees, or
any other person, arising from and incident to the Contractor's performance of this contract. The Contractor shall hold harmless and indemnify the Government from any and all claims arising therefrom, except in the instance of gross negligence on the part of the Government.

G.2.4 The Contractor shall obtain adequate insurance for damage to, or theft of, materials and equipment in insurance coverage for loose transit to the site or in storage on or off the site.

G.2.5 The general liability policy required of the Contractor shall name "the United States of America, acting by and through the Department of State", as an additional insured with respect to operations performed under this contract.

G.3.0 DOCUMENT DESCRIPTIONS

G.3.1 SUPPLEMENTAL DOCUMENTS: The Contracting Officer shall furnish from time to time such detailed drawings and other information as is considered necessary, in the opinion of the Contracting Officer, to interpret, clarify, supplement, or correct inconsistencies, errors or omissions in the Contract documents, or to describe minor changes in the work not involving an increase in the contract price or extension of the contract time. The Contractor shall comply with the requirements of the supplemental documents, and unless prompt objection is made by the Contractor within 20 days, their issuance shall not provide for any claim for an increase in the Contract price or an extension of contract time.

G.3.1.1. RECORD DOCUMENTS. The Contractor shall maintain at the project site:

   (1) a current marked set of Contract drawings and specifications indicating all interpretations and clarification, contract modifications, change orders, or any other departure from the contract requirements approved by the Contracting Officer; and,

   (2) a complete set of record shop drawings, product data, samples and other submittals as approved by the Contracting Officer.

G.3.1.2. "As-Built" Documents: After final completion of the work, but before final acceptance thereof, the Contractor shall provide:

   (1) a complete set of "as-built" drawings, based upon the record set of drawings, marked to show the details of construction as actually accomplished; and,

   (2) record shop drawings and other submittals, in the number and form as required by the specifications.

G.4.0 LAWS AND REGULATIONS - The Contractor shall, without additional expense to the Government, be responsible for complying with all laws, codes, ordinances, and regulations applicable to the performance of the work, including those of the host country, and with the lawful orders of any governmental authority having jurisdiction. Host country authorities may not enter the construction site without the permission of the Contracting Officer. Unless otherwise directed by the Contracting Officer, the Contractor shall comply with the more
stringent of the requirements of such laws, regulations, and orders and of the contract. In the event of a conflict between the contract and such laws, regulations and orders, the Contractor shall promptly advise the Contracting Officer of the conflict and of the Contractor's proposed course of action for resolution by the Contracting Officer.

G.4.1 The Contractor shall comply with all local labor laws, regulations, customs, and practices pertaining to labor, safety, and similar matters, to the extent that such compliance is not inconsistent with the requirements of this contract.

G.4.2 The Contractor shall give written assurance to the Contracting Officer that all subcontractors and others performing work on or for the project have obtained all requisite licenses and permits.

G.4.3 The Contractor shall submit proper documentation and evidence satisfactory to the Contracting Officer of compliance with this clause.

G.5.0 CONSTRUCTION PERSONNEL - The Contractor shall maintain discipline at the site and at all times take all reasonable precautions to prevent any unlawful, riotous, or disorderly conduct by or among those employed at the site. The Contractor shall ensure the preservation of peace and protection of persons and property in the neighborhood of the project against such action. The Contracting Officer may require, in writing that the Contractor remove from the work any employee that the Contracting Officer deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the project is deemed by the Contracting Officer to be contrary to the Government's interests.

G.5.1 If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

G.5.2 After award, the Contractor has ten calendar days to submit to the Contracting Officer a list of workers and supervisors assigned to this project for the Government to conduct all necessary security checks. It is anticipated that security checks will take 30 days to perform. For each individual the list shall include:
- Full Name
- Place and Date of Birth
- Current Address
- National Identification number
- Fingerprint Card
- Participation in a personal interview with Embassy security staff

Failure to provide any of the above information may be considered grounds for rejection and/or resubmittal of the application. Once the Government has completed the security screening and approved the applicants a badge will be provided to the individual for access to the site. This badge may be revoked at any time due to the falsification of data, or misconduct on site.

G.5.3 The Contractor shall provide an English speaking supervisor on site at all times. This position is considered as key personnel under this purchase order.
G.6.0 Materials and Equipment - All materials and equipment incorporated into the work shall be new and for the purpose intended, unless otherwise specified. All workmanship shall be of good quality and performed in a skillful manner that will withstand inspection by the Contracting Officer.

G.7.0 SPECIAL WARRANTIES

G.7.1 Any special warranties that may be required under the contract shall be subject to the stipulations set forth in 52.246-21, "Warranty of Construction", as long as they are not in conflict.

G.7.2 The Contractor shall obtain and furnish to the Government all information required to make any subcontractor's, manufacturer's, or supplier's guarantee or warranty legally binding and effective. The Contractor shall submit both the information and the guarantee or warranty to the Government in sufficient time to permit the Government to meet any time limit specified in the guarantee or warranty, but not later than completion and acceptance of all work under this contract.

G.8.0 EQUITABLE ADJUSTMENTS

Any circumstance for which the contract provides an equitable adjustment that causes a change within the meaning of paragraph (a) of the "Changes" clause shall be treated as a change under that clause; provided, that the Contractor gives the Contracting Officer prompt written notice (within 20 days) stating:

(a) the date, circumstances, and applicable contract clause authorizing an equitable adjustment and

(b) that the Contractor regards the event as a changed condition for which an equitable adjustment is allowed under the contract

The Contractor shall provide written notice of a differing site condition within 10 calendar days of occurrence following FAR 52.236-2, Differing Site Conditions.

G.9.0 ZONING APPROVALS AND PERMITS

The Government shall be responsible for:

- obtaining proper zoning or other land use control approval for the project
- obtaining the approval of the Contracting Drawings and Specifications
- paying fees due for the foregoing; and,
- for obtaining and paying for the initial building permits.
SECTION H - CLAUSES

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. In addition, the full text of a clause may be accessed electronically at: Acquisition.gov this address is subject to change.

If the Federal Acquisition Regulation (FAR) is not available at the location indicated above, use the Department of State Acquisition website at e-CFR to see the links to the FAR. You may also use an Internet “search engine” (for example, Google, Yahoo or Excite) to obtain the latest location of the most current FAR.

THE FOLLOWING FEDERAL ACQUISITION REGULATION CLAUSE(S) IS/ARE INCORPORATED BY REFERENCE (48 CFR CH. 1):

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(a) Definitions. As used in this clause—
Backhaul means intermediate links between the core network, or backbone network, and the small subnetworks at the edge of the network (e.g., connecting cell phones/towers to the core telephone network). Backhaul can be wireless (e.g., microwave) or wired (e.g., fiber optic, coaxial cable, Ethernet).
Covered foreign country means The People’s Republic of China.
Covered telecommunications equipment or services means—
(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities);
For the purpose of public safety, security of Government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hyterta Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);

(3) Telecommunications or video surveillance services provided by such entities or using such equipment; or

(4) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Critical technology means–

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22, Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled-

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or


Interconnection arrangements means arrangements governing the physical connection of two or more networks to allow the use of another's network to hand off traffic where it is ultimately delivered (e.g., connection of a customer of telephone provider A to a customer of telephone company B) or sharing data and other information resources.

Reasonable inquiry means an inquiry designed to uncover any information in the entity's possession about the identity of the producer or provider of covered telecommunications equipment or services used by the entity that excludes the need to include an internal or third-party audit.

Roaming means cellular communications services (e.g., voice, video, data) received from a visited network when unable to connect to the facilities of the home network either because signal coverage is too weak or because traffic is too high.

Substantial or essential component means any component necessary for the proper function or performance of a piece of equipment, system, or service.

(b) Prohibition.
Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. The Contractor is prohibited from providing to the Government any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless an exception at paragraph (c) of this clause applies or the covered telecommunication equipment or services are covered by a waiver described in FAR 4.2104.

Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract, or extending or renewing a contract, with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless an exception at paragraph (c) of this clause applies or the covered telecommunication equipment or services are covered by a waiver described in FAR 4.2104. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract.

(c) Exceptions. This clause does not prohibit contractors from providing—

(1) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(2) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(d) Reporting requirement.

(1) In the event the Contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the Contractor is notified of such by a subcontractor at any tier or by any other source, the Contractor shall report the information in paragraph (d)(2) of this clause to the Contracting Officer, unless elsewhere in this contract are established procedures for reporting the information; in the case of the Department of Defense, the Contractor shall report to the website at https://dibnet.dod.mil. For indefinite delivery contracts, the Contractor shall report to the Contracting Officer for the indefinite delivery contract and the Contracting Officer(s) for any affected order or, in the case of the Department of Defense, identify both the indefinite delivery contract and any affected orders in the report provided at https://dibnet.dod.mil.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause

(i) Within one business day from the date of such identification or notification: the contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.
(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: any further available information about mitigation actions undertaken or recommended. In addition, the Contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) **Subcontracts.** The Contractor shall insert the substance of this clause, including this paragraph (e) and excluding paragraph (b)(2), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial products or commercial services.

(End of clause)

II. THE FOLLOWING DEPARTMENT OF STATE ACQUISITION REGULATION (DOSAR) CLAUSE(S) IS/ARE SET FORTH IN FULL TEXT:

**CONTRACTOR IDENTIFICATION (JULY 2008)**

Contract performance may require contractor personnel to attend meetings with government personnel and the public, work within government offices, and/or utilize government email.

Contractor personnel must take the following actions to identify themselves as non-federal employees:

1) Use an e-mail signature block that shows name, the office being supported and company affiliation (e.g., “John Smith, Office of Human Resources, ACME Corporation Support Contractor”);

2) Clearly identify themselves and their contractor affiliation in meetings.

3) Identify their contractor affiliation in Departmental e-mail and phone listings whenever contractor personnel are included in those listings; and

4) Contractor personnel may not utilize Department of State logos or indicia on business cards.

(End of clause)

**652.204-70 DEPARTMENT OF STATE PERSONAL IDENTIFICATION CARD ISSUANCE PROCEDURES (MAY 2011)**

(a) The Contractor shall comply with the Department of State (DOS) Personal Identification Card Issuance Procedures for all employees performing under this contract who require frequent and continuing access to DOS facilities, or information systems. The Contractor shall insert this clause in all subcontracts when the subcontractor’s employees will require frequent and continuing access to DOS facilities, or information systems.
(b) The DOS Personal Identification Card Issuance Procedures may be accessed at http://www.state.gov/m/ds/rls/rpt/c21664.htm.

(End of clause)

652.229-71 PERSONAL PROPERTY DISPOSITION AT POSTS ABROAD (AUG 1999)

Regulations at 22 CFR Part 136 require that U.S. Government employees and their families do not profit personally from sales or other transactions with persons who are not themselves entitled to exemption from import restrictions, duties, or taxes. Should the Contractor experience importation or tax privileges in a foreign country because of its contractual relationship to the United States Government, the Contractor shall observe the requirements of 22 CFR Part 136 and all policies, rules, and procedures issued by the chief of mission in that foreign country.

(End of clause)

652.236-70 ADDITIONAL SAFETY MEASURES (OCT 2017)

In addition to the safety/accident prevention requirements of FAR 52.236-13, Accident Prevention Alternate I, the contractor shall comply with the following additional safety measures.

(a) High Risk Activities. If the project contains any of the following high risk activities, the contractor shall follow the section in the latest edition, as of the date of the solicitation, of the U.S. Army Corps of Engineers Safety and Health manual, EM 385-1-1, that corresponds to the high risk activity. Before work may proceed, the contractor must obtain approval from the COR of the written safety plan required by FAR 52.236-13, Accident Prevention Alternate I (see paragraph (f) below), containing specific hazard mitigation and control techniques.

(1) Scaffolding;

(2) Work at heights above 1.8 meters;

(3) Trenching or other excavation greater than one (1) meter in depth;

(4) Earth-moving equipment and other large vehicles;

(5) Cranes and rigging;

(6) Welding or cutting and other hot work;

(7) Partial or total demolition of a structure;

(8) Temporary wiring, use of portable electric tools, or other recognized electrical hazards. Temporary wiring and portable electric tools require the use of a ground fault circuit
interrupter (GFCI) in the affected circuits; other electrical hazards may also require the use of a
GFCI;

(9) Work in confined spaces (limited exits, potential for oxygen less than 19.5 percent or
combustible atmosphere, potential for solid or liquid engulfment, or other hazards considered to
be immediately dangerous to life or health such as water tanks, transformer vaults, sewers,
cisterns, etc.).

(10) Hazardous materials - a material with a physical or health hazard including but not
limited to, flammable, explosive, corrosive, toxic, reactive or unstable, or any operations, which
creates any kind of contamination inside an occupied building such as dust from demolition
activities, paints, solvents, etc.; or

(11) Hazardous noise levels as required in EM 385-1 Section 5B or local standards if
more restrictive.

(b) Safety and Health Requirements. The contractor and all subcontractors shall comply with
the latest edition of the U.S. Army Corps of Engineers Safety and Health manual EM 385-1-1, or
OSHA 29 CFR parts 1910 or 1926 if no EM 385-1-1 requirements are applicable, and the
accepted contractor’s written safety program.

(c) Mishap Reporting. The contractor is required to report immediately all mishaps to the
COR and the contracting officer. A “mishap” is any event causing injury, disease or illness,
death, material loss or property damage, or incident causing environmental contamination. The
mishap reporting requirement shall include fires, explosions, hazardous materials contamination,
and other similar incidents that may threaten people, property, and equipment.

(d) Records. The contractor shall maintain an accurate record on all mishaps incident to work
performed under this contract resulting in death, traumatic injury, occupational disease, or
damage to or theft of property, materials, supplies, or equipment. The contractor shall report this
data in the manner prescribed by the contracting officer.

(e) Subcontracts. The contractor shall insert this clause, including this paragraph (e), with
appropriate changes in the designation of the parties, in subcontracts.

(f) Written program. The plan required by paragraph (f)(1) of the clause entitled “Accident
Prevention Alternate I” shall be known as the Site Safety and Health Plan (SSHP) and shall
address any activities listed in paragraph (a) of this clause, or as otherwise required by the
contracting officer/COR.

(1) The SSHP shall be submitted at least 10 working days prior to commencing any
activity at the site.

(2) The plan must address developing activity hazard analyses (AHAs) for specific
tasks. The AHAs shall define the activities being performed and identify the work sequences,
the specific anticipated hazards, site conditions, equipment, materials, and the control measures
to be implemented to eliminate or reduce each hazard to an acceptable level of risk. Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives.

(3) The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by EM 385-1-1) shall be identified and included in the AHA. Proof of their competency/qualification shall be submitted to the contracting officer or COR for acceptance prior to the start of that work activity. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

(End of clause)

652.242-73 AUTHORIZATION AND PERFORMANCE (AUG 1999)

(a) The Contractor warrants the following:
   (1) That is has obtained authorization to operate and do business in the country or countries in which this contract will be performed;
   (2) That is has obtained all necessary licenses and permits required to perform this contract; and,
   (3) That it shall comply fully with all laws, decrees, labor standards, and regulations of said country or countries during the performance of this contract.

(b) If the party actually performing the work will be a subcontractor or joint venture partner, then such subcontractor or joint venture partner agrees to the requirements of paragraph (a) of this clause.

(End of clause)

652.243-70 NOTICES (AUG 1999)

Any notice or request relating to this contract given by either party to the other shall be in writing. Said notice or request shall be mailed or delivered by hand to the other party at the address provided in the schedule of the contract. All modifications to the contract must be made in writing by the Contracting Officer.

(End of clause)
## SECTION I - LIST OF ATTACHMENTS

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SECTION J – INSTRUCTIONS ON HOW TO SUBMIT A QUOTATION

The Offeror shall include Defense Base Act (DBA) insurance premium costs covering employees. The offeror may obtain DBA insurance directly from any Department of Labor approved providers at the DOL website at [http://www.dol.gov/owcp/dlhwc/lscarrier.htm](http://www.dol.gov/owcp/dlhwc/lscarrier.htm)

A. QUALIFICATIONS OF OFFERORS

Offerors/quoters must be technically qualified and financially responsible to perform the work described in this solicitation. At a minimum, each Offeror/Quoter must meet the following requirements:

1. Be able to understand written and spoken English.
2. Have an established business with a permanent address and telephone listing.
3. Be able to demonstrate prior construction experience with suitable references.
4. Have the necessary personnel, equipment and financial resources available to perform the work.
5. Have all licenses and permits required by local law.
6. Meet all local insurance requirements.
7. Have the ability to obtain or to post adequate performance security, such as bonds, irrevocable letters of credit or guarantees issued by a reputable financial institution.
8. Have no adverse criminal record; and
9. Have no political or business affiliation which could be considered contrary to the interests of the United States.

B. SUBMISSION OF QUOTATIONS

This solicitation is for the performance of the construction services described in SCOPE OF WORK, and the Attachments which are a part of this request for quotation.

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<th>VOLUME</th>
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<tr>
<td>I</td>
<td>Standard Form 1449 including a completed Attachment 4, &quot;BREAKDOWN OF PROPOSAL PRICE BY DIVISIONS OF SPECIFICATIONS&quot;</td>
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<tr>
<td>II</td>
<td>Performance schedule in the form of a &quot;bar chart&quot; and Business Management/Technical Proposal</td>
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Submit the complete quotation to the address indicated. If mailed, on Standard Form 18, or if hand-delivered, use the address set forth below:
The Offeror/Quoter shall identify and explain/justify any deviations, exceptions, or conditional assumptions taken with respect to any of the instructions or requirements of this request for quotation in the appropriate volume of the offer.


(a) Present the performance schedule in the form of a "bar chart" indicating when the various portions of the work will be commenced and completed within the required schedule. This bar chart shall be in sufficient detail to clearly show each segregable portion of work and its planned commencement and completion date.

(b) The Business Management/Technical Proposal shall be in two parts, including the following information:

Proposed Work Information - Provide the following:

(1) A list of the names addresses and telephone numbers of the owners, partners, and principal officers of the Offeror.

(2) The name and address of the Offeror's field superintendent for this project.

(3) A list of the names, addresses, and telephone numbers of subcontractors and principal materials suppliers to be used on the project, indicating what portions of the work will be performed by them; and,

Experience and Past Performance - List all contracts and subcontracts your company has held over the past three years for the same or similar work. Provide the following information for each contract and subcontract:

(1) Customer's name, address, and telephone numbers of customer's lead contract and technical personnel.

(2) Contract number and type.

(3) Date of the contract award place(s) of performance, and completion dates; Contract dollar value.

(4) Brief description of the work, including responsibilities; and

(5) Any litigation currently in process or occurring within last 5 years.
C. **52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995)**

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) A site visit has been scheduled for **9/11/2022 – 10:00 AM**.

(c) Participants will meet at **Maadi House – 20 St. 19 Maadi**

D. **MAGNITUDE OF CONSTRUCTION PROJECT**

It is anticipated that the range in price of this contract will be: **65000.00 USD**

E. **LATE QUOTATIONS**. Late quotations shall be handled in accordance with FAR.

F. **52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)**

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<td>52.204-7</td>
<td>SYSTEM FOR AWARD MANAGEMENT (OCT 2018)</td>
</tr>
<tr>
<td>52.204-16</td>
<td>COMMERCIAL AND GOVERNMENT ENTITY CODE REPORTING (AUG 2020)</td>
</tr>
<tr>
<td>52.214-34</td>
<td>SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991)</td>
</tr>
<tr>
<td>52.215-1</td>
<td>INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (JAN 2017)</td>
</tr>
</tbody>
</table>
SECTION K - EVALUATION CRITERIA

Award will be made to the lowest priced, acceptable, responsible quoter. The Government reserves the right to reject quotations that are unreasonably low or high in price.

The Government will determine acceptability by assessing the offeror's compliance with the terms of the RFQ. The Government will determine responsibility by analyzing whether the apparent successful quoter complies with the requirements of FAR 9.1, including:

- ability to comply with the required performance period, taking into consideration all existing commercial and governmental business commitments.
- satisfactory record of integrity and business ethics.
- necessary organization, experience, and skills or the ability to obtain them.
- necessary equipment and facilities or the ability to obtain them; and
- otherwise, qualified, and eligible to receive an award under applicable laws and regulations.
SECTION L – REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS

L.1  52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.
"Common parent", as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

“Taxpayer Identification Number (TIN)”, as used in this provision, means the number required by the IRS to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision in order to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325 (d), reporting requirements of 26 USC 6041, 6041A, and 6050M and implementing regulations issued by the Internal Revenue Service (IRS). If the resulting contract is subject to the reporting requirements described in FAR 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) otherwise due under the contract.

(d) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror’s relationship with the Government (31 USC 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror’s TIN.

(e) Taxpayer Identification Number (TIN).

TIN: ____________________________

☐ TIN has been applied for.
☐ TIN is not required because:
   ☐ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the U.S. and does not have an office or place of business or a fiscal paying agent in the U.S.
   ☐ Offeror is an agency or instrumentality of a foreign government.
   ☐ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of Organization.
   ☐ Sole Proprietorship.
   ☐ Partnership.
   ☐ Corporate Entity (not tax exempt).
   ☐ Corporate Entity (tax exempt).
   ☐ Government Entity (Federal, State, or local).
☐ Foreign Government.
☐ International organization per 26 CFR 1.6049-4.
☐ Other ________________________________.

(f) Common Parent.
☐ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this clause.
☐ Name and TIN of common parent:
  Name _____________________________
  TIN ______________________________

(End of provision)

L.2 52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (JAN 2022)

(a) (1) The North American Industry Classification System (NAICS) code for this acquisition is __524113/524114__ [insert NAICS code].

(2) The small business size standard is __38,500,000 MILLION DOLLARS__ [insert size standard]

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce is 500 employees if the acquisition—
  (i) Is set aside for small business and has a value above the simplified acquisition threshold.
  (ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or
  (iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(b) (1) If the provision at 52.204-7, System for Award Management, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the provision at 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by checking one of the following boxes:
  (i) ☐ Paragraph (d) applies.
  (ii) ☐ Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c) (1) The following representations or certifications in SAM are applicable to this solicitation as indicated:
  (i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless—
(A) The acquisition is to be made under the simplified acquisition procedures in part 13;
(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or
(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.
(iii) 52.203-18, Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements-Representation. This provision applies to all solicitations.
(iv) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the provision at 52.204-7, System for Award Management.
(v) 52.204-5, Women-Owned Business (Other Than Small Business). This provision applies to solicitations that-
(A) Are not set aside for small business concerns;
(B) Exceed the simplified acquisition threshold; and
(C) Are for contracts that will be performed in the United States or its outlying areas.
(vi) 52.204-26, Covered Telecommunications Equipment or Services-Representation. This provision applies to all solicitations.
(vii) 52.209-2, Prohibition on Contracting with Inverted Domestic Corporations-Representation.
(viii) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.
(ix) 52.209-11, Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. This provision applies to all solicitations.
(x) 52.214-14, Place of Performance-Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.
(xi) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.
(xii) 52.219-1, Small Business Program Representations (Basic, Alternates I, and II). This provision applies to solicitations when the contract will be performed in the United States or its outlying areas.
(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.
(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.
(C) The provision with its Alternate II applies to solicitations that will result in a multiple-award contract with more than one NAICS code assigned.
(xiii) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract will be performed in the United States or its outlying areas.
(xiv) 52.222-22. Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xv) 52.222-25. Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xvi) 52.222-38. Compliance with Veterans’ Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial products or commercial services.

(xvii) 52.223-1. Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA–designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xviii) 52.223-4. Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA–designated items.

(xix) 52.223-22. Public Disclosure of Greenhouse Gas Emissions and Reduction Goals-Representation. This provision applies to solicitations that include the clause at 52.204-7.

(xx) 52.225-2. Buy American Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xxi) 52.225-4. Buy American-Free Trade Agreements-Israeli Trade Act Certificate. (Basic, Alternates I, II, and III.) This provision applies to solicitations containing the clause at 52.225-3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $92,319, the provision with its Alternate II applies.

(D) If the acquisition value is $92,319 or more but is less than $100,000, the provision with its Alternate III applies.

(xxii) 52.225-6. TradeAgreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xxiii) 52.225-20. Prohibition on Conducting Restricted Business Operations in Sudan-Certification. This provision applies to all solicitations.

(xxiv) 52.225-25. Prohibition on Contracting with Entities Engaging in Certain Activities or Transactions Relating to Iran-Representation and Certifications. This provision applies to all solicitations.

(xxv) 52.226-2. Historically Black College or University and Minority Institution Representation. This provision applies to solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions.

(2) The following representations or certifications are applicable as indicated by the Contracting Officer:

[Contracting Officer check as appropriate.]

   __ (i) 52.204-17. Ownership or Control of Offeror.
   __ (ii) 52.204-20. Predecessor of Offeror.
   __ (iii) 52.222-18. Certification Regarding Knowledge of Child Labor for Listed End Products.
(d) The offeror has completed the annual representations and certifications electronically in SAM website accessed through https://www.sam.gov. After reviewing the SAM information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to insert changes, identifying change by clause number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause # Title Date Change

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on SAM.

(End of provision)
covered telecommunications equipment or services" in paragraph (c)(2) of the provision at 52.204-26, or in paragraph (v)(2)(ii) of the provision at 52.212-3.

(a) **Definitions.** As used in this provision—

- Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) **Prohibition.**

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) **Procedures.** The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(d) **Representation.** The Offeror represents that—

(1) It □ will, □ will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that—
It does, does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) Disclosures.
(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—
   (A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);
   (B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and
   (C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services—
   (A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or
   (B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—
   (A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);
   (B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and
   (C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services—
   (A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or
(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(End of provision)

L.4. 52.204-26 COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES-REPRESENTATION (OCT 2020)

(a) Definitions. As used in this provision, “covered telecommunications equipment or services” and “reasonable inquiry” have the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (b) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for “covered telecommunications equipment or services”.

(c) Representations. (1) The Offeror represents that it [ ] does, [ ] does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(2) After conducting a reasonable inquiry for purposes of this representation, the Offeror represents that it [ ] does, [ ] does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of Provision)

L.5. 52.209-2 PROHIBITION ON CONTRACTING WITH INVERTED DOMESTIC CORPORATIONS’ REPRESENTATION (NOV 2015)

(a) Definitions. “Inverted domestic corporation” and “subsidiary” have the meaning given in the clause of this contract entitled Prohibition on Contracting with Inverted Domestic Corporations (52.209-10).

(b) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(c) Representation. The Offeror represents that.

(1) It □ is, □ is not an inverted domestic corporation; and

(2) It □ is, □ is not a subsidiary of an inverted domestic corporation.

(End of provision)

L.6 AUTHORIZED CONTRACTOR ADMINISTRATOR
If the offeror does not fill-in the blanks below, the official who signed the offer will be deemed to be the offeror's representative for Contract Administration, which includes all matters pertaining to payments.

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Number:</td>
</tr>
<tr>
<td>Address:</td>
</tr>
</tbody>
</table>

L.7. 52.225-20 PROHIBITION ON CONDUCTING RESTRICTED BUSINESS OPERATIONS IN SUDAN – CERTIFICATION (AUG 2009)

(a) Definitions. As used in this provision—

“Business operations” means engaging in commerce in any form, including by acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.

“Marginalized populations of Sudan” means—

(1) Adversely affected groups in regions authorized to receive assistance under section 8(c) of the Darfur Peace and Accountability Act (Pub. L. 109-344) (50 U.S.C. 1701 note); and
(2) Marginalized areas in Northern Sudan described in section 4(9) of such Act.

“Restricted business operations” means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person conducting the business can demonstrate—

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;
(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;
(3) Consist of providing goods or services to marginalized populations of Sudan;
(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;
(5) Consist of providing goods or services that are used only to promote health or education; or
(6) Have been voluntarily suspended.

(c) Certification. By submission of its offer, the offeror certifies that it does not conduct any restricted business operations in Sudan.
<table>
<thead>
<tr>
<th>Div/Spec. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>015000</td>
<td>TEMPORARY FACILITIES &amp; CONTROLS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Mobilization</td>
<td>Ls</td>
<td>1</td>
</tr>
<tr>
<td>013525</td>
<td>CONSTRUCTION SAFETY &amp; OCCUPATIONAL HEALTH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Compliance with EM385-1-1</td>
<td>Ls</td>
<td>1</td>
</tr>
</tbody>
</table>

**DIVISION 2 EXISTING CONDITIONS**

**SALVAGE ITEMS**

*Dismantle, remove and Salvage of the existing elements to the contractor as follows:*

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Water closet (salvaged to the contractor)</td>
<td>ea</td>
<td>4</td>
</tr>
<tr>
<td>2 Sink (salvaged to the contractor)</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>3 Indoor Lighting fixtures (salvaged to the contractor)</td>
<td>ea</td>
<td>6</td>
</tr>
<tr>
<td>4 Water Heaters (salvaged to the contractor)</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>5 Aluminum windows and door</td>
<td>ls</td>
<td>1</td>
</tr>
</tbody>
</table>

**024119 SELECTIVE DEMOLITION**

*Demolishing; removing and dismantling of the existing elements required for the new design as follows:*

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ceramic Walls &amp; Floors</td>
<td>m2</td>
<td>230</td>
</tr>
<tr>
<td>2 Masonary Wall</td>
<td>m2</td>
<td>2.5</td>
</tr>
<tr>
<td>3 Granite Counter tops for vanity</td>
<td>ls</td>
<td>1</td>
</tr>
<tr>
<td>4 Mirrors</td>
<td>ls</td>
<td>1</td>
</tr>
<tr>
<td>6 Doors</td>
<td>ea</td>
<td>7</td>
</tr>
<tr>
<td>8 Interior Walls</td>
<td>m2</td>
<td>32</td>
</tr>
<tr>
<td>9 Bathroom accessories and door handles.</td>
<td>ls</td>
<td>1</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Unit Cost EGP</td>
<td>TOTAL COST</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>Labor</td>
<td>Material</td>
</tr>
<tr>
<td>Description</td>
<td>Unit</td>
<td>Qty</td>
</tr>
<tr>
<td>10</td>
<td>Electrical conduits, boxes, and wiring</td>
<td>ls</td>
</tr>
<tr>
<td>12</td>
<td>Plumbing piping and fitting</td>
<td>ls</td>
</tr>
<tr>
<td>13</td>
<td>Exhaust fans (to be handled to the COR)</td>
<td>ea.</td>
</tr>
<tr>
<td>14</td>
<td>External Plaster &amp; Paint</td>
<td>m2</td>
</tr>
<tr>
<td>16</td>
<td>Manhole</td>
<td>ea.</td>
</tr>
<tr>
<td>17</td>
<td>Gully traps</td>
<td>ea.</td>
</tr>
<tr>
<td>18</td>
<td>Split units AC (to be handled to the COR)</td>
<td>ea.</td>
</tr>
</tbody>
</table>

**DIVISION 3 CONCRETE**

**033000 Cast In Place Concrete**

*Plain Concrete; cast on site, or ready mix, ordinary Portland cement; including formwork*

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>New sewage concrete manhole 60 x 60 x 60 cm as per specifications &amp; details</td>
<td>ea.</td>
</tr>
<tr>
<td>3</td>
<td>Reinforced Concrete footing for the water tank 80x80x15cm as per attached detail</td>
<td>ea.</td>
</tr>
</tbody>
</table>

**DIVISION 4 CONCRETE UNIT MASONRY**

**042200 UNIT MASONRY**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CMU walls</td>
</tr>
</tbody>
</table>

**DIVISION 7 THERMAL AND MOISTURE PROTECTION**

**Waterproofing**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bathrooms floors and walls for a height of 200mm, 2 coats of cold applied bitumen</td>
</tr>
</tbody>
</table>

**DIVISION 5 METALS**

**055000 Metal Fabrication**

*Security grilles, fixed, including installation priming and painting*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Cast Iron Manhole cover 60 x 60 cm labelled for sewage (Source: Tawakol or approved equal)</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>092400</td>
<td>Cement Plastering</td>
</tr>
<tr>
<td></td>
<td>Portland cement plaster; plain finish; including metal angle beads, stop beads; metal lathing; accessories for fittings; to</td>
</tr>
<tr>
<td>1</td>
<td>Interior walls</td>
</tr>
<tr>
<td>2</td>
<td>Exterior walls</td>
</tr>
<tr>
<td>092900</td>
<td>Gypsum board</td>
</tr>
<tr>
<td></td>
<td>Gypsum board suspended ceilings; including suspension system; to</td>
</tr>
<tr>
<td>1</td>
<td>Suspended ceilings (green for wet area)</td>
</tr>
<tr>
<td>093013</td>
<td>Ceramic and Porcelain Tiling</td>
</tr>
<tr>
<td></td>
<td>Ceramic/ Porcelain tiles and fittings; locally fabricated by El Gawhara, Cleopatra, or equal approved, including fixing; sand leveling and mortar bedding as approved samples; to (average price 200 LE/m²)</td>
</tr>
<tr>
<td>1</td>
<td>Porcelain Floor Tiles, min. size is 600 x 600 mm</td>
</tr>
<tr>
<td>2</td>
<td>Ceramic Wall Tiles, min. size is 600 x 600 mm</td>
</tr>
<tr>
<td>3</td>
<td>Porcelain skirting 10cm height</td>
</tr>
<tr>
<td>096340</td>
<td>Stone Flooring</td>
</tr>
<tr>
<td></td>
<td>Marble and Granite shall be as specified and as per the approved sample including fixation using cement mortar or thin set adhesive</td>
</tr>
<tr>
<td>1</td>
<td>Marble 4cm thick &quot;&quot;imported Italian butticino&quot; Vanity Countertop as per attached detail</td>
</tr>
<tr>
<td>2</td>
<td>Marble 2cm thick &quot;&quot;imported Italian butticino&quot; Back splash and front of counter top</td>
</tr>
<tr>
<td>3</td>
<td>Marble-built-in walk-in shower, with border threshold, &quot;&quot;imported Italian butticino&quot;</td>
</tr>
<tr>
<td>085113</td>
<td>Aluminum doors and windows</td>
</tr>
<tr>
<td></td>
<td>Doors and windows shall be heavy duty &quot;Techncal - Jumbo&quot; profile or approved equal with architectural architrave, engraved &quot;Tempered Glass&quot; stamp for tempered, accessories and hardware as per the approved sample.</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Labor</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Material</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td></td>
<td><strong>EGP</strong></td>
</tr>
<tr>
<td>1</td>
<td>Single 6mm, Turn/tilt window, 60x60cm, 1 panel, including insect screen</td>
</tr>
<tr>
<td>2</td>
<td>Single 6mm, Fixed window, 60x60cm, 1 panel, including opening for fan</td>
</tr>
<tr>
<td>3</td>
<td>Double 6mm, sliding window, 150x120cm, 2 panels, including insect screen</td>
</tr>
<tr>
<td>4</td>
<td>Aluminum water tank cover, with 5 sides, 80x80x150cm, fixed to the concrete footing, painted,</td>
</tr>
<tr>
<td></td>
<td><strong>Bathroom Accessories</strong></td>
</tr>
<tr>
<td>1</td>
<td>Framless Mirror with LED light</td>
</tr>
<tr>
<td>2</td>
<td>Framless Mirror 180x80cm</td>
</tr>
<tr>
<td>3</td>
<td>Stainless Steel Boarders 5cm wide for walls</td>
</tr>
<tr>
<td>4</td>
<td>Floor Door Stopper silver</td>
</tr>
<tr>
<td>5</td>
<td>Frosted glass Toilet partition, 12mm thick, White, 2.2m hight, hinged including 4 doors, 80cm width tempered door for toilets 4 doors, 70cm width tempered door for showers &amp; changing room all accessories, hinges, silver handle, door lock</td>
</tr>
<tr>
<td>6</td>
<td>Coat Hook chrome finish</td>
</tr>
<tr>
<td>7</td>
<td>Soap dispenser silver stainless steel built in counter top</td>
</tr>
<tr>
<td>8</td>
<td>Toilet paper holder</td>
</tr>
<tr>
<td>9</td>
<td>Grab Bars, Stainless steel, Silver as shown in attached drawing A01</td>
</tr>
<tr>
<td></td>
<td><strong>DIVISION 22 Plumbing</strong></td>
</tr>
<tr>
<td>220523.14</td>
<td><strong>Check Valves for plumbing piping</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, install, connect, and test check valves for water heaters, washing machine, dish washer, ... etc complete, including pipes and fittings according DIN 8062.</td>
</tr>
<tr>
<td>1</td>
<td>3/4&quot; check valve</td>
</tr>
<tr>
<td>220523.15</td>
<td><strong>Gate Valves for plumbing piping</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, install, connect, and test poly propylene (PN 20) piping for water circulating systems located inside and outside complete, including pipes and fittings according DIN 8062 and as shown on drawings.</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Total Cost</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3/4” Angle valves, Grohe or equal approved</td>
</tr>
<tr>
<td>2</td>
<td>1/2” Angle valves, Grohe or equal approved</td>
</tr>
<tr>
<td>220719</td>
<td><strong>Plumbing piping insulation</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, install, pipe insulation complete with adhesives, tapes, etc as per specifications</td>
</tr>
<tr>
<td>1</td>
<td>Flexible Elastomeric Insulation 1”</td>
</tr>
<tr>
<td>2</td>
<td>Flexible Elastomeric Insulation 2”</td>
</tr>
<tr>
<td>3</td>
<td>Aluminum foil tape</td>
</tr>
<tr>
<td>4</td>
<td>Aluminum cladding 0.6mm thick for all outdoor piping</td>
</tr>
<tr>
<td>221119</td>
<td><strong>Domestic Water Piping</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, install, connect and test piping for water supply systems located inside and outside complete, including pipes, flexible connections and fittings as shown on drawings. Testing shall be certified by the manufacturing company.</td>
</tr>
<tr>
<td>1</td>
<td>1/2” polypropylene pipes, accessories and fittings according DIN 8062 for water pipes. For locations other than the chancery</td>
</tr>
<tr>
<td>22119</td>
<td><strong>Domestic water piping specialties</strong></td>
</tr>
<tr>
<td>1</td>
<td>Chrome P traps</td>
</tr>
<tr>
<td>2</td>
<td>Strainer</td>
</tr>
<tr>
<td>3</td>
<td>Drain valve</td>
</tr>
<tr>
<td>4</td>
<td>Pressure relief valve</td>
</tr>
<tr>
<td>221316</td>
<td><strong>Sanitary Waste and Vent Piping</strong></td>
</tr>
<tr>
<td></td>
<td>Supply, install, connect and test all newly installed soil, waste and vent vertical &amp; horizontal aboveground and underground piping system from all plumbing fixtures to outside the building complete including pipes, fittings, couplings, supports, hangers roof vent capped and all other accessories as specified and as shown on drawings.</td>
</tr>
<tr>
<td>1</td>
<td>4” PVC schedule 40 pipes, fittings and accessories for drainage and vent pipes. To be pressure tested at 10bar</td>
</tr>
<tr>
<td>2</td>
<td>2” PVC schedule 40 pipes, fittings and accessories for drainage and vent pipes. To be pressure tested at 10bar</td>
</tr>
<tr>
<td>3</td>
<td>1” PVC schedule 40 pipes, fittings and accessories for condensate drainage pipes. To be pressure tested at 10bar</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>4</td>
<td>Warning tape for sewer lines</td>
</tr>
</tbody>
</table>

**221319 Sanitary Waste Piping specialities**

<table>
<thead>
<tr>
<th>Div/Spec. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Floor clean out</td>
<td>ea.</td>
<td>1</td>
</tr>
</tbody>
</table>

**221319.13 Sanitary Drains**

<table>
<thead>
<tr>
<th>Div/Spec. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Floor drains complete with stainless steel strainers and covers</td>
<td>ea.</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Gully trap</td>
<td>ea.</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Stainless steel Surface drain 30 x 30 cm</td>
<td>ea.</td>
<td>3</td>
</tr>
</tbody>
</table>

**22300 Electric Domestic Water Heaters**

<table>
<thead>
<tr>
<th>Div/Spec. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install government furnished electrical heater of capacity 80 Gallons as per manufacturer recommendation</td>
<td>ea</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Supply and install insulated copper flexible connections for water heater</td>
<td>ea</td>
<td>2</td>
</tr>
</tbody>
</table>

**224100 Residential Plumbing Fixtures**

*Install, connect and test, plumbing fixtures, trim and accessories complete including mixers, faucets, water supplies, stop angle valves, bed pan washers, ..etc. All as per specifications and as shown on drawings.*

<table>
<thead>
<tr>
<th>Div/Spec. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply &amp; Install Drop-in sink and accessories (Model: P3 comfort Duravit or equal approved)</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Supply &amp; Install Lavatory Faucet (Grohe Bathroom sink faucet GROHE EUROSMART or equal approved)</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Supply &amp; Install only walk-in shower mixer &amp; Shower Head (TEMPESTA COSMOPOLITAN 100 SHOWER RAIL SET 4 SPRAYS or equal approved)</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Supply &amp; Install shower faucet (grohe or equal approved)</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Supply and Install water closet, complete with flush mechanism and wash hoses (Tonic 2, ideal Standard or equal approved)</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Supply and Install water closet, complete with flush mechanism and wash hoses (Tonic 2, ideal Standard or equal approved) ADA compliant</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
<td>Unit</td>
<td>Qty</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>238126</td>
<td>Supply and install High wall split AC units, 24,000 BTU/hr (indoor &amp; Outdoor unit), Carrier optimax inverter heat pump or approved equal.</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Aluminum cladding 0.6mm thick for all outdoor piping</td>
<td>lm</td>
<td>2</td>
</tr>
</tbody>
</table>

**DIVISION 26 Electrical**

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recessed LED+driver spot lights 6W, 3000K, PF&gt;0.95.</td>
<td>ea</td>
<td>11</td>
</tr>
<tr>
<td>Recessed LED+driver spot lights 16W, 4000K, PF&gt;0.95.</td>
<td>ea</td>
<td>10</td>
</tr>
<tr>
<td>Surface LED light fixture 60x60 cm 32W, 5000K, PF&gt;0.95.</td>
<td>ea</td>
<td>1</td>
</tr>
<tr>
<td>Flood light 200W LED, 4000K, PF&gt;0.95.</td>
<td>ea</td>
<td>4</td>
</tr>
<tr>
<td>Outside Wall light 12W LED, 4000K, PF&gt;0.95.</td>
<td>ea</td>
<td>6</td>
</tr>
<tr>
<td>Electrical outlets for Strip lights 10W / meter, 3000K.</td>
<td>lm</td>
<td>20</td>
</tr>
<tr>
<td>Single Power receptacles</td>
<td>ea</td>
<td>7</td>
</tr>
<tr>
<td>Single Power receptacles (W.P.)</td>
<td>ea</td>
<td>4</td>
</tr>
<tr>
<td>Duplex Power receptacles</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>Light switch 10/16A, 220V.</td>
<td>ea</td>
<td>7</td>
</tr>
<tr>
<td>Disconnect switch 32A, 250V, IP65, 2-P for AC units</td>
<td>ea</td>
<td>3</td>
</tr>
<tr>
<td>Disconnect switch 60A, 220V, IP65, 2-P for Water Heater</td>
<td>ea</td>
<td>1</td>
</tr>
<tr>
<td>Hand dryer (Government Furnish, Contractor Installed Items)</td>
<td>ea</td>
<td>2</td>
</tr>
<tr>
<td>Electrical raceways, 3/4&quot; conduits, 10x10cm boxes, flexible liquidtight, fittings and accessories</td>
<td>lm</td>
<td>300</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
<td>Unit</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>14</td>
<td>16mm² (6 AWG) Copper wirings, terminations to match existing color codes and circuit ampacity.</td>
<td>lm</td>
</tr>
<tr>
<td>15</td>
<td>6mm² (10 AWG) Copper wirings, terminations to match existing color codes and circuit ampacity.</td>
<td>lm</td>
</tr>
<tr>
<td>16</td>
<td>4mm² (12 AWG) Copper wirings, terminations to match existing color codes and circuit ampacity.</td>
<td>lm</td>
</tr>
<tr>
<td>17</td>
<td>Supply and install a new power panel PP 100A, 380V, 3ph, 50 Hz (NEMA 1). The item include the supply and installation of the panel to include circuit breakers, ground fault circuit interruptor, Digital Power Meter, conduits, boxes, cables, wiring, termination complete with accessories, penetrations, sleeves and all related items needed for complete operational item.</td>
<td>LS</td>
</tr>
</tbody>
</table>

**Division 32 SITE IMPROVEMENT**

<table>
<thead>
<tr>
<th>321400</th>
<th>Unit paving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terrazzo tiles, heavy duty, for outdoor use 15mm thick (using Nile Co. or equal approved)</td>
</tr>
</tbody>
</table>

**TOTAL CLIN 1 (7901)**

**CLIN 2 (7949)**

**STRUCTURAL ASSESSMENT**

| 1 | A stamped Structural calculation by a structural / civil consultant for structural assessment of the roof and enlargement of door opening to install FE doors. | LS | 1 |

**DIVISION 3 CONCRETE**

<table>
<thead>
<tr>
<th>033000</th>
<th>Cast In Place Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plain Concrete; cast on site, or ready mix, ordinary Portland cement; including formwork</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>New concrete frame around the 2 FE doors as specified by approved FE door Manufactural &quot;Gateway&quot; Method of instalation attached.</td>
</tr>
<tr>
<td></td>
<td>4 Door Lentil (D1 &amp; D2)</td>
</tr>
<tr>
<td>DIVISION 5 METALS</td>
<td>Metal Fabrication</td>
</tr>
<tr>
<td>055000</td>
<td>Window Grills 60x60cm for windows. Maximum distance between bars 10cm</td>
</tr>
<tr>
<td>DIVISION 8 OPENINGS</td>
<td>FORCED ENTRY (FE) / BALLISTIC RESISTANT (BR) DOOR AND WINDOW ASSEMBLIES</td>
</tr>
<tr>
<td>083180</td>
<td>Exterior painting, resistant to UV without color fading, Sibes or approved equal for preparation and Jotashield of Juton, or equal approved for paint</td>
</tr>
<tr>
<td>099100</td>
<td>External Walls (New Wall) of the building Painting walls, plastered masonry, three coats of smooth texture exterior paint, following surface preparation (wash and clean old paint and apply putty)</td>
</tr>
<tr>
<td></td>
<td>Interior painting, acrylic emulsion paint washable; to concrete, masonry, render and plaster, Fenomastic of Jotun, or equal approved for paint</td>
</tr>
<tr>
<td></td>
<td>Painting Walls, two coats of latex paint, following surface preparation (Clean old paint, apply putty, sand and smooth)</td>
</tr>
<tr>
<td></td>
<td>Painting Ceiling, drywall, two coats of latex paint, following surface preparation (Clean old paint, apply putty, sand and smooth)</td>
</tr>
<tr>
<td>Div/Spec. No.</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
<td>wooden door 85cm x 210 cm with hinges, handles, lockes with massive oak trims, all accessories to be German made. Including door frame (D1, D2 &amp; D3)</td>
</tr>
<tr>
<td>233413</td>
<td>Exhaust Fan</td>
</tr>
<tr>
<td>1</td>
<td>Supply and install window type exhaust fan of air flow rate 400 CFM and static pressure 0.1 in.wg. complete with exhaust grill, back draft damper. (Source: S&amp;P or approved equal)</td>
</tr>
</tbody>
</table>

**Division 23 Heating, Ventilation and Air Conditioning**

**TOTAL CLIN 2 (7949)**

1. Defense Base Act (DBA) insurance premium cost

<table>
<thead>
<tr>
<th>Unit</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>ls</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL CONTRACT VALUE**

<table>
<thead>
<tr>
<th>TOTAL CLIN 1 (7901)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL CLIN 2 (7949)</td>
<td>-</td>
</tr>
</tbody>
</table>

**DBA**

**Total Cost, EGP**

**Total Cost, USD** (rate USD=19.1 EGP)

**Notes:**
1. The above prices includes all required labor, material, overhead, and profit for the completion of all works specified under this contract.
2. The total price shall be the total lump-sum price.
3. The contractor shall quote for the salvaged items to be deducted from the total price.
SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Access to site.
5. Work restrictions

1.2 PROJECT INFORMATION

A. Project Location: US government owned properties, Maadi House Club at 21 road 19, Maadi, Cairo, Egypt.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The work under this contract is to create safe sanctuary at the Maadi house club by installing FE doors at the current Pool bathrooms. Work shall include:
   a. Install two FE doors at the Male & female bathrooms by the pool (Government Furnish contractor installed).
   b. The subcontractor, including the crew chief, shall have a previous experience in the installation of special FE/BR doors and windows and security hardware as used in US Embassies and high-security office and manufacturing buildings.
   c. Contractor to submit structural assessment of the bathrooms by the pool.
   d. Enlarge the doors opening to install the two FE doors.
   e. Demolish the interior ceramic tiles, ceiling, toilet partitions, lighting, receptacles, AC units, exhaust fans, and plumbing fixtures as indicated in attached drawings.
   f. Demolish existing manholes, gully traps and surface drains.
   g. Install ceramic tiles for walls and floors.
   h. Plaster all the building exterior and patch and paint all inside and outside of the building.
   i. Supply & Install drop ceiling & lighting.
   j. Supply & Install drop sinks & marble vanity unit.
   k. Supply & Install toilet partitions as per the new plan in DWG. A01.
   l. Supply & Install all plumbing fixtures and accessories as indicated in the bill of quantities.
   m. Replace paver tiles shown in DWG. #A03.
   n. Replace all water supply and drainage network for both bathrooms.
   o. Construct new sewer manholes, connect new manholes to existing city sewer line.
   p. Provide gully traps and surface drains.
   q. Provide new air conditioning units and new water heater.
   r. Provide new ventilation fans for bathrooms.
s. Replace all lighting fixtures, wiring devices and the power panel of the building.

t. Install two new hand dryer (Government Furnish contractor installed).

u. Provide new circuits for lighting, receptacles, air condition units and water heater.

1.4 PHASED CONSTRUCTION

A. The Work shall be conducted in one phase.

B. The contractor shall receive a letter of authorization to represent the Embassy throughout the process of the local city permit and shall start in the permit process immediately after receiving the NTP and the letter of authorization.

C. Before commencing work, submit an updated copy of Contractor's construction schedule showing the sequence, commencement, and completion dates.

1.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a good condition throughout construction period. Repair damage caused by construction operations.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to the working hours of 8:00 a.m. to 6:00 p.m., Sunday through Thursday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities unless permitted by the COR. Notify the COR not less than two work days in advance of proposed utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and or other disruption to occupants with the COR.

1.7 GOVERNMENT FURNISHED ITEMS

A. Some materials/equipment shall be Government Furnished, Contractor Installed (GFCI), contractor’s price shall be the cost of installation only. Government Furnished items shall be delivered to the contractor at project site. The contractor shall inspect and receive the items and shall be responsible for their storage and installation.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000
SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.
E. Daily Construction Reports: Submit at **weekly** intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

### 1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the submittal schedule, progress reports, payment requests, and other required schedules and reports.

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for **commencement of the Work** to date of **Final Completion**.
   
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   
   1. Activity Duration: Define activities so no activity is longer than **10** days, unless specifically allowed by the COR.
   
   
   3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for inspection and acceptance by the COR.
   
   4. Punch List and Final Completion: Include not more than **5** days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.
F. Recovery Schedule: When periodic update indicates the Work is 5 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of Microsoft Project.

H. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

2.2 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. Approximate count of personnel at Project site.
   2. Material deliveries.
   3. General weather conditions.
   4. Accidents.
   5. Meetings and significant decisions.
   6. Unusual events.
   7. Stoppages, delays, shortages, and losses.
   8. Emergency procedures.
   9. Change Orders received and implemented.
   10. Construction Work Change Directives received and implemented.
   11. Services connected and disconnected.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 2 days before each regularly scheduled progress meeting.

   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the Work progresses, indicate final completion percentage for each activity.

END OF SECTION 013200
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require COR's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require COR’s responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by COR and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Electronic copies of digital data files of the Contract Drawings may be provided for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on COR’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. COR will advise Contractor when a submittal being processed must be delayed for coordination.

2. Resubmittal Review: Allow 10 days for review of each resubmittal.
D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.

F. Options: Identify options requiring selection by COR.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from COR’s action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:
   1. Submit electronic submittals via email as PDF electronic files.
      a. COR will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   2. Action Submittals: Submit two paper copies of each submittal unless otherwise indicated. COR will return one copy.
   3. Informational Submittals: Submit one paper copy of each submittal unless otherwise indicated. COR will not return copies.
   4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
      a. Provide a notarized statement on original paper copy for the local permit.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
   4. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   
a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Submit Shop Drawings in the following format:
   a. Two opaque (bond) copies of each submittal. COR will return one copy.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      
a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

   3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

E. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

F. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

H. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

I. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to COR.

B. Project Closeout: See requirements in Section 017700 "Closeout Procedures."

3.2 COR’s ACTION

A. General: COR will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: COR will review each submittal, make marks to indicate corrections or revisions required, and return it. COR will stamp each submittal with an action stamp.

C. Informational Submittals: COR will review each submittal and will not return it, or will return it if it does not comply with requirements.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

F. The contractors shall submit, as part of their bid:

1. Qualification Data: For the contractor to demonstrate their capabilities and experience in similar projects in type and scale. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

2. Qualification data for the project manager and site engineer.

3. Special work procedures

4. Quality Control and Assurance program and plan

5. Safety Program and plan.

6. Technical data, manufacturer’s catalog.

7. List of all suppliers and sub-contractors

G. The contractor shall submit after contract award submittals as included in specification sections

END OF SECTION 013300
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes administrative and procedural requirements for quality assurance and quality control.
   B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
      1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
      2. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS
   A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
   B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by The COR.
   C. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
   D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.3 REPORTS AND DOCUMENTS
   A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
      1. Date of issue.
      2. Project title and number.
      3. Name, address, and telephone number of testing agency.
      4. Dates and locations of samples and tests or inspections.
      5. Names of individuals making tests and inspections.
      6. Description of the Work and test and inspection method.
      8. Complete test or inspection data.
      9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Name and signature of laboratory inspector.
12. Recommendations on retesting and re-inspecting.

B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.4 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Testing Agency Qualifications: an independent agency with the experience and capability to conduct testing and inspecting indicated.

F. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.5 QUALITY CONTROL

A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
B. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

C. Testing Agency Responsibilities: Cooperate with COR in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Facilities for storage and field curing of test samples.

D. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. Water and Sewer Service from Existing System: Water from existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

B. Electric Power Service from Existing System: Electric power from existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Enclosure Fence, corrugated sheets or portable chain link fence around construction area.

2.2 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations if required.
PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Water Service: Connect to existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Electric Power Service: Connect to existing electric power service. Maintain equipment in a condition acceptable to Occupant.

D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

E. Telephone Service: Provide superintendent with cellular telephone.

3.2 SUPPORT FACILITIES INSTALLATION

A. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project. Provide temporary, directional signs for construction personnel and visitors.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Tree and Plant Protection: Comply with requirements of the COR on the protection of trees and plants.

D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
   1. Prohibit smoking in construction areas.
   2. Supervise welding operations.
   3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Post warnings and information.
3.4 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Termination and Removal: Remove each temporary facility when need for its service has ended.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill acceptable to authorities having jurisdiction on daily bases.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site. Remove construction debris on a daily basis and not on outside sidewalk of across the road.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

END OF SECTION 015000
SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

2. Installation of the Work.
3. Cutting and patching.
4. Progress cleaning.
5. Starting and adjusting.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Do not cut and patch construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: Before beginning site-work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
   4. The submission of the bid will be a conclusive evidence that the bidder has complied with all conditions related to the character, quality and quantity of work requirements to be performed. No claims for additional time or compensation due to variations between existing and conditions encountered during construction will be honored. Failure of the contractor to thoroughly inspect and identify defects, if any, shall not release him from the responsibility to guarantee the whole works (Existing to remain, and new works) for the period specified in the contract terms.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 SPECIAL WORK PROCEDURES

A. Working Hours: All work shall be performed during hours from 8:00 a.m. to 6:00 p.m., Sunday through Thursday except for the holidays identified in the holiday schedule attached, which are considered non-working days. Working after hours and weekends may be required and approved by the COR with at least 24 hours advance notice, especially in demolition work, for shut down of utilities, or when the work obstruct the regular function of the building.

B. Scaffolding, shores, material hoist and trash disposal shall be the responsibility of the contractor.

C. Security Procedures: All contractors’ personnel shall be subject to all the security procedures required for clearance of personnel working inside U.S. Embassy Compounds. These requirements shall include:
   1. Submission of valid finger prints, addressed to the U.S. Embassy and copy of the Egyptian ID, two week prior to the required date to access the site.
   2. Access for trucks shall be granted on a 48 hours (two working days) advance notice showing: 1) Drivers name, 2) Copy of driver’s ID, 3) Truck description and plate number, and 4) date and time access required.
3. Access for daily laborers can be given for three days, with a 48 hours advance notice showing the name of the persons, ID #, date and place of issue, and a copy of the ID. Access will be given for one time only (three days) for day laborers.

4. All contractor personnel shall be subject to a daily check (in and out) by the US government guard personnel.

5. Failure of the contractor to fulfill any security requirement in a timely manner shall not be constructed as a base for any time and money extension.

6. Delay or suspension of work due to the U.S. government security regulations or requirements shall not be a base for claims.

3.3 PREPARATION

A. Existing Utility Information: Furnish information to the COR that is necessary to adjust, move, or relocate existing utility lines, services, or other utility appurtenances located in or affected by construction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.4 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey. If discrepancies are discovered, notify the COR promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations from two or more locations.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

2. Do not hold waste materials more than two days.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces using only cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

3.8 SECURITY AND SITE ACCESS PROCEDURES

D. All contractors’ personnel shall be subject to all the security procedures required for clearance of personnel working inside U.S. Embassy Compounds. These requirements shall include:

1. Submission of valid finger prints, addressed to the U.S. Embassy and copy of the Egyptian ID, two week prior to the required date to access the site.

7. Access for trucks shall be granted on a 48 hours (two working days) advance notice showing: 1) Drivers name, 2) Copy of driver’s ID, 3) Truck description and plate number, and 4) date and time access required.

8. Access for daily laborers can be given for three days, with a 48 hours advance notice showing the name of the persons, ID #, date and place of issue, and a copy of the ID. Access will be given for one time only (three days) for day laborers.
9. All contractor personnel shall be subject to a daily check (in and out) by the US government guard personnel.

10. Failure of the contractor to fulfill any security requirement in a timely manner shall not be constructed as a base for any time and money extension.

11. Delay or suspension of work due to the U.S. government security regulations or requirements shall not be a base for claims.

3.9 SAFETY

A. The contractor must comply to the following:
   1. DOSAR Accident Prevention Clause 652-236-70, included below in full text.
   2. SAFETY AND HEALTH REQUIREMENTS of the US Army Corps of Engineers - EM 385-1-1. 
   3. Safety requirements that is specific to the job and will be addressed and documented during the pre-construction meeting.
3.10 ACCIDENT PREVENTION CLAUSE (APR 2004) (IN FULL TEST)

(a) General. The contractor shall provide and maintain work environments and procedures which will safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to contractor operations and activities; avoid interruptions of Government operations and delays in project completion dates; and, control costs in the performance of this contract. For these purposes, the contractor shall:

1. Provide appropriate safety barricades, signs and signal lights;
2. Comply with the standards issued by any local government authority having jurisdiction over occupational health and safety issues; and,
3. Ensure that any additional measures the contracting officer determines to be reasonably necessary for this purpose are taken.
4. For overseas construction projects, the contracting officer shall specify in writing additional requirements regarding safety if the work involves:
   i. Scaffolding;
   ii. Work at heights above two (2) meters;
   iii. Trenching or other excavation greater than one (1) meter in depth;
   iv. Earth moving equipment;
   v. Temporary wiring, use of portable electric tools, or other recognized electrical hazards. Temporary wiring and portable electric tools require the use of a ground fault circuit interrupter (GFCI) in the affected circuits; other electrical hazards may also require the use of a GFCI;
   vi. Work in confined spaces (limited exits, potential for oxygen less that 19.5 percent or combustible atmosphere, potential for solid or liquid engulfment, or other hazards considered to be immediately dangerous to life or health such as water tanks, transformer vaults, sewers, cisterns, etc.);
   vii. Hazardous materials - a material with a physical or health hazard including but not limited to, flammable, explosive, corrosive, toxic, reactive or unstable, or any operations which creates any kind of contamination inside an occupied building such as dust from demolition activities, paints, solvents, etc.; or
   viii. Hazardous noise levels.

(b) Records. The contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to or theft of property, materials, supplies, or equipment. The contractor shall report this data in the manner prescribed by the contracting officer.

(c) Subcontracts. The contractor shall be responsible for its subcontractor’s compliance with this clause.

(d) Written program. Before commencing work, the contractor shall:
   1. Submit a written plan to the contracting officer for implementing this clause. The plan shall include specific management or technical procedures for effectively controlling hazards associated with the project; and,
   2. Meet with the contracting officer to discuss and develop a mutual understanding relative to administration of the overall safety program.

(e) Notification. The contracting officer shall notify the contractor of any non-compliance with these requirements and the corrective actions required. This notice, when delivered to the contractor or the contractor’s representative
on site, shall be deemed sufficient notice of the non-compliance and corrective action required. After receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to promptly take corrective action, the contracting officer may issue an order suspending all or part of the work until satisfactory corrective action has been taken. The contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any suspension of work order issued under this clause.

(End of clause)

3.11 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

3.12 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300
SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1.2 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 5 days prior to date the work will be completed and ready for final inspection.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.3 FINAL COMPLETION PROCEDURES

A. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, COR will either proceed with inspection or notify Contractor of unfulfilled requirements.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

END OF SECTION 017700
SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.

1.2 MATERIALS OWNERSHIP
A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 FIELD CONDITIONS
A. Notify COR of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
B. Storage or sale of removed items or materials on-site is not permitted.
C. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS
A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.5 CLEANING

A. Remove demolition waste materials from Project site [and dispose of them in an approved construction and demolition waste landfill acceptable to authorities having jurisdiction.]

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119
SECTION 042200 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hollow Concrete Blocks.

B. Mortar and Grout.

1.2 RELATED SECTIONS

A. Section 092400 – Cement Plastering

1.3 SUBMITTALS

A. Submit Manufacturer’s product data for each type including design mix and admixture limitations.

B. Samples: Submit two samples of each type and size of block units, obtain approval before placing orders with suppliers.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ES 1292.

B. Testing: independent testing laboratory in accordance with ES 1292 & ES 1349.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Maintain packaged materials clean, dry, and protected against dampness, and foreign matter.

C. Storing: stack blocks so that they are stable and clear of the ground. Protect from inclement weather and keep dry.

D. Cement: deliver in sealed bags bearing the manufacturer’s name and store in piles not more than ten bags high in perfectly dry weatherproof sheds clear from ground on planks or other damp-proofing supports.

E. Sand: aggregates shall be stored in separate stockpiles and to be free from all foreign materials which may become mixed with them.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering
accessories that may be incorporated into the Work include, but are not limited to, the following:

1. **Tooblat**
   Cairo Alexandria Desert Road, Kilo 26
   Tel: 5390719 – 20 – 21 – 22 – 23 – 24
   Fax: 5390725

2. **Arab Brick**
   3 Ahmed Oraby Street, Mohandessin
   Tel: 5010926 – 25

3. **Misr Brick**
   15 May City, Helwan
   Tel: 5500812 – 5501385
   Fax: 5506528

### 2.2 BLOCKS

**A.** Mortar and grout: Mortar aggregate, natural color ES 1108.

**B.** Concrete Blocks, unless otherwise specified, are to be to ES 1292, manufactured from ordinary Portland cement to ES 373 and natural aggregates to ES 1109.

1. **Hollow Concrete Blocks** shall be:
   - **Density:** 1500 kg/m$^3$
   - **Total volume of holes** shall not exceed 50% of the unit volume
   - **Shell and membrane thickness** of the solid portion shall not be less than 20mm

**C.** Testing Hollow Concrete Blocks: ten blocks from each batch are to be selected by the COR for testing for compressive strength. Results are to be as follows:
   - Individual block: not less than 25 kg/cm$^2$ of gross area
   - Average of 10 blocks: not less than 30 kg/cm$^2$ of gross area.

### 2.3 MORTAR AND GROUT MATERIALS

**A.** Ingredients for mortar shall be measured in proper clean gauge boxes.

**B.** Cement: Ordinary Portland cement to ES 373. Do not use cementitious materials that have become damp.

**C.** Aggregates: Comply to ES 1108. Except for the joints less than 6mm, use aggregates graded with 100% passing sieve no. 16.

**D.** Water: Clean and potable.

### 2.4 ACCESSORIES

**A.** Joint reinforcing: Welded wire with deformed side rods
1. Steel Wire: 9 gauge (4.8 mm) galvanized steel.

2. Type: Ladder or truss type.

B. Ties and Anchors:
   1. Bent Wire Ties: Galvanized Steel
   2. Rigid Anchors: Galvanized steel straps.
   3. Masonry to concrete frame: Two pieces galvanized steel anchor.
   4. Unit type masonry inserts in concrete: Malleable iron.

C. Masonry Accessories:
   1. Non metallic expansion joint strips.
   2. Preformed control joint gaskets.
   3. Bond breaker strips.

2.5 MORTAR

A. Mortar: shall be cement-sand mortar.
   1. Consisting of 350 kgs Portland Cement, 1m³ sand and a minimum amount of water to produce a workable consistency.
   2. Mixed mortar components dry and then add water until the correct consistency is obtained.
   3. Use mortar within 1 hour of the addition of water.
   4. Limit cementitious materials in mortar to Portland cement and lime.

B. Grout: shall be fine grout of 1 part ordinary Portland cement to 2 or 3 parts of fine aggregates by volume. Fine aggregate to be measured in damp loose condition.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with referenced unit masonry Egyptian standard and other requirements.

B. Construct walls with all materials fully bonded or tied together to ensure compliance with design requirements for stability, strength, fire resistance, thermal and sound insulation as relevant.

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3.2 LAYING

A. Concrete Blocks: do not use non-autoclaved concrete blocks until four weeks after casting. Do not wet concrete blocks. Use approved water-retaining admixture in mortar to suit suction.

B. Uniformity: carry up work including both leaves of cavity work, with no portion more than 1.2 m above another at any time, racking back between levels. Do not carry up work higher than 1.5 m in one day.

C. Lay Blocks on full bed of mortar with joints filled to consistent thickness of not more than 12 mm.

D. Lay Hollow Blocks with cavity downward. Do not fill hollows in hollow blocks. Use cut or special shape blocks to make up courses and piece-in.

E. Accuracy: keep courses level, true to line and evenly spaced. Accurately plumb all faces, angles and features. Set out carefully to ensure satisfactory junctions and joints with adjoining or built-in elements and components.

F. Stopping and resuming work: rack back a distance of ½ unit length or 200 mm in each course. Clean exposed surfaces of set masonry, wet units lightly and remove loose masonry units and mortar prior to laying fresh masonry.

G. Curing: all walls and partitions shall be properly cured by sprinkling water twice a day for a period of not less than five (5) days after completion of laying the course.

3.3 BONDING AND JOINTING

A. Block work Bond, unless otherwise specified, is to be stretching half lap.

B. Lintel Bearings: carefully predetermine setting out so those full blocks occur beneath ends of lintels.

C. Joints not visible in finished work are to be struck off with the trowel as work proceeds.

D. Joints for Plaster: strike off and leave rough joints in block work to be plastered or rendered.

3.4 MORTAR BEDDING AND JONTING

A. Bedding: lay concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, and columns and where adjacent to cells or cavities to be filled with mortar. For starting courses on footings where cells are not grouted, spread out full mortar bed including areas under cells.

B. Joints: if not other wise indicated lay masonry walls with 10mm joints. Maintain joint widths shown, except for minor variations required to maintain bond alignment. Cut joints flush for masonry walls, which are to be concealed or to be covered by other materials.

C. Walls to be plastered shall have joints racked out to a depth of 12 mm to form a key.

D. Remove concrete masonry units disturbed after laying, clean and lay in fresh mortar. Do not pound

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corners at jambs to fit stretcher units, which have been set in position. If adjustments are required, remove units clean off mortar and set in fresh mortar.

3.5 REINFORCED MASONRY JAMB

A. Build masonry jamb with hollow concrete blocks with dimensions as shown on the drawings
B. Both sides of openings to be filled with cement grout as specified herein.

3.6 TOLERANCE

A. Comply with construction tolerances of referenced Egyptian code of practice.

END OF SECTION 04810
SECTION 083180 - FORCED ENTRY (FE) / BALLISTIC RESISTANT (BR) ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. The extent of forced-entry resistant (FE) door assembly required for the Project is indicated on Contract Drawings, including construction, profiles, swing, sizes, hardware, accessories, devices, and locations.

B. Install FE/BR assemblies only into a steel substrate in such a manner that allows for future frame adjustment. This will be a steel sub-frame attached to concrete or masonry.

C. All security frames with electronic hardware shall have ¾” flexible steel conduit in frame as shown on electric drawing.

1.2 PERFORMANCE REQUIREMENTS

A. General: Fabricate and install FE/BR assemblies to achieve indicated levels of resistance. Extend resistance to include anchorages, interfaces with adjoining substrates, and hardware.

1. Forced-Entry (FE) resistant assemblies: Where door assembly or window or louver is shown or scheduled as FE, provide manufacturer's material and fabrication for panels, inserts, hardware, devices, and framing of units for the following ratings by the Physical Security Division of the Bureau of Diplomatic Security (DS/PSP/PSD):

a. Provide resistance of 5 minutes for forced entry, using basic hand tools.

2. Ballistic resistant (BR) assemblies: Where assembly is shown or scheduled as BR, provide manufacturer's materials and fabrication for panel, inserts, and framing of unit according to DS/PSP/PSD ratings:

1.3 SUBMITTALS

A. General: For each type of security door and louver assembly, submit the following in accordance with Division 1 Contract Specification Sections:

1. Product data for each element of work, whether purchased from other manufacturers or provided as door Fabricator's standard production. Include data substantiating that products comply with requirements of these specifications.

2. Manufacturer's standard color chart.
3. Certificates:
   a. Letter from manufacturer indicating the products have been certified by
      Bureau of Diplomatic Security (DS) and UL in accordance with article on
      "Manufacturers" in this Section.
   b. Letter from manufacturer indicating that automatic door operators for
      handicap compliance have been fully designed by and coordinated with the
      hardware supplier for the width and weight of each applicable door, that the
      operator controls and equipment are sized adequately given the location of
      the control box and its relationship to the door, and is fully compliant with
      ADA and appropriate fire codes (for doors that are part of the fire egress
      system).

4. Shop drawings showing each dimensioned detail of each door, window and louver
   assembly, including performance rating, swing, hardware set, and adjacent
   construction. Provide drawings on A3 sheets. Show typical door exterior
   elevations at not less than 1:20 scale. After final modifications and corrections
   have been incorporated into the drawings, submit drawings as AutoCAD files
   with .DWG extension. Show the following:
   a. Cover sheet: Include manufacturer's name, address, telephone, and
      facsimile numbers; customer and address; project location; contract or
      purchase order number; and submittal release record.
   b. Unit information:
      1) Manufacturer's model number.
      2) Government code.
      3) Mark (door no.).
      4) Door/frame finish.
      5) Door type.
      6) Government or ASTM/UL certification number.
      7) Government or ASTM/UL certification number for glazing, if
         different from door certification.
      8) Government certification number for deal tray, if different from door
         certification.
   c. Elevation Drawings:
      1) Rough opening dimensions.
      2) Door opening dimensions.
      3) Frame opening dimensions.
      4) Vision opening dimensions.
      5) Substrate/rough opening material.
      6) Finished floor.
      7) Sill condition.
      8) Undercut for carpet.
      9) Weatherstripping.
10) Manufacturer's name and reference numbers for primer and finish paint, including number of coats applied.
11) Door class (fire) rating: rated or non-rated.
12) Door and frame gauge thickness.
13) Separate steel sub-frames/embeds (number and list).
14) Detail symbols.
15) Hardware and hardware symbols.
16) Electrical access, including terminal strips.

d. Plan Drawings:
   1) Relate to elevation on drawing.
   2) Identify "Attack" and "Protected" sides.
   3) Identify door swing
   4) Provide key on drawings.
   5) Indicate room space numbers taken from Contract Drawings.

e. Details: Show section at 1:5 scale of members indicating construction, size, and thickness of components, frame profile, anchorage, steel sub-frames/embeds, continuous shim plates (where applicable), location of conduit entry into both sub-frame and door frame, threshold configuration, thumbturn lock guards, vision panel together with connections, fasteners, shims, sealant, backer rods, and means of separating dissimilar metals. Details shall be on separate sheets from plan and elevation drawings.

f. General Product Information: Include notes sheet, miscellaneous materials specifications, abbreviations, finish/paint system, legend, and glazing specifications.

g. Breakdown of Product Line Items:
   1) If Manufacturer produces one contract line item as several parts (e.g., door with transom and sidelights), they shall break out items on drawings. Each item shall be a subdivision of that product line item number.

5. Installation instructions shall cite all anchorage components, including complete description of anchors, as well as installation criteria such as drilling specifications into concrete or masonry, torque requirements, minimum edge distance, spacing, etc. For sub-frame attachment to concrete, instructions shall include alert to installers to avoid cutting rebar during anchor installation.

6. Installation instructions shall be customized for each type of application.

B. Certificates for FE/BR Products: Complete and submit to the COR, the forms referenced in Quality Assurance Article. Forms are found at the end of this Section.

1.4 QUALITY ASSURANCE
A. Quality Control for Forced-Entry/Ballistic Resistant (FE/BR) Products: Certificates for fabricated and assembled FE/BR products specified in this Section shall follow quality control procedures established by the Government.

B. Testing Laboratory Qualifications: For compliance with non-security performance requirements on security door assemblies of this Section, use only those testing laboratories, which have successfully demonstrated to COR that they have experience and capabilities needed to satisfactorily conduct required tests.

C. Qualifications: The subcontractor, including the crew chief, shall have a previous experience in the installation of special FE/BR doors and windows and security hardware as used in US Embassies and high-security office and manufacturing buildings. The crew chief shall have the ability to read and understand the Contract Drawings, Specifications, shop drawings, and installation manuals by the manufacturer.

D. The FE/BR Installer shall have the following responsibilities:

1. Pre-Installation Conference: Before beginning installation of the FE/BR assemblies, the Installer shall conduct a pre-installation conference at the Project site with the contractor, the electrical sub-contractor, the COR, the Embassy Security engineer, and other interested parties to review installation procedures and manuals, schedules, and coordination of the FE/BR-assembly installation with other elements of the Work.

2. Training: Provide the crew, which is to actually perform the installations of the FE/BR assemblies with on-site, hands-on training before the installation of the first FE/BR door, and instruct the crew on preventive measures which must be taken to protect the FE/BR assemblies from damage during construction.

3. Inspection: Supervise the crew during their installation of the FE/BR doors. Upon completion of the installation of each FE/BR doors, inspect the work and direct the crew in any correction or modifications required for acceptable performance of the units.

E. Certification by General Contractor: Prior to final completion, the General Contractor shall provide to the COR a certification that the FE/BR materials have been installed in accordance with the manufacturer's instructions and are operational. Specifically, the General Contractor's certification shall include:

1. That the employees performing the installation met the specified training and experience qualifications.

2. That manufacturer's installation instructions and shop drawings were followed.

3. That each frame bolt has been installed plus or minus 6-mm of the center line in the horizontally slotted bolt hole and are fully torqued to the manufacturer's specs with shims inserted.

4. That thresholds do not exceed specified limits, as indicated in the approved shop drawings.

5. That cap plugs for each door have been bagged and won't be installed until after the final QA inspection has been conducted by the Embassy security engineers and the COR.
6. That all access plates for each door has been installed as indicated in the approved shop drawings.
7. That each embed plate or sub-frame has been installed level, plumb and square.
8. That each door frame head has been installed level and the non-hinge side jamb has been installed plumb and square.
9. That for each door assembly, there is a continuous minimum gap between the door leaf and the door frames.
10. That each forced entry lock (FEL) is fully operable and the strike doesn't bind on the strike plate or the strike plate doesn't bind on the strike plate receiver without any part ground down.
11. That each lockset, deadbolt and panic exit device is able to fully engage and freely operate.
12. That FEL strike plates have not been altered.
13. That each door closer has been installed and adjusted in accordance with the manufacturer's instructions.
14. That automatic door operators have been adjusted as appropriate in accordance with the manufacturer's instructions to meet UFAS and appropriate fire codes.
15. That any separate pieces of ballistic trim have been installed, as indicated in the approved shop drawings.
16. Any overlapping finish work (i.e. metal, wood, stone, etc.) shall be designed to be removable without damaging the window and finish to allow future adjustments of 6-mm in or out of the opening.

F. Employ only experienced tradesmen for fabrication and installation, who are capable of producing work of the highest standard of quality in the industry.

1.5 IDENTIFICATION SYSTEMS

A. Identify each assembly to provide Government with ready reference to original manufacturer to facilitate reorders, replacement parts, service, resolution of complaints, and inventory. The label shall be an embossed/printed metal plate or metallic foil with adhesive backing for permanent identification. Locate label on the door frame header so that it is not exposed when the door is closed and is clearly visible and not obscured by hardware when the door is open. The label shall be approximately 40 x 75 mm and shall cite:

1. Manufacturer's name/city/state.
2. Contract number.
3. Month/year of manufacture.
4. Mark number.
5. Government or ASTM/UL certification model number.

B. Provide a steel stamped ID code directly beneath the upper FEL under the door leaf non-hinge jamb trim plate, which will consist of the manufacturer name abbreviation, fabrication date (mm/yy) and mark number.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver each assembly to project site with fabrication, finishing, and assembly of primary panels, embeds/sub-frames, and frames completed and prepared for installation and connection with security systems. Disassemble hardware for shipping only to extent hardware interferes with shipping.

B. Deliver door assemblies with glazing panels as factory glazed unless otherwise directed by Government.

C. Pack door assemblies and window with accessories in one crate to include the door and frame, and the embed/sub-frame and ballistic trim. Provide two wood cross braces on both sides of the crate, and provide a separate compartment for installation hardware.

D. Provide removable spreader bar between jambs during fabrication, delivery, and installation and to include Mullions of each frame assembly, except where integral threshold is required and serves same purpose. Do not mar finishes of assembly with installation or removal of spreader bars.

E. Provide protection of pre-finished units, such as pre-finished with baked enamel or stainless steel, using self-adhesive paper.

F. Treat security door assemblies as fragile merchandise packaged and shipped in export wood crates with width end in upright position. Comply with manufacturer's directions for storage and handling to prevent edge damage or other damage to assembly resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, and contact with chemical solvents. Provide at least one wood cross-brace for the door assembly. Clearly mark crates to indicate which side should be opened first.

G. Clearly mark sub-frames/embeds with door mark number and identify head and left and right jambs. Package sub-frames/embeds separately and ship in export wood crates separate from the door assemblies. Protect each sub-frame/embed piece to minimize damage to finished surfaces.

H. Package and ship installation hardware (anchors, bolts, screws, shims, ballistic trim, shop drawings, etc.) for each door in the same crate as the door assembly.

I. Package and ship shop drawings for each door in the same crate as the door assembly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Accepted manufacturer which is pre-certified fabricators (by DS) of ballistic-resistant and forced-entry-resistant assemblies is “Norshield Security Product, Division of Norment Industries, Inc.” or equal approved and certified as detailed below.
B. Products must be certified by Bureau of Diplomatic Security (DS) in accordance with DS/PSP/PSD SD-STD-01.01, latest revision, and meet ASTM and UL standards for FE/BR regarding installation, operation, maintenance, hardware, finishes, and weather protection. These assemblies must also be able to accept scheduled hardware without compromising performance of either the door assembly or the hardware.

C. Clarifications and additional OBO requirements for products tested under the ASTM and UL standards:
   1. Door frames are to be bolted to the sub-frames instead of being welded as shown in the ASTM test specifications. The door frames are to have horizontally slotted holes, not to exceed 300mm on center.
   2. Manufacturer shall provide two copies of all applicable ASTM and UL test reports for each product.
   3. Manufacturer shall provide two copies of the installation instruction manuals for each product.
   4. Door frame and sub-frame head are to have access ports to support 25mm conduit.
   5. Provide at least two bolt holes in the door head sill frame to facilitate proper installation.
   6. Insert shims at every frame bolt. Provide 1.5mm (1/16-inch) thick plastic shims or stainless steel shims with break off tabs for rough opening (R.O.) frame clearance.

D. Selection of fabricator/manufacturer security door and window assemblies, and selection of manufactured elements, which are used in make up of that assembly, are Contractor's options subject to the following requirements and limitations, and subject to general provisions of Construction Contract:

2.2 MATERIALS, GENERAL

A. Composition: A Government Code number, defined as indicated herein, identifies the composition of the door: Rating 2: Steel or Hollow Metal.

B. Hot-Rolled Steel Sheets and Strips: ASTM A 569, commercial quality, pickled and oiled, except as otherwise indicated.

C. Cold-Rolled Steel Sheets: ASTM A 366, commercial quality, except as otherwise indicated.

D. Galvanized Steel Sheets: ASTM A 526, with ASTM A 525, G90 zinc coating, mill phosphatized; commercial quality, except as otherwise indicated.

E. Stainless Steel Sheets where required for finish: AISI Type 302/304, complying with ASTM A 167; commercial quality, No. 4 directional polish.

F. Supports and Anchors: Fabricate to endure required performances, but of not less than 1.5 mm sheet steel. For exterior wall assemblies, hot-dip zinc coat support/anchor units after fabrication in compliance with ASTM A 153, Class B.
G. Inserts, Bolts Fasteners: Standard units of strengths required to endure performances; hot-dip zinc coated where used in exterior wall assemblies in compliance with ASTM A 153, Class C/D.

H. Paint for Shop Application: Rust-inhibitive enamel for baking suitable as base for finish coats, which are specified as work of other sections.

I. Vision Panels for teller window: Fabricate vision panels of sizes shown and scheduled with same performance capabilities as specified/shown for teller window where installed. Where applicable, achieve performances and combined performances through lamination of transparent sheets, films, and screens of standard manufactured/tested products.

   1. Forced-Entry (FE) Resistance: Where assembly is indicated for forced-entry resistance rating (FE), provide light of size shown or scheduled in accordance with Bureau of Diplomatic Security (DS) certification.

   2. Ballistic Resistance (BR): Where assembly is indicated for ballistic-resistance rating (BR), provide light of size shown or scheduled in accordance with DS certification.

J. Hot-Dip Galvanizing: All exterior doors must be hot-dip galvanized in accordance with ASTM standards.

2.3 HARDWARE

A. General: Provide special units of door hardware to achieve performances, and as shown and scheduled.

   1. Hinges and pivots: 3 hinges shall be provided for doors, hinges shall be double rabbeted in the door, and shall be McKinney T4B 3786 4-1/2” x 4-1/2” NRP, or equal approved.

   2. Locksets and latchsets: Unless otherwise noted, locksets and latchsets shall be mortise type, with steel cases and heavy forged brass fronts adjustable from flat to beveled. Locks shall be Corbin hardware Division L9500 series.

   3. Exit devises: shall be Von Duprin, Inc.

   4. Closers shall be LCN 4110H-CUSH Series

   5. Surface Pulls shall be Trimco 1195-2

   6. Door stops: wall or floor type, Shall be IvesSeries

   7. Thresholds for outswing egress door shall be Pemko 270 series x 290DV x full width of opening

2.4 FABRICATION AND ASSEMBLY

A. General: Fabricate, test, and pre-assemble security door assemblies with hardware at factory; disassemble hardware only to extent necessary for handling, packaging, shipment, and installation at Project. Fabricate metal work to comply with performance requirements. Fabrications shall be rigid, neat, and free from warp/buckle/similar defects, with eased edges and continuously-welded joints, ground where exposed, to
produce smooth, flush, invisible joints. Weld in accordance with AWS D1.1, Structural Welding Code for Steel.

1. Prepare door leafs and frames of each assembly to receive hardware, devices, and accessory units as shown and scheduled. Reinforce work for hardware and devices, and cut work for mortised or concealed units; comply with ANSI A115 series specifications, working from templates supplied by unit manufacturers and suppliers.
   a. Locate hardware, devices, and accessories as shown and scheduled (including on approved shop drawings) or, in accordance with security device manufacturer's recommendation for optimum responses, but in any case, as required to achieve required assembly performances. Do not cut or otherwise alter hardware in order to install on door.
   b. Except where assembly is equipped with door-seal stripping at jambs and head, provide neoprene door silencers on stops; three at strike jamb for single door, and four at head for double door.
   c. Except as otherwise indicated, pre-fabricate and pre-assemble security door assemblies to include full extent of required conduit-protected electrical/electronic power and control wiring placed and supported to avoid conflicts with other elements and subsequent drilling/cutting-in of work during installation of units. Provide access ports as required to support 25 mm conduit in door frames and sub-frames/embeds.
   d. Clearances: Not more than 3 mm at jambs and head, except not more than 6 mm between fire-rated pair of doors. Not more than 6 mm at bottom. Undercut for carpets are not permitted where doors are used in corridors.
   e. Fabricate frames with horizontally slotted bolt holes to allow for future frame adjustment.

2. Shop painting: Provide base-coat, factory-applied painting of ferrous metal elements of assemblies excluding other specified exposed-finish surfaces of stainless steel, aluminum, bronze, and similar metals not intended for painting. Provide touch-up paint with each painted door.
   a. Clean steel and zinc-coated steel surfaces of mill scale, rust, oil, grease, dirt, and other substances, immediately before finish application.
   b. Apply pretreatment of cold phosphate solution (SSPC--PT2), hot phosphate solution (SSPC-PT4), or basic zinc-chromate/vinyl-butryal solution (SSPC-PT3).
   c. Apply paint coat specified for shop application, and bake on within time limits recommended by manufacturer of pretreatment. Apply in a uniform, smooth coat to result in dry film thickness of not less than 0.05 mm. Use color of the paint as selected by the COR out of the manufacturer’s color chart.

3. Sub-frames/Embeds: Provide steel sub-frames or embed plates for all FE or FE/BR doors for installation at concrete, masonry, and other non-steel rough openings and for structural steel openings where the depth is less than the door
frame depth. For individual openings, sub-frames or embeds shall be provided by the door supplier. For larger, multi-panel openings, sub-frames or embeds may be provided by either the door supplier or the Contractor; in either case they shall be designed by the door supplier and shown with the door shop drawings. Sub-frames shall be 6 mm thick minimum and embeds a minimum of 6 mm for interior applications and a minimum of 10 mm for exterior applications, with a minimum depth equal to or greater than the door frame depth. Coordinate the sub-frame or embed anchor locations with the door frame bolt hole locations. The steel sub-frame shall be assembled and braced by the manufacturer prior to shipping, in order to avoid out of plane deformation during transportation, installation and concrete pouring. The steel sub-frame shall be installed square & plumb. maximum tolerance allowed is 3mm.

a. Interior embeds shall be A36 mild steel 6-mm (1/4 inch) minimum thickness and shall be prime painted with a high-grade metal primer. All embeds shall be factory drilled and tapped with an anchor design to allow minimum 10-mm (3/8 inch) adjustment 360 degrees from the centerline of the center of the drilled and tapped hole. All fasteners for doors or windows shall be ASTM grade 8 or other appropriate high strength bolt as identified in the blast report and complying with standard OBO specifications for FE/BR and Blast resistant products. All door embeds shall be pre-punched for the technical security conduit. Embeds without adjustment features or blank plates for field drilling and tapping shall not be permitted. Final embed design; construction and features shall be approved by the COR and the Embassy Security Engineer prior to fabrication and shipment.

b. For Existing Concrete - Provide a steel sub-frame, typically a 50 mm x 150 mm x 6 mm steel tube. Anchor the sub-frame with either 12 mm diameter x 90 mm long drop-in type expansion anchors or with Hilti HY150 injection or equivalent strength anchoring system with 12 mm diameter x 200 mm long Hilti HIT threaded rods spaced at 300 mm on center.

c. For Solid Masonry - Provide a steel sub-frame, typically a 50mm x 150mm x 6mm steel tube. Anchor the sub-frame with a Hilti HY150 or equivalent strength injection anchoring system with 12 mm diameter x 200 mm long Hilti HIT threaded rods spaced at 300 mm on center.

d. For Hollow Masonry - Provide a steel sub-frame, typically a 50 mm x 150 mm x 6 mm steel tube. Anchor the sub-frame to the masonry with a Hilti HY20 or equivalent strength injection anchoring system with 12 mm diameter x 200 mm long Hilti HIT threaded rods and screen tubes spaced at 300 mm on center.

4. Protect the bottom forced entry lock thumbturn with a "U" shaped metal guard, with the opening at the bottom that has been approved by the OBO/PE/SM FE/BR Program. Attach the guard to the door surface with counter-sunk screws on the inside of the "U." The finish of the guard shall match the finish of the door.
PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install security door assemblies in accordance with approved shop drawings, manufacturer's data and instructions, and requirements of these specifications. Install as required to achieve specified performances, and to comply with recommendations of related industry association or testing agency sponsoring standards for required non-security performances.

1. Install the assemblies in compliance with recommendations and instructions of the manufacturer.
2. Install the security devices on door assemblies as shown or scheduled. Comply with manufacturer's instruction, and install devices fully wired and ready for electrical/electronic connection as work of other sections as directed by each system installer.
3. Installer shall not grind any portion of door leaf, frame, FEL strikes, FEL strike plates or FEL strike plate receivers.
4. Forced entry lock strikes shall engage strike plate without binding. Do not remove and relocate or otherwise alter strike plates.
5. Install all frame bolts plus or minus 6-mm of the center line in the horizontally slotted bolt hole and torque to the manufacturer's specs with shims at every frame bolt.
6. Coordinate installation of door assemblies in sub-frames or embeds with installation of expansion joint materials, isolators, joint fillers, spacer strips, tapes, gaskets, sealants, backer rods, and other elements indicated. Produce tightly fitted, weather resistant security door assemblies that achieve required performances. Tighten bolts for maximum shear and tensile strength, for resisting forced indicated. Comply with Fabricator's instructions and recommendations.
7. Place installation accessory items as shown and as required for unit installations, including flashings, shims, fillers, bedding materials, and anchorage accessories. Prepare openings for unit interfaces with other work.

B. Anchorage: The door manufacturer shall provide anchors appropriate for substrate to which door frame and sub-frame is to be fastened. Door frames shall have pre-drilled horizontally slotted bolt hole patterns not to exceed 300 mm on center. The manufacturer shall verify substrates involved, and supply any special fastening tools (e.g., special drill, bit, tap) required by anchoring system. The anchor shall be acceptable for shock/short duration loading, and have potential for removal and re-installation during life of building.

1. Avoid cutting rebar during concrete sub-frame installation.
2. Provide 1.5 mm (1/16 inch) thick plastic shims with break-off tabs for rough opening (RO) frame clearance.
3. Match finish of cap plugs used in frame with frame finish to the maximum extent possible. Do not install cap plugs until after the final QA inspection, conducted by the Embassy Security Engineer has been completed.

3.2 ADJUST AND CLEAN

A. General: Upon request of COR, remove protective coverings and clean exposed surfaces. Repair damaged elements, restore abraded surfaces, touch-up base-coat paint finish with air-drying primer, and remove imperfections from exposed natural metal finishes.

1. Check and readjust hardware, devices, and accessories with door-to-frame-and-sill/threshold clearances set for proper operation of locks, door seals, and other operational units. Do not remove permanently applied performance labels.

2. Comply with "Door Hardware" section requirements for protection and handling of keys, locking devices, and associated information.

3. Exercise extreme care in cleaning exposed surfaces of polycarbonate; comply with manufacturer's directions.

END OF SECTION 08318
SECTION 085113 – ALUMINUM DOORS AND WINDOWS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 09220 - Plastering

1.2 SUBMITTALS

A. The contractors shall submit, as part of their bid:
   1. Manufacturer’s specifications, technical data, and standard cross sections.
   2. Technical data for all hardware items.

B. The contractor shall submit 10 days after contract award, shop drawings for the fabrication and installation of each window and balcony type, include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and include the following:
   1. Aluminum windows, frames, screen panels and fixed panels.
   2. Flashing and drainage details
   3. Weather-stripping details
   4. Glazing details
   5. Window system operators: show locations, mounting, and details for installing operator components and controls.
   6. Methods of attaching all components to the existing frames, trimming and finishing.

C. The contractor shall submit, after final completion and acceptance of the work, the warranty certificate

1.3 QUALITY ASSURANCE

A. Aluminum units: Provide units produced by a firm with not less than five years of successful experience in the fabrication of aluminum doors, windows, screens and frames, of the types required for this project. All work shall meet UBC and local code requirements for wind loads and seismic zone 2A, earthquakes.

B. Weather resistance: Fabricate windows, frames, and screen panels, to include weather stripping and thresholds to prevent the uncontrolled penetration of air and water under normal weather conditions from the interior and the exterior. Glass shall be sealed into the window frame from outside to provide full insulation. Provisions for condensation water drainage should be included.

C. The contractor shall take field measurements prior to preparation of shop drawings and fabrication to ensure proper installation and fit.

D. Performance Requirements
   1. General: Provide units capable of complying with performance requirements indicated herein.
2. Air infiltration: Provide units with sufficient air infiltration rate.
3. Water resistant: Provide units with no water penetration.
4. Thermal movements: Provide units including anchorage that accommodates thermal movements resulting changes in the ambient temperature without buckling, distortion, opening of joints, failure of joint sealant, damaging loads and stresses on glazing and connections, and other detrimental defects.

**PART 2 – PRODUCTS**

1.1 **Aluminum profiles**
Sections and profiles shall be made of extruded aluminum alloys free from defects impairing strength or appearance, medium weight systems, 1.6 mm thickness, frame. Depth and profiles shall be as recommended by manufacturer for system, strength, corrosion resistance, and application of required finish. Provisions for condensation drainage should be included in the profiles.

1.2 **Fasteners**
Galvanized, aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, color to match, guaranteed by the manufacturer to be compatible with the windows, frames, screens, hardware, anchors and other items being fastened.
Do not use exposed fasteners except where unavoidable for the assembly of units, and unavoidable for the application of hardware. Provide only concealed screws in glazing stops.

1.3 **Compression weather-stripping**
Provide manufacturer's standard replaceable stripping of EPDM gaskets complying with ASTM, including central, lateral, and glass beading gaskets, as recommended and guaranteed by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproofed for the life of the building.

1.4 **Glazing**
Double, 6mm thick, clear float glass.

1.5 **Finish and colors**
Powder coated, electrostatic, off-white color.

1.6 **Accessories & hardware**
Anti-rust, of the best quality available, aluminum, stainless steel, carbon steel or other corrosion resistant material, designed to smoothly operate, tightly close, and securely lock windows.
For hinged and fixed units: Heavy duty hinges, locks in door leafs, locking gear and plates, pull handles, limit stop and cylinder in door leaf
For sliding systems: Heavy duty nylon rollers, latch lock self closing in window leaf and manual closing in doors.
PART 3 - EXECUTION

3.1 Fabrication

A. Sizes and profiles: The required sizes for windows, and the profile requirements are stated herein and shown on the drawings.

B. Verify all windows and balcony openings by field measurements prior to fabrication and indicate measurements on the shop drawings.

C. To the greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work shall be completed before shipment to project site. Disassemble components only as necessary for shipment and installation. All corners, meeting stiles/rails shall be mitered square and reinforced. All frames shall be pre-cut to receive hardware.

D. Glazing: Fabricate window units with glazing stops & supports to provide a completely sealed unit, weather tight & water tight. Glazing shall be double.

3.2 Installation:

A. Installation, general: Comply with manufacturer's specifications and recommendations for the installation of the panels, accessories, hardware, etc. Maintain continuity of line and accurate relation of planes and angles. Install in accordance with the manufacturer’s installation instructions and the approved shop drawings.

B. All units shall be installed on mitered finished plaster, no wooden frames will be installed.

C. Aluminum frames should be installed using liquid foam around the frames to provide water and air tight units. Trims should be installed either as part of the frame section or separately to provide finished surrounding for the units.

D. All jambs, heads and sills shall be set in correct locations, level, square, plumb and in alignment with other work.

E. Drill and tap frames and doors and apply surface mounted hardware items, complying with hardware manufacturer's and template requirements. Use concealed fasteners wherever possible.

F. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weather stripping.

G. Glass and Glazing: Water-tight and airtight installation of glass product required. Each installation must withstand normal temperature changes, wind loading, impact loading, without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

H. Clean complete system, inside and outside, promptly after installation of glass and sealants. Exercise care to avoid damage to the finish. Remove excess glazing and sealant compounds, dirt and other substances.

I. Testing: The contractor shall notify the COR in advance of testing. Testing shall be carried out using water hose. Reseal any leakage, which may occur and repeat test until no leakage is observed.
SECTION 092400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes the following:
   1. Portland cement plaster.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 04810 – Unit Masonry Assemblies.

1.2 SUBMITTALS

A. Material Certificates: Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.

B. Design mix for each type of plaster

1.3 QUALITY ASSURANCE

A. Mockups: Prior to installing plaster work, construct panels for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups, using materials indicated for final unit of Work. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by the COR. Obtain the COR's approval of mockups before start of plaster work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

1.5 PROJECT CONDITIONS

A. Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.
B. Ventilation: Provide natural or mechanical means of ventilation to properly dry interior spaces after Portland Cement Plaster has cured.

C. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

PART 2 - PRODUCTS

2.1 ACCESSORIES

A. Cornerbeads: Small nose cornerbeads fabricated from the following metal, with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement.

1. PVC Plastic: Minimum (0.89 mm) thick.
2. Aluminum: Minimum (1.2 mm) thick.

B. Casing Beads: Square-edged style, with expanded flanges of the following material:

1. PVC Plastic: Minimum (0.89 mm) thick.
2. Aluminum: Minimum (1.2 mm) thick.

C. Curved Casing Beads: Square-edged style, fabricated from aluminum coated with clear plastic, preformed into curve of radius indicated.

D. Control Joints: Prefabricated, of material and type indicated below:

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.
2. Aluminum: Minimum 0.050 inch (1.2 mm) thick.

2.2 PLASTER MATERIALS

A. Base-Coat Cements: Type as indicated below:

1. Portland cement, ASTM C 150, Type I.

B. Job-Mixed Finish-Coat Cement: Material and color as indicated below:

1. Portland cement, ASTM C 150, Type I.

C. Cement Color: Gray.

D. Sand Aggregate for Base Coats and finish coats: ASTM C 897.

2.3 MISCELLANEOUS MATERIALS
A. Water for Mixing and Finishing Plaster: Potable.
B. Bonding Agent: ASTM C 932.
C. Acid-Etching Solution: Muriatic acid (10 percent solution of commercial hydrochloric acid) mixed 1 part to not less than 6 nor more than 10 parts water.
D. Dash-Coat Material: 2 parts portland cement to 3 parts fine sand, mixed with water to a mushy-paste consistency.

2.4 PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.
B. Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.
C. Three-Coat Work over Metal Lath: Base-coat proportions as indicated below:
   1. Scratch Coat: 1 part Portland Cement, 1 to 2 parts masonry cement, 2-1/2 to 4 parts aggregate.
   2. Brown Coat: 1 part Portland Cement, 1 to 2 parts masonry cement, 3 to 5 parts aggregate.
D. Two-Coat Work over Concrete Unit Masonry: Base-coat proportions as indicated below:
   1. Base Coat: 1 part masonry cement, 3 to 4 parts aggregate.
E. Job-Mixed Finish Coats: Proportion materials for finish coats in parts by volume for cementitious materials and parts by volume per sum of cementitious materials to comply with the following requirements:
   1. Proportions using sand aggregates: 1 part portland cement, 1 part masonry cement, 3 parts sand.

2.5 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

3.1 PREPARATIONS FOR PLASTERING

A. Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.
B. Etch concrete and concrete unit masonry surfaces indicated for direct plaster application. Scrub with acid-etching solution on previously wetted surface and rinse thoroughly with clean water. Repeat
application, if necessary, to obtain adequate suction and mechanical bond of plaster (where dash coat, bonding agent, or additive is not used).

C. Apply bonding agent on concrete and concrete unit masonry surfaces indicated for direct plaster application; comply with manufacturer's written instructions for application.

D. Apply dash coat on concrete surfaces indicated for direct plaster application. Moist-cure dash coat for at least 24 hours after application and before plastering.

E. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

F. Flashing: Refer to Division 7 Sections for installing flashing as indicated.

G. Surface Conditioning: Immediately before plastering, dampen concrete and concrete unit masonry surfaces that are indicated for direct plaster application, except where a bonding agent has been applied. Determine and apply amount of moisture and degree of saturation that will result in optimum suction for plastering.

3.2 INSTALLATION OF PLASTERING ACCESSORIES

A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install accessories of type indicated at following locations:

1. External Corners: Install corner reinforcement at external corners.
2. External Corners: Bend lath around external angles without using cornerbeads or reinforcement.
3. Terminations of Plaster: Install casing beads, unless otherwise indicated.
4. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by the COR:
   a. Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.
   b. Distance between Control Joints: Not to exceed (5.4 m) in either direction or a length-to-width ratio of 2-1/2 to 1.
   c. Wall Areas: Not more than. (13 sq. m).
   d. Horizontal Surfaces: Not more than. (9 sq. m) in area.
   e. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

3.3 PLASTER APPLICATION

A. Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.
B. Do not use excessive water in mixing and applying plaster materials.

C. Flat Surface Tolerances: Do not deviate more than plus or minus (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a (3-m) straightedge placed at any location on surface.

D. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary.

E. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

F. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

G. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

H. Number of Coats: Apply plaster of composition indicated, to comply with the following requirements:
   1. Three Coats: Over Metal lath.
   2. Two Coats: Over the following plaster bases:
      a. Concrete unit masonry.
      b. Concrete, cast-in-place or precast when surface condition complies with ASTM C 926 for plaster bonded to solid base.

I. Finish Coats: Apply finish coats to comply with the following requirements:
   1. Float Finish: Apply finish coat to a minimum thickness of (3 mm) to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching the approved sample.

J. Moist-cure plaster base and finish coats to comply with ASTM C 926.

3.4 CUTTING AND PATCHING

A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

3.5 CLEANING AND PROTECTING
A. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 092400
SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. This Section includes the following:
   1. Interior gypsum board.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE
A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.4 STORAGE AND HANDLING
A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS
A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
B. Do not install interior products until installation areas are enclosed and conditioned.
C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
PART 2 - PRODUCTS

2.1 PANELS, GENERAL
   A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD
   A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. G-P Gypsum.
      c. USG Corporation.

   B. Wall Type:
      1. Thickness: 5/8 inch (15.9 mm), Type x
      2. Long Edges: Tapered.
      3. Foil Face Backing

   C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

      1. Thickness: 1/2 inch (12.7 mm).
      2. Long Edges: Tapered.
      3. Foil Face Backing

2.3 TRIM ACCESSORIES
   A. Interior Trim: ASTM C 1047.

      1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
      2. Shapes:
         a. Cornerbead.
         b. Bullnose bead.
         c. LC-Bead: J-shaped; exposed long flange receives joint compound.
         d. L-Bead: L-shaped; exposed long flange receives joint compound.
         e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
         f. Expansion (control) joint.
         g. Curved-Edge Cornerbead: With notched or flexible flanges.

   B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Fry Reglet Corp.
   b. Gordon, Inc.
   c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper.
   2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-(6.4- to 9.5-mm-) wide joints to install sealant.
G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces, unless otherwise indicated.
2. Ceiling Type: Ceiling surfaces.
3. Moisture- and Mold-Resistant Type: At bathrooms.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board
manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

A. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by COTR for visual effect.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners, unless otherwise indicated.
   2. Bullnose Bead: Use where indicated.
   3. LC-Bead: Use at exposed panel edges.
   4. L-Bead: Use where indicated.
   5. U-Bead: Use at exposed panel edges.
   6. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 2: Panels that are substrate for tile.
   2. Level 3: Where indicated on Drawings.
   3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
      a. Primer and its application to surfaces are specified in other Division 9 Sections.

3.7 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

GYPSUM BOARD
B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900
SECTION 093013 – CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Ceramic tile
   2. Porcelain tile.
   3. Quarry tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Samples for Verification:
   1. Full-size units of each type and composition of tile and for each color and finish required.
   2. Full-size units of each type of trim and accessory for each color and finish required.
   3. Metal edge strips in 150-mm lengths.
C. Shop drawings showing wall elevations and floor patterns using the approved tiles and decorative tiles, Drawings shall be reviewed and approved by the COR.

1.3 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tiles of same type and color or finish from one source or producer, 1st grade of quality.
   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.5 PROJECT CONDITIONS
A. Environmental Limitations: Do not install tile until construction in spaces is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Provide tile and tile products by one of the following manufacturers:
   1. Ceramica Royal
   2. Kleopatra
   3. Al Gawhara
   4. Imported Procelain

2.2 SETTING AND GROUTING MATERIALS
A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
   1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
      a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
   B. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3.
   C. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

2.3 ELASTOMERIC SEALANTS
A. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; as applicable to nonporous joint substrates indicated, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

2.4 MISCELLANEOUS MATERIALS
A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
   B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, half-hard brass or stainless steel; ASTM A 666, 300 Series exposed-edge material.
C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: silicone product for sealing grout joints that does not change color or appearance of grout.

2.5 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that complies with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.

2. Remove protrusions, bumps, and ridges by sanding or grinding.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

E. Lay out tile wainscots to next full tile beyond dimensions indicated.

F. Grout tile to comply with requirements of the following tile installation standards:
   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

3.4 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
   1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
      a. Tile floors in wet areas.
      b. Tile floors composed of tiles 200 by 200 mm or larger.
      c. Tile floors composed of rib-backed tiles.

B. Joint Widths: Install tile on floors with the following joint widths:
   1. Ceramic Floor Tile: 1.6 mm.

C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

D. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.5 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
B. Install metal lath and scratch coat for walls to comply with ANSI A108.1A, Section 4.1.

C. Joint Widths: Install tile on walls with the following joint widths:
   1. Ceramic Mosaic Tile: 1.6 mm.
   2. Ceramic Wall Tile: 1.6 mm.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093013
SECTION 096340 - STONE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dimension stone exterior flooring.
2. Dimension stone interior flooring.
3. Dimension stone stair treads and risers.
4. Dimension stone thresholds.
5. Dimension stone counter tops

1.2 ACTION SUBMITTALS

A. Shop Drawings: Include plans, sections, details, and attachments to other work.

B. Samples:

1. For each stone type indicated. Include at least two or more Samples in each set and show the full range of color and other visual characteristics in completed Work.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

PART 2 - PRODUCTS

2.1 GRANITE

A. Material Standard: Comply with ASTM C 615.

B. Varieties and Sources: Subject to compliance with requirements, use one of the following sources, or equal approved:

1. Marmonil
2. Wadi El Nil
3. Egymarble

C. Finish: Polished, or Honed, as indicated and according to the approved sample.
2.2 MARBLE

A. Material Standard: Comply with ASTM C 503.

B. Varieties and Sources: Subject to compliance with requirements, use one of the following sources, or equal approved:
   1. Marmonil
   2. Wadi El Nil
   3. Egymarble

C. Finish: Polished, or Honed, as indicated and according to the approved sample.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

B. Aggregate: ASTM C 144.; use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

C. Latex Additive: Manufacturer's standard water emulsion.

D. Thin-Set Mortar:

E. Water: Potable.

2.4 GROUT

A. Grout Colors: Match stone.

B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate to produce required color.

   1. Unsanded grout mixture for joints 1/8 inch (3 mm) and narrower.
   2. Sanded grout mixture for joints wider than 1/8 inch (3 mm).

D. Polymer-Modified Cement Grout: ANSI A118.7.
   1. Unsanded grout mix for joints 1/8 inch (3 mm) and narrower.
   2. Sanded grout mix for joints wider than 1/8 inch (3 mm).

2.5 ACCESSORIES

A. Abrasive Inserts for Stair Treads: Abrasive strips consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder, fabricated for installing in routed grooves of stair treads to provide slip resistance. Provide epoxy-resin installation adhesive compatible with inserts.
   1. Width: 6.4 mm.
2. Depth: 12.7 mm.
3. Length: 100 mm less than stair width.

B. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone produce and by sealer manufacture. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

C. Floor Sealer: Colorless, slip- and stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone produce for application indicated.

2.6 MORTAR AND GROUT MIXES

A. Mortar: Comply with referenced standards and with manufacturers' written instructions to produce mortar of uniform quality and with optimum performance characteristics.

B. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions and to produce a stiff mixture with a moist surface when bed is ready to receive stone.

C. Joint Grout: Comply with mixing requirements in referenced ANSI standards and with manufacturer's written instructions.

2.7 STONE FABRICATION

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

B. Cut stone to produce pieces of thickness, size, and shape indicated.

C. Pattern Arrangement: Fabricate and arrange stone units with veining and other natural markings to comply with the following requirements:

1. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
2. Arrange units in blend pattern.

D. Fabricate stone thresholds in sizes and profiles as indicated or required to provide transition between adjacent floor finishes.

E. Fabricate stone stair treads in sizes and profiles indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
C. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials.

3.2 INSTALLATION, GENERAL

A. Do necessary field cutting as stone is set. Cut lines straight and true and finish field-cut edges to match shop-cut edges.

B. Scribe and field cut stone as necessary to fit at obstructions.

C. Provide control and expansion joints of widths and at locations indicated. Keep control and expansion joints free of mortar, grout, and other rigid materials.

3.3 INSTALLATION TOLERANCES

A. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1.5 mm or one-fourth of nominal joint width, whichever is less.

B. Variation in Surface Plane: Do not exceed 3 mm in 3 m maximum from level or slope indicated.

C. Variation in Plane between Adjacent Units: Do not exceed 0.8-mm difference between planes of adjacent units.

3.4 INSTALLATION OF STONE BONDED TO CONCRETE

A. Saturate concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat to damp concrete and broom to provide an even coating that completely covers the concrete. Do not exceed 1.5-mm thickness. Limit area of mortar-bed bond coat to avoid its drying out before placing setting bed.

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

D. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

E. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1.5-mm thick bond coat to mortar bed or to back of each stone unit.

F. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

G. Rake out joints to depth required to receive grout as units are set.

H. Point joints after setting. Tool joints flat, uniform, and smooth, without visible voids.
3.5 **STONE THRESHOLD INSTALLATION**

A. At locations adjacent to stone flooring, install stone thresholds in same type of setting bed as abutting stone flooring unless otherwise indicated.

B. At locations not adjacent to stone flooring, install stone thresholds in thin-set, latex-portland cement mortar.

3.6 **STONE STAIR TREAD AND RISER INSTALLATION**

A. Install stone stair treads and risers to comply with "Installation of Stone Bonded to Concrete" Article.

3.7 **GROUTING**

A. Grout stone joints to comply with ANSI A108.10 and with manufacturer's written instructions.

1. Do not use sanded grout for polished stone.
2. Grout joints as soon as possible after initial set of setting bed. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free of drying cracks.

3.8 **ADJUSTING AND CLEANING**

A. In-Progress Cleaning: Clean stonework as work progresses.

B. Clean stonework after setting and grouting are complete. Use procedures recommended by stone fabricator for application types.

C. Apply sealer to cleaned stonework according to sealer manufacturer's written instructions.

3.9 **PROTECTION**

A. Prohibit traffic from installed stone for a minimum of 72 hours.

B. Protect installed stonework during construction with nonstaining kraft paper. Where adjoining areas require construction work access, cover stonework with a minimum of 20-mm untreated plywood over nonstaining kraft paper.

END OF SECTION 096340
SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and field application of paints and coatings.

1.2 RELATED SECTIONS

A. Section 092400: Cement Plastering.

1.3 REFERENCES


C. NACE (National Association of Corrosion Engineers) - Industrial Maintenance Painting.


1.4 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.5 SUBMITTALS

A. Product Data: Provide data on all finishing products.

B. Samples: Submit two samples, actual in size illustrating range of colors and textures available for each surface finishing product scheduled.

C. Manufacturer's Instructions: Indicate special surface preparation procedures, substrate conditions requiring special attention.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for finishes.

1.8 FIELD SAMPLES
A. Provide field sample panel, 1.00 m long by 1.00 m wide, illustrating special coating color, texture, and finish.

B. Accepted sample may not remain as part of the Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container label to include manufacturer’s name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing. Do not deliver to site containers larger than 20 kg in weight.

C. Store paint materials at minimum ambient temperature of 7 degrees C and a maximum of 32 degrees C, in ventilated area, and as required by manufacturer’s instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 7 degrees C for interiors; 10 degrees C for exterior; unless required otherwise by manufacturer’s instructions.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering materials that may be incorporated into the work include the following or approved equal:

1. Jotun, Egypt for final coats.

2. Chemicals for Modern Building.


B. All paint preparation and finish coats materials must be Lead free.

2.2 COATING MATERIALS

A. Manufacturer: coating materials are to be approved brands and obtained from one approved manufacturer unless otherwise specified.
B. Emulsion paint: PVA resin based emulsion to produce a durable, flexible and water-resistant coating suitable for repeated washing and scrubbing.

C. Oil paint: oleo-resinous; non-toxic; drying to a smooth; highly opaque to produce a durable; flexible and water-resistant coating with excellent adhesion and color retention. Undercoat is to be suitable to receive further coatings. Finish is to be high gloss; semi-gloss; semi-gloss or matt; to be selected by the COR or designated representative.

D. Epoxy paint: epoxy paint shall have a high degree of resistance to acids, alkalis and water. It shall be easily applied over surfaces that have been primed with a primer containing an inhibitive pigment and shall present a glossy finish. One coat of primer and two finish coats shall be applied with minimum thickness of 0.075 mm per coat.

E. Acrylic paint: ready mixed; waterproof and decorative coating comprising synthetic rubber base; selected pigment sand line aggregate for texture surfaces. The following selection of paint shall be applied as shown on the drawing.

2.3 PREPARATION AND PRIMING MATERIALS

A. Preparation materials: cleaning, stopping, filling, sealing etc... materials are to be types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared, unless otherwise specified.

B. Primer for concrete; masonry, rendering and plaster: natural oil and alkali resistant resin based priming paint.

C. Primer for wood: ready mixed aluminum priming paint, water-borne priming paint, or solvent-borne priming paint to provide high moisture resistance and suitable for use with type of wood and preservative treatment.

D. Primer for iron and steel: non-leaded based priming paint.

E. Primer for galvanized iron and steel: zinc chromate priming paint.

PART 3 - EXECUTION

3.1 GENERALLY

A. Quality of work: operatives must be appropriately skilled and experienced in the use of specified materials and methods of application. Prepare surfaces and apply coatings in accordance with manufacturer’s recommendations.

B. Coating materials:

1. Where possible are to be from one manufacturing batch; where more than one batch is to be used, keep separate, allocate to distinct parts or areas of the work and inform the COR or designated representative accordingly

2. To be delivered in sealed containers, clearly labeled with type of material, brand name, intended use and manufacturer’s batch numbers

3. Store in a clean, dry area protected from extreme temperatures and in accordance with manufacturer’s recommendations; use in order of delivery.
C. Compatibility:

1. Check that all materials to be used are recommended by their manufacturers for the particular surface and conditions of exposure and that they are compatible with each other.

2. Where surfaces have been treated with preservatives, check with treatment manufacturer that coating materials are compatible with the treatment and do not inhibit its performance.

3. Inform the COR or designated representative of any discrepancy in specification of coatings and obtain instructions before proceeding with application.

D. Color range: carry out decoration in colours or within range produce by particular coating manufacturer as appropriate and as selected by the COR or designated representative.

E. Off site work: off site preparation and coating is to be carried out under cover in a suitable environment with adequate lighting. Store all items, both before and after coating, in a clean, dry area protected from the weather and mechanical damage, properly stacked with spaces to permit air circulation and prevent sticking of surfaces.

F. Protection: adequately protect both internal and external surfaces which are not to be coated, by covering with dust sheets or other suitable materials. Place "wet paint" signs and provide barriers where necessary to prevent damage to freshly applied coatings.

G. Control samples: for each type of coating, prepare sample areas of the finished work, including preparation, in advance of the remainder. Make arrangements with the COR or designated representative for the full time supervision of the application of each coat. Obtain approval of appearance before proceeding. Control samples may, at the COR or designated representative's discretion, be used as the basis for comparative testing of dry film thickness of complete coating systems.

H. Inspection of work: permit coating manufacturers to inspect the work in progress and take samples of their products from site if requested.

I. Inspection of work: inspection of the whole of the work at each stage may be made, at the direction of the COR or designated representative. Agree with the COR or designated representative a program which will facilitate such inspections and notify him when each part and stage of the work is ready for inspection. Do not proceed with subsequent stages of the work until authorized.

3.2 PREPARATION

A. Preparation materials: use in accordance with manufacturer’s recommendations.

B. Masonry and rendering: remove dirt, surface deposits, loose and flaking material with a stiff brush. Fill holes and cracks flush with surface.

C. Plaster: remove dirt and surface deposits with a stiff brush. Rub down to remove nibs, trowel marks and plaster splashes. Lightly rub over-trowelled glossy plaster with worn abrasive paper. Fill all depressions, holes and cracks and lightly rub down flush with surface.

D. Plasterboard: fill imperfections and/or minor damage to leave a smooth; blemish-free surface.

E. Uncoated wood: Ensure that large and loose knots are removed and made good with sound wood of the same species and sand flush. Ensure that surfaces are clean and remove oil, grease and excessive natural oils with suitable solvents. Sand to a smooth, even finish with arrises rounded or eased.
Remove resinous exudations by heat. Ensure that heads of fastenings are countersunk sufficiently to hold stopping / filling; fill nail and screw holes, joints, cracks, holes, depressions, open or coarse grain with stopper / filler worked well in and finished off flush with surface; sand smooth and remove dust.

F. Priming wood: before priming preservative treated wood ensure that any cut surfaces have been re-treated and solvents have completely dried out. Apply primer to all surfaces including rebates, beads, backs etc... which will be concealed when components are fixed in place. Liberally coat all end grain, allow soaking in, and then, re-coating.

G. Pre-primed wood: remove dirt and grease from satisfactorily pre-primed surfaces and sand lightly. Sand down chalking, powdery and other defective areas to the bare surface, remove dust, and re-prime as necessary.

H. Stopping, filling and priming: apply oil based stoppers / fillers after priming. Apply water based stoppers / fillers before priming unless otherwise recommended by manufacturer. Patch prime water based stoppers / fillers when applied after priming.

I. Stopper/filler for clear coatings: carefully adjust color so that after coatings have been applied it closely matches the color of the wood, to approval.

J. Concealed metal surfaces: apply black bitumen coating solution to concealed surfaces of metal components before fixing.

K. External doors: prime and paint bottom edges before hanging.

L. Ironmongery: remove from surfaces to be coated and refix on completion. Do not remove hinges unless instructed to do so.

M. Doors and windows: ensure that doors and opening windows etc... are eased as necessary before coating. Prime any resulting bare areas.

N. Galvanized surfaces: remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

O. Uncoated steel and iron surfaces: remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

P. Shop primed steel surfaces: sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

3.3 APPLICATION

A. Generally: apply products in accordance with manufacturer’s instructions

B. Unsuitable conditions: do not apply coatings to surfaces affected by moisture, when relative humidity is more than 80% or when heat is likely to cause blistering or wrinkling. Take necessary precautions including restrictions on working hours, providing temporary protection and allowing extra drying time, to ensure that coatings are not adversely affected by climatic conditions before, during and after application.

C. Painting generally:
1. Do not thin or intermix paint materials unless otherwise specified or recommended; if materials are found to have been thinned without authorization, the COR or designated representative may require the application of additional coats.

2. Apply priming coats as soon as possible on the same day a preparation is completed; ensure that they are of adequate thickness and suit surface porosity.

3. Adjacent coating of the same material must be of a different tint to ensure that each coat provides complete coverage.

4. Apply coatings by brush unless otherwise specified or approved; keep brushes, tools and equipment in a clean condition.

5. Apply coatings to clean, dust free, suitably dry surfaces in dry atmospheric conditions and after any previous coats have hardened; lightly abrade between coats as necessary.

6. Apply coatings evenly to give smooth finish of uniform color, free from brush marks, nibs, sags, runs and other defects; cut in neatly and cleanly; do not splash or mark adjacent surfaces.

7. Keep all surfaces clean and free from dust during coating and drying; adequately protect completed work from damage.

D. Completion: ensure that opening lights and other moving parts move freely. Remove all masking tape and protective wrappings.

3.4 SCHEDULE - EXTERIOR SURFACES

A. Concrete, cement plaster:

1. One coat of alkali resistant primer.

2. Two coats of block filler.

3. A minimum of two coats of acrylic emulsion paint.

B. Gypsum wallboard:

1. One coat of exterior gypsum board primer.

2. A minimum of two coats of acrylic emulsion paint.

B. Steel: All steel surfaces shall be painted using enamel, Semi-gloss paints.

END OF SECTION 099100
SECTION 220513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.2 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
   1. Permanent-split capacitor.
   2. Split phase.
   3. Capacitor start, inductor run.
   4. Capacitor start, capacitor run.
B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 220513
SECTION 220523.14 - CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Bronze swing check valves.
   2. Iron swing check valves.
   3. Iron swing check valves with closure control.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.
   1. Certification that products comply with NSF 61 Annex G [and NSF 372].

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
   1. ASME B1.20.1 for threads for threaded end valves.
   2. ASME B16.1 for flanges on iron valves.
   3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   4. ASME B16.18 for solder joint.
   5. ASME B31.9 for building services piping valves.


D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.
G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:
   1. Description:
      a. Standard: MSS SP-80, Type 3.
      b. CWP Rating: 200 psig (1380 kPa).
      c. Body Design: Horizontal flow.
      e. Ends: Threaded or soldered. See valve schedule articles.
      f. Disc: Bronze.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow in horizontal position with hinge pin level.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
   1. Pump-Discharge Check Valves:
      a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze disc.
3.4 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG ([1035 kPa]) OR LESS)

A. Pipe NPS 2 (DN 50) and Smaller:

1. Horizontal and Vertical Applications: Bronze swing check valves, Class 125, bronze disc with threaded end connections.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: Bronze swing check valves, Class 125, bronze disc with threaded end connections.

END OF SECTION 220523.14
PSECTON 220523.15 - GATE VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Bronze gate valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.
   1. Certification that products comply with NSF 61 Annex G.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
   1. ASME B1.20.1 for threads for threaded end valves.
   2. ASME B16.1 for flanges on iron valves.
   3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   4. ASME B16.18 for solder joint.
   5. ASME B31.9 for building services piping valves.


D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Bypass and Drain Connections: MSS SP-45.
2.2 BRONZE GATE VALVES

A. Class 125, NRS, Bronze Gate Valves:
   1. Description:
      a. Standard: MSS SP-80, Type 1.
      b. CWP Rating: 200 psig (1380 kPa).
      d. Ends: Threaded or solder joint.
      e. Stem: Bronze.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. Use gate valves for shutoff service only.

3.4 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG ([1035 kPa]) OR LESS)

A. Pipe NPS 2 (DN 50) and Smaller: Bronze gate valves, Class 125, with threaded ends.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: Bronze gate valves, Class 125, with threaded ends.

END OF SECTION 220523.15
SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes insulating the following plumbing piping services:
      1. Domestic hot and cold-water piping.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS
   A. Field quality-control reports.

1.4 QUALITY ASSURANCE
   A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
      1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
      2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
   B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS
   B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
C. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

2.3 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive, suitable for indoor and outdoor applications.
   1. Width: 2 inches (50 mm).
   2. Thickness: 6 mils (0.15 mm).
   3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Width: 2 inches (50 mm).
   2. Thickness: 3.7 mils (0.093 mm).
   3. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
   4. Elongation: 5 percent.
   5. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.4 FIELD-APPLIED JACKETS

A. Aluminum Jacket: 0.6 mm thickness Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.
3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above-ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.

3.3 PENETRATIONS

A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
2. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of pipe insulation.
   2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed valve covers manufactured of same material as pipe insulation when available.
   2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.7 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall include straight pipe, threaded fittings, welded fittings, of threaded strainers, welded strainers, threaded valves, and flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water: Insulation shall be the following:
   1. Flexible Elastomeric: 1 inch (25 mm) thick.

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be the following:
   1. Flexible Elastomeric: 1 inch (25 mm) thick.

3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
   1. PVC: 20 mils (0.5 mm) thick.

D. Piping, Exposed:
   1. Aluminum: 0.024 inch (0.61 mm) thick.

3.12 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Water Piping: Insulation shall be the following:
   1. Flexible Elastomeric: 2 inches (50 mm) thick.

B. Domestic Hot and Recirculated Hot Water: Insulation shall be the following:
   1. Flexible Elastomeric: 2 inches (50 mm) thick.

3.13 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping, Exposed:
   1. Aluminum, Smooth 0.024 inch (0.61 mm) thick.

END OF SECTION 220719
SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS
   A. Product Data: For piping, fittings, transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS
   A. System purging and disinfecting activities report.
   B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PVC / PPR PIPE AND FITTINGS

2.2 PIPING JOINING MATERIALS
   A. Heat Fusion for Joining PPR Piping and Tubing:

2.3 TRANSITION FITTINGS
   A. General Requirements:
      1. Same size as pipes to be joined.
      2. Pressure rating at least equal to pipes to be joined.
      3. End connections compatible with pipes to be joined.
   B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
C. Plastic-to-Metal Transition Fittings:
   1. Description:
      a. **CPVC and PVC** one-piece fitting with manufacturer's Schedule 40 equivalent dimensions.
      b. One end with threaded brass insert and one threaded end.

D. Plastic-to-Metal Transition Unions:
   1. Description:
      a. **CPVC and PVC** four-part union.
      b. Brass threaded end.
      c. Solvent-cement-joint plastic end.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
   2. Pressure Rating: **150 psig (1035 kPa) minimum at 180 deg F (82 deg C)**.

C. Dielectric Flanges:
   2. Factory-fabricated, bolted, companion-flange assembly.
   3. Pressure Rating: **150 psig (1035 kPa) minimum at 180 deg F (82 deg C)**
   4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
   1. Nonconducting materials for field assembly of companion flanges.
   2. Pressure Rating: **150 psig (1035 kPa)**
   3. Gasket: Neoprene or phenolic.
   4. Bolt Sleeves: Phenolic or polyethylene.
   5. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
   2. Electroplated steel nipple complying with ASTM F 1545.
   3. Pressure Rating and Temperature: **300 psig (2070 kPa) at 225 deg F (107 deg C)**.
   4. End Connections: Male threaded or grooved.
   5. Lining: Inert and noncorrosive, propylene.
PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.

C. Install shutoff valve immediately upstream of each dielectric fitting.

D. Install domestic water piping level without pitch and plumb.

E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

F. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

G. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

H. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

I. Install piping to permit valve servicing.

J. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

N. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors.

P. Install sleeves for piping penetrations of walls, ceilings, and floors.
3.2 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:
   1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings or nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install vinyl-coated hangers for CPVC/PPR piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 (DN 25) and Smaller: 36 inches (900 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
   2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.

3.6 IDENTIFICATION

A. Identify system components with labels to match existing.

B. Label pressure piping with system operating pressure.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Piping Inspections:
      a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
      b. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
      c. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
   2. Piping Tests:
      a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

c. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

d. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.9 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:

   1. Polypropylene pipe shall be provided as per manufacturer standard application to the work related.

END OF SECTION 221116
PSECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vacuum breakers.
   2. Strainers.
   3. Drain valves.
   4. Trap-seal primer valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
   2. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
4. Inlet and Outlet Connections: Threaded.
5. Finish: **Rough bronze**.

### 2.4 STRAINERS FOR DOMESTIC WATER PIPING

**A. Y-Pattern Strainers:**

1. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 (DN 65) and larger.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
   a. Strainers NPS 2 (DN 50) and Smaller: **0.062 inch (1.57 mm)**.
6. Drain: **Factory-installed, hose-end drain valve**.

### 2.5 DRAIN VALVES

**A. Ball-Valve-Type, Hose-End Drain Valves:**

2. Pressure Rating: **400-psig (2760-kPa)** minimum CWP.
3. Size: **NPS 3/4 (DN 20)**.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
8. Inlet: Threaded or solder joint.

### 2.6 TRAP-SEAL PRIMER DEVICE

**A. Drainage-Type, Trap-Seal Primer Device**<Insert drawing designation if any>:

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve and pump.

B. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 FIELD QUALITY CONTROL

A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

END OF SECTION 221119
SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Pipe, tube, and fittings.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE
   A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS
   A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 PVC PIPE AND FITTINGS
   A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
   B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
   C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
   D. Adhesive Primer: ASTM F 656.
      1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
E. Solvent Cement: ASTM D 2564.
   1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class, schedule 40.
B. Gaskets: ASTM C 564, rubber.
C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
E. Install piping at indicated slopes.
F. Install piping free of sags and bends.
G. Install fittings for changes in direction and branch connections.
H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
   1. Building Sanitary Drain: 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
   2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

K. Install aboveground PVC piping according to ASTM D 2665.

L. Install underground PVC piping according to ASTM D 2321.

M. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

A. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.3 VALVE INSTALLATION

A. Backwater Valves: Install backwater valves in piping subject to backflow.
   1. Horizontal Piping: Horizontal backwater valves.
   2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.

3.4 HANGER AND SUPPORT INSTALLATION

A. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve and coupling.

B. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
   2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
   3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
C. Install supports for vertical PVC piping every 48 inches (1200 mm).

D. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Install horizontal backwater valves with cleanout cover flush with floor.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.6 FIELD QUALITY CONTROL

A. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
3. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without
introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

3.7 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.8 PIPING SCHEDULE

A. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be the following:
   1. Cast-iron soil pipe and fittings; gaskets; and gasketed joints.

B. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be the following:
   1. PVC pipe, PVC socket fittings, and solvent-cemented joints.
   2. Cast-iron soil pipe and fittings; gaskets; and gasketed joints.

C. Underground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be the following:
   1. PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 221316
SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Floor drains.
   2. Trench drains.

1.2 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.
B. FRP: Fiberglass-reinforced plastic.
C. HDPE: High-density polyethylene.
D. PE: Polyethylene.
E. PP: Polypropylene.
F. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.
B. Comply with NSF 14 for plastic sanitary piping specialty components.

2.2 FLOOR DRAINS

A. Plastic Floor Drains:
   2. Material: PVC.
3. Seepage Flange: **Required.**
4. Clamping Device: **Required.**
5. Outlet: **Bottom.**
6. Sediment Bucket: **Not required.**
7. Top or Strainer Material: **Stainless steel.**
8. Top of Body and Strainer Finish: **Stainless steel.**
9. Top Shape: **Square.**
10. Trap Material: **Plastic drainage piping.**
11. Trap Pattern: **Standard P-trap or local trap.**

2.3 TRENCH DRAINS

A. Trench Drains:

2. Material: Ductile or gray iron.
3. Clamping Device: **Required.**
4. Outlet: **Side.**
5. Grate Material: **Stainless steel.**
6. Grate Finish: **Painted.**
7. Top Loading Classification: **Heavy Duty.**
8. Trap Material: **Stainless steel.**
9. Trap Pattern: **Standard P-trap or local trap.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:
   a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
   b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
   c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.
   a. Maintain integrity of waterproof membranes where penetrated.
5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
B. Install trench drains at low points of surface areas to be drained.
   1. Set grates of drains flush with finished surface, unless otherwise indicated.
   2. Install on support devices, so that top will be flush with adjacent surface.

C. Install open drain fittings with top of hub 1 inch (25 mm) above floor.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.

C. Comply with requirements in Section 221323 "Sanitary Waste Interceptors" for grease interceptors, grease-removal devices, oil interceptors, sand interceptors, and solid interceptors.

D. Install piping adjacent to equipment to allow service and maintenance.

E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319.13
SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Residential, electric, storage, domestic-water heaters.
   2. Domestic-water heater accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated.

B. Shop Drawings:
   1. Wiring Diagrams: For power, signal, and control wiring.

1.3 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

   1. Warranty Periods: From date of Substantial Completion.
      a. Residential, Electric, Storage, Domestic-Water Heaters:
         1) Storage Tank: Five years.

PART 2 - PRODUCTS (GFCI)

Government Furnished Contractor Installed.

A. Residential, Electric, Storage, Domestic-Water Heaters:

   1. Approved manufacturers AO smith, Rheem or approved equal provided the manufacturer have a local representative for future maintenance and repair.

      b. Pressure Rating: 150 psig (1035 kPa).

   4. Factory-Installed Storage-Tank Appurtenances:
a. Anode Rod: Aluminum anode with stainless steel core or Magnesium
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE 90.2.
e. Jacket: Steel, cylindrical, with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Heating Elements: Two; electric, screw-in immersion type; wired for non-simultaneous operation unless otherwise indicated. Limited to 4.5 kW total.
h. Temperature Control: Adjustable thermostat.
i. Safety Control: High-temperature-limit cutoff device or system.
j. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics:

1. Capacity: **80 gal.**
2. Recovery: **21 gph** at **90 deg F** temperature rise.
3. Temperature Setting: **125 deg F (52 deg C).**
4. Heating Elements: **4.5KW.**
5. Electrical Characteristics:
   a. Volts: **240.**
   b. Phases: **Single.**
   c. Hertz: **50.**

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than **NPS 3/4 (DN 20)** with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

B. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

C. Heat-Trap Fittings: ASHRAE 90.2.

D. Pressure-Reducing Valves: ASSE 1003 for water. Set at **25-psig- (172.5-kPa-) maximum outlet pressure** unless otherwise indicated.

E. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

F. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of **18 inches (457 mm)** above the floor.
2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. And retesting will be required.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.

B. Residential, Electric, Domestic-Water Heater Mounting: Install residential, electric, domestic-water heaters on domestic-water heater mounting bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

C. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

D. Fill electric, domestic-water heaters with water.

E. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare test and inspection reports.

END OF SECTION 223300
SECTION 224100 - RESIDENTIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bathtubs.
2. Faucets.
3. Lavatories.
4. Showers.
5. Water closets.
6. Toilet seats.
7. Supply fittings.
8. Waste fittings.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted plumbing fixtures.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 BATHTUBS (Government furnished)

A. Bathtubs, with shower.

1. PMMA (Acrylic) Bathtubs:
2. Fixture:
   b. Standard: ANSI Z124.1.2 for FRP bathtubs.
c. Bathing Surface: Slip resistant according to ASTM F 462.
d. Drain: NPS 1-1/2 (DN 40); chrome-plated-brass, pop-up waste and overflow.

4. Waste Fittings:
   b. Drain: Stainless steel or chrome-plated brass, removable strainer.
   c. Overflow: Chrome-plated-brass escutcheon with toggle drain-plug device.
   d. Drain Piping: NPS 1-1/2 (DN 40) cast-brass overflow, P-trap, and waste.
   e. Drain Piping: Schedule 40 PVC, NPS 1-1/2 (DN 40) P-trap and waste.

2.2 BATHTUB FAUCETS (Government furnished)

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Bathtub Faucets: Single handle, **thermostatic**.
   1. Pressure-Balance Faucets:
   2. Thermostatic Faucets:
   4. Faucet:
      b. Finish: Polished chrome plate.
      c. Maximum Flow Rate: **2.5 gpm (9.5 L/min.)** unless otherwise indicated.
      d. Mounting: Concealed.
      e. Operation: Single handle, **push-pull** control, with hot- and cold-water indicators.
      g. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
      h. Diverter: In-tub filler spout.
      i. Supply Connections: NPS 1/2 (DN 15).

5. Shower Head:
   b. Type: Hand shower. Include wall-mounting device.
   d. Shower Head Material: Metallic with chrome-plated finish.
   e. Spray Pattern: **Adjustable**.

2.3 LAVATORIES (Government furnished)

A. Lavatories: **Oval, vitreous china**, counter mounted.
   1. PMMA (Acrylic) Lavatories.
   2. Solid-Surface Lavatories.
   3. Stainless-Steel Lavatories.
   4. Vitreous-China Lavatories:
   5. Fixture:
      f. Type: **Self-rimming**.

B. Lavatories: **Oval**, vitreous china, pedestal.
   1. Fixture:
      b. Oval Nominal Size: **20 by 17 inches (508 by 432 mm)**.

2.4 LAVATORY FAUCETS (Government furnished)

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: **Single-control mixing** valve.
   1. General-Duty, Solid-Brass Faucets:
   2. General-Duty, Copper- or Brass-Underbody Faucets:
   4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
   5. Body Material: **General-duty, solid brass**.
   6. Finish: **Polished chrome plate or Polished brass**.
   7. Valve Handle(s): **Lever**.
   8. Inlet(s): **NPS 3/8 (DN 10) tubing, plain end, NPS 1/2 (DN 15) female shank**.
   9. Spout: **Swivel, gooseneck**.
   10. Operation: **Compression, manual, Sensor**.
   11. Drain: **Pop up**.
2.5 SHOWERS (Government furnished)

A. Showers: Standard FRP, PMMA with base and faucet.

1. FRP Showers:
2. PMMA (Acrylic) Showers:
4. Bathing Surface: Slip resistant according to ASTM F 462.

B. Showers: Accessible FRP, PMMA with seat, grab bar, base, and faucet.

1. FRP Showers:
2. PMMA Showers:
4. Nominal Size: 60 by 36 inches (1525 by 915 mm).
5. Bathing Surface: Slip resistant according to ASTM F 462.
6. Accessibility Options: Include grab bar and bench.
7. Drain: Grid, NPS 2 (DN 50).

2.6 SHOWER FAUCETS (Government furnished)

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Shower Faucets: Single handle, thermostatic, mixing valve.

1. Single-Handle, Pressure-Balance Faucets:
2. Single-Handle, Thermostatic Faucets:
3. Two-Handle, Non-Pressure-Balance, and Non-Thermostatic Mixing Faucets:
4. Fixture:
   a. Standard: ASME A112.18.1/CSA B125.1 [and ASSE 1016].
   b. General: Include hot- and cold-water indicators; check stops; and hand head complying with ASSE 1014 with arm, flange, hose, and bracket. Coordinate faucet inlets with supplies.
   c. Body Material: with nonmetallic trim.
   d. Finish: Polished chrome plate or Polished brass.
   e. Mounting: Exposed.
   f. Operation: Compression, manual
   g. Antiscald Device: Integral with mixing valve.
   h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

5. Supply Connections: [NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)].
6. Shower Head:
   a. Type: Ball joint and head integral with mounting flange.
b. Shower Head Material: **Nonmetallic** with chrome-plated finish.
c. Spray Pattern: **Adjustable**.

2.7 **WATER CLOSETS (Government furnished)**

A. Water Closets: Floor mounted, floor outlet, close coupled (gravity tank), vitreous china.

1. Bowl:
   b. Bowl Type: **Siphon jet**.
   c. Height: **Standard or Handicapped/elderly**.
   d. Rim Contour: **Elongated**.

2. Supply Fittings:
   b. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
   c. Stop: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
   
   d. Riser:
      1) Size: **NPS 3/8 (DN 10) or NPS 1/2 (DN 15)** as per design drawings.
      2) Material: **Chrome-plated, soft-copper flexible tube** riser.

B. Water Closets: Floor mounted, floor outlet, close coupled (flushometer tank), vitreous china.

1. Sloan's "Flushmate" Flushometer-Tank, 1.0-Gal./Flush (3.8-L/Flush) Water Closets:
2. Sloan's "Flushmate" Flushometer-Tank, 1.6-Gal./Flush (6-L/Flush) Water Closets:
3. Geberit's "PF/2 Energizer" Flushometer-Tank, 1.6-Gal./Flush (6-L/Flush) Water Closets:
4. Briggs's Vacuum-Assist, Flushometer-Tank, 1.6-Gal./Flush (6-L/Flush) Water Closets:

5. Bowl:
   b. Bowl Type: **Siphon jet**.
   c. Height: **Standard or Handicapped/elderly**.
   d. Rim Contour: **Elongated**.

6. Supply Fittings:
   b. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
   c. Stop: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
d. Riser:
   1) Size: NPS 3/8 (DN 10) or NPS 1/2 (DN 15).
   2) Material: Chrome-plated, soft-copper flexible tube riser.

2.8 TOILET SEATS (Government furnished)

A. Toilet Seats:
   3. Type: Residential or Commercial (Standard).
   4. Shape: Elongated rim (Closed front).
   5. Configuration: Closed front with cover.
   7. Hinge Type: Self-sustaining, check.

2.9 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Lavatory Supply Fittings:
   1. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
   2. Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
   3. Risers:
      a. Size: NPS 3/8 (DN 10) for lavatories.
      b. Material: Chrome-plated, soft-copper flexible tube riser.

2.10 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 (DN 32) offset tailpiece for accessible lavatories.

C. Drain: Pop-up type with NPS 1-1/4 (DN 32) straight tailpiece as part of faucet for standard lavatories.

D. Trap:
1. Size: NPS 1-1/2 (DN 40) for lavatories.
2. Material: Chrome-plated, one-piece, cast-brass trap with swivel 0.029-inch- (73-mm-) thick tubular brass wall bend; and chrome-plated-brass or -steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.
4. Material: ASTM F 409 ABS [or] [PVC] one-piece trap and waste to wall and wall flange.

2.11 GROUT

B. Characteristics: Nonshrink; recommended for interior and exterior applications.
C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install plumbing fixtures level and plumb according to roughing-in drawings.
B. Install floor-mounted water closets on closet flange attachments to drainage piping.
C. Install counter-mounting fixtures in and attached to casework.
D. Install pedestal lavatories on pedestals and secured to wood blocking in wall.
E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
   1. Exception: Use gate valves if supply stops are not specified with fixture. Comply with valve requirements specified in and Section 220523.15 "Gate Valves for Plumbing Piping."
F. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
G. Install toilet seats on water closets.
H. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
I. Install shower flow-control fittings with specified maximum flow rates in shower arms.

J. Install traps on fixture outlets.
   1. Exception: Omit trap on fixtures with integral traps.
   2. Exception: Omit trap on indirect wastes unless otherwise indicated.

K. Set bathtubs and shower receptors in leveling bed of cement grout.

L. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories and sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

M. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings.

N. Seal joints between plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.2 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories and sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 ADJUSTING

A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.4 CLEANING AND PROTECTION

A. After completing installation of plumbing fixtures, inspect and repair damaged finishes.

B. Clean plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
C. Provide protective covering for installed plumbing fixtures and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224100
SECTION 233413 - AXIAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tubeaxial fans.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.
7. Fan speed controllers.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For axial fans to include in emergency, operation, and maintenance manuals.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AMCA Compliance: Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.

B. Capacities and Characteristics:

1. Airflow: **400 cfm**.
2. External Static Pressure: **0.1 inches wg**.
3. Drive Type: **Direct**.
4. Motor:
   a. Electrical Characteristics:
      1) Volts: **230**.
      2) Phase: **Single**.
      3) Hertz: 50.

5. Vibration Isolators: **Spring** isolators.

2.2 TUBEAXIAL FANS

A. Description: Fan wheel and housing, factory-mounted motor with direct drive, an inlet cone section, and accessories.

B. Housings: **Injection molded plastic** with flanged inlet and outlet connections.

C. Accessories:

1. Mounting Clips: **mounting** clips welded to fan housing, of same material as housing.
2. Inlet Screen: Wire-mesh screen on fans not connected to ductwork, of same material as housing.
3. Outlet Screen: Wire-mesh screen on fans not connected to ductwork, of same material as housing.
4. Backdraft Dampers: Butterfly style, for bolting to the discharge of fan or outlet cone, of same material as housing.
5. Shaft Seal: Elastomeric seal and Teflon wear plate, suitable for up to **300 deg F** (149 deg C).
6. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
7. Inlet Bell: Curved inlet for when fan is not attached to duct, of **same material as housing**.
8. Inlet Cone: Round-to-round transition of same material as housing.
9. Outlet Cone: Round-to-round transition, of same material as housing.
10. Direct-Driven Units: Encase motor in housing outside of airstream[, **factory wired to disconnect switch located on outside of fan housing**]. Extend lubrication lines to outside of casing and terminate with grease fittings.

D. Factory Finishes:

2.3 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install axial fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Equipment Mounting: Install fans in windows

D. Install units with clearances for service and maintenance.

3.2 CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
   3. Verify that cleaning and adjusting are complete.
   4. Verify lubrication for bearings and other moving parts.
   5. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 233413
SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
   1. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
   2. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:
   1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:
   a. For Compressor: **Five** years from date of Substantial Completion.
   b. For Parts: **Five** years from date of Substantial Completion.
   c. For Labor: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Carrier Optimax heat pump or approved equal.

2.2 INDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Wall-Mounted, Evaporator-Fan Components:
   1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
   2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
   5. Fan Motors:
      a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
      b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
      c. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
      d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
e. Mount unit-mounted disconnect switches on exterior of unit.

6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

7. Condensate Drain Pans:
   a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

      1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
      2) Depth: A minimum of 1 inch (25 mm) deep.

b. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.

c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.


8. Air Filtration Section:
   a. General Requirements for Air Filtration Section:

      1) Comply with NFPA 90A.
      2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
      3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Filters:
   1) Efficient carbon - electrostatic air filter for odors and microscopic dust removal.
   2) Efficient anti dust washable air filters for clean and healthy air.

2.3 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

   a. Compressor Type: Scroll.
   b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
c. Refrigerant Charge: R-410A.
d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
7. High Ambient (tropical): Permits operation up to 126 deg F (52 deg C).

2.4 ACCESSORIES

A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

B. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
   1. Compressor time delay.
   2. 24-hour time control of system stop and start.
   3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
   4. Fan-speed selection including auto setting.

C. Automatic-reset timer to prevent rapid cycling of compressor.

D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

E. Drain Hose: For condensate.

2.5 CAPACITIES AND CHARACTERISTICS

A. Cooling Capacity:
   1. 23,650 Btu/h.
   2. Moisture Removal: 2.6 (L/h).

B. Heating Capacity:
   1. Type: Electric.
   2. Total Capacity: 24,000 Btu/h.
   3. Electric Heating Coil:
      a. Total Capacity: 7.03 kW.
      b. Volts: 220.
      c. Phase: Single.
      d. Hertz: 50.
C. Indoor Unit:
   1. Fan Motor Electrical Characteristics:
      a. Volts: 220.
      b. Phase: Single.
      c. Hertz: 50.

D. Outdoor Unit:
   1. Type: Air cooled.
   2. Electrical Characteristics:
      a. Volts: 220.
      b. Phase: Single.
      c. Hertz: 50.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on manufacturer’s equipment support.

D. Equipment Mounting:
   1. Comply with requirements for vibration isolation devices.

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
B. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

END OF SECTION 238126
SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for [Type PVC].
C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for [armored cable, Type STA and PVC/PVC and XLPE/PVC with ground wire.

2.2 CONNECTORS

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.
PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for all feeders. Solid for 4 mm² and smaller; stranded for 6mm² and larger.

B. Branch Circuits: Copper. Solid for 4mm² and smaller; stranded for 6mm² and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: PVC/PVC or XLPE/PVC multiconductor cable.

B. Feeders Concealed in Ceilings, Walls, and Partitions: PVC/PVC.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: PVC/STA/PVC or XLPE/STA/PVC.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: PVC insulated.

E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: PVC/PVC or XLPE/PVC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material [and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors].

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least [6 inches (150 mm)] of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.


3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors 50mm2 and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

   a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.

   b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

   c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

B. Test and Inspection Reports: Prepare a written report to record the following:
1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519
SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Furse, ERCO or approved equal.

2.2 SYSTEM DESCRIPTION
A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS
A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   4. Bonding Conductor: 16 mm2, stranded conductor.
   5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
   6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES (If Needed).

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for 10mm2 and smaller, and stranded conductors for 16 mm2 and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, 70mm2 minimum.

1. Bury at least 24 inches (600 mm) below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Pad-Mounted generator and Switches: Install two ground rods around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than 35mm² for taps to equipment grounding terminals.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. UPS System network.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the distribution panel to equipment grounding bar terminal on busway.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

3.5 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
C. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526
SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved:

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Wheatland, Allied, B-LINE, HILTI. Or approved equal.
3. Channel Width: [1-5/8 inches (41.25 mm)].
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
7. Channel Dimensions: Selected for applicable load criteria.
B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, or stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529
SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal conduits, tubing, and fittings.
   2. Nonmetal conduits, tubing, and fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   1. Structural members in paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. IMC: Comply with ANSI C80.6 and UL 1242.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
   a. Material: Steel.
   b. Type: Compression.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

F. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS
A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. ENT: Comply with NEMA TC 13 and UL 1653.
C. RNC: schedule -40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
D. LFNC: Comply with UL 1660.
E. Continuous HDPE: Comply with UL 651B.
F. Fittings for LFNC: Comply with UL 514B.
G. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS
A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
C. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Device Box Dimensions: 100 mm square by 60 mm deep.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, [Type 1] [Type 3R] with continuous-hinge cover with flush latch unless otherwise indicated.

   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

H. Cabinets:

   1. NEMA 250, [Type 1] [Type 3R] galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.
   6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

   1. Exposed Conduit: schedule-40-PVC.
   2. Concealed Conduit, Aboveground: IMC (outdoor), EMT (indoor).
   3. Underground Conduit: RNC, schedule-40-PVC in direct buried or concrete encased.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

   1. Exposed, Not Subject to Physical Damage: [EMT] [ENT] [or] [RNC].
   2. Exposed, Not Subject to Severe Physical Damage: [EMT] [RNC identified for such use].
   3. Exposed and Subject to Severe Physical Damage: [GRC] [IMC]. Raceway locations include the following:

      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
c. Mechanical rooms.
d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT or RNC, schedule-40-PVC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.

C. Minimum Raceway Size: [3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of hot-water pipes. Install horizontal raceway runs above water piping.

B. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

C. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

D. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

E. Support conduit within 12 inches (300 mm) of enclosures to which attached.

F. Raceways Embedded in Slabs:
1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
3. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

G. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, or IMC for raceways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

I. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

K. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

L. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where an underground service raceway enters a building or structure.
   3. Where otherwise required by NFPA 70.

M. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

N. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
O. Locate boxes so that cover or plate will not span different building finishes.

P. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Q. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

R. Set metal floor boxes level and flush with finished floor surface.

S. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
   1. Excavate trench bottom to provide firm and uniform support for conduit.
   2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
   3. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
   4. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533
SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Identification of power and control cables.
   2. Identification for conductors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with ANSI Z535.4 for safety signs and labels.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
   1. **Black letters on an orange field.**
   2. Legend: Indicate voltage and service type.

B. Warning labels and signs shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2.3 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
2.4 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Underground-Line Warning Tape

1. Tape:
   a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   b. Printing on tape shall be permanent and shall not be damaged by burial operations.
   c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:
   a. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE".
   b. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE.

2.5 Signs

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

2.6 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use industry standard colors for ungrounded service conductors.
   a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

D. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

END OF SECTION 260553
SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Distribution panelboards.
      2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS
   A. MCCB: Molded-case circuit breaker.
   B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of panelboard.
   B. Shop Drawings: For each panelboard and related equipment.
      1. Include dimensioned plans, elevations, sections, and details.
      2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
      3. Detail bus configuration, current, and voltage ratings.
      4. Short-circuit current rating of panelboards and overcurrent protective devices.
      5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
      6. Include wiring diagrams for power, signal, and control wiring.
      7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS
   A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and maintenance data.
1.6  **WARRANTY**

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

   1. Panelboard Warranty Period: **12** months from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1  **PANELBOARDS COMMON REQUIREMENTS**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Enclosures: **Flush and Surface**-mounted, dead-front cabinets.

   1. Rated for environmental conditions at installed location.

      a. Indoor Dry and Clean Locations: NEMA 250, IP42
      c. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, IP54.

   2. Height: **84 inches (2.13 m)** maximum.

   3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.

   4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

D. Incoming Mains Location: **Bottom**.

E. Phase, Neutral, and Ground Buses: **Hard-drawn copper, 98 percent conductivity**.

F. Neutral copper bus bar size shall be same size of the phase copper bus bar.

G. Conductor Connectors: Suitable for use with conductor material and sizes.

   1. Material **Hard-drawn copper, 98 percent conductivity**.
   2. Main and Neutral Lugs: **Mechanical** type, with a lug on the neutral bar for each pole in the panelboard.
   3. Ground Lugs and Bus-Configured Terminators: **Mechanical** type, with a lug on the bar for each pole in the panelboard.
   4. Feed-Through Lugs: **Mechanical** type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. **Subfeed (Double) Lugs**: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

H. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

I. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.

### 2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD **Type 1**.

### 2.3 LIGHTING, POWER AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Schneider Electric, ABB or approved equal.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
   1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.

C. Mains: **Circuit breaker**.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: **set screw type circuit breakers**.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: **set screw type circuit breakers**.

F. Branch Overcurrent Protective Devices: Fused switches.

G. Contactors in Main Bus: NEMA ICS 2, Class A, **electrically** held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
   1. External Control-Power Source: **220-V branch circuit**.

### 2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. General Electric, Cutler Hummer or approved equal.
   2. MCCB Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Provide Available fault current as described in NEC 110.24.

C. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

D. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NECA 407.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim [90 inches (2286 mm)] above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
G. Make grounding connections and bond neutral for services and separately derived systems to
ground. Make connections to grounding electrodes, separate grounds for isolated ground bars,
and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Create a directory to indicate installed circuit loads; incorporate Owner's final room
designations. Obtain approval before installing. Handwritten directories are not acceptable.
Install directory inside panelboard door.

B. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements
for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder,
      and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test for low-voltage air
circuit breakers stated in NETA Acceptance Testing Specification. Certify compliance
   with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate
      compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards
   included and that describes scanning results, with comparisons of the two scans. Include
   notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416
SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Receptacles and associated device plates.
   2. Toggle switches and associated device plates.
   3. GFCI devices.
   5. Wall-switch and exterior occupancy sensors.
   6. Communications outlets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Leviton, Hubbell or approved equal.
B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 220 V, 10/16 A.
   Leviton, Hubbell or approved equal.

2.4 GFCI DEVICES

1. Provide circuit breaker with GFCI protection 10mA for the required circuits according to the NEC 70 requirement.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and IEC.

B. Switches, 220 V, 10/16 A: Leviton, Hubbell or approved equal.
   1. Single Pole:
   2. Two Pole:
   3. Three Way:

C. Pilot-Light Switches, 20 A:
   1. Legrand, Gewiss or approved equal.
   2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

2.6 RESIDENTIAL DEVICES

A. Fan Speed Controls:
   1. Modular, 220-V, full-wave, solid-state units with integral, quiet on-off switches.
   2. Continuously adjustable toggle switch.

B. Communication Outlet:
   Leviton, Hubbell or approved equal.
1. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 6. Comply with UL 1863.

C. Combination TV Outlet:

Leviton, Hubbell or approved equal.
1. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; coaxial cables RG6 as needed.

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic
3. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.

2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Emergency Power System: [Red].
2. TVSS Devices: Blue.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.
B. Conduits:
   1. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtailed.

C. Device Installation:
   1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Connect devices to branch circuits using pigtailed that are not less than 6 inches (152 mm) in length.
   4. Use a torque screwdriver when a torque is recommended or required by manufacturer.
   5. Tighten unused terminal screws on the device.

D. Receptacle Orientation:
   1. Install ground pin of horizontally mounted receptacles up.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Test Instruments: Use instruments that comply with UL 1436.
   2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:
   1. Line Voltage: Acceptable range is 200 to 240 V.
   2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
   3. Ground Impedance: Values of up to 2 ohms are acceptable.
   4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726
SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonfusible switches.
   2. Molded-case circuit breakers (MCCBs).
   3. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.
PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

A. GE, ABB brand or approved equal.

B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

F. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Lugs: Suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. ABB, Schneider Electric brand or approved equal.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.


D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
   1. Instantaneous trip.
   2. Long- and short-time pickup levels.
   3. Long- and short-time time adjustments.
   4. Ground-fault pickup level, time delay, and $I^2t$ response.
E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; **integrally mounted, self-powered** type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: One **SPDT switch** with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One **NO** contact that operates only when circuit breaker has tripped.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, **Type 1**.
2. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816
SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior solid-state luminaires that use LED technology.
   2. Lighting fixture supports.

1.2 DEFINITIONS

A. CRI: Color Rendering Index.
B. IP: International Protection or Ingress Protection Rating.
C. LED: Light-emitting diode.
D. Lumen: Measured output of lamp and luminaire, or both.
E. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, arranged by designation.
B. Shop Drawings: For nonstandard or custom luminaires.
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale and coordinated with each other, using input from installers of the items involved:
B. Product Certificates: For each type of luminaire.
C. Sample warranty.
1.5  CLOSEOUT SUBMITTALS
   A.  Operation and maintenance data.

1.6  WARRANTY
   A.  Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
   B.  Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1  LUMINAIRE REQUIREMENTS
   A.  Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   B.  Recessed Fixtures: Comply with NEMA LE 4.
   C.  CRI of 70. CCT of 3000 K.
   D.  Rated lamp life of 35,000 hours.
   E.  Internal driver.
   F.  Nominal Operating Voltage: 240 V ac or 24V.
      1.  Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
   G.  Housings:
      1.  Extruded-aluminum housing and heat sink.

2.2  DOWNLIGHT
   A.  Hubbell, Lithonia or approved equal.
   B.  Minimum 1,000 lumens. Minimum allowable efficacy of 80 lumens per watt.
   C.  Universal mounting bracket.
   D.  Integral junction box with conduit fittings.
2.3 RECESSED LINEAR
   A. Hubbell, Lithonia or approved equal.
   B. Minimum 2,000 lumens. Minimum allowable efficacy of 85 lumens per watt.
   C. Integral junction box with conduit fittings.

2.4 SURFACE MOUNT, LINEAR
   A. Hubbell, Lithonia or approved equal.
   B. Minimum 750 lumens. Minimum allowable efficacy of 80 lumens per watt.
   C. Integral junction box with conduit fittings.

2.5 SUSPENDED, LINEAR
   A. Hubbell, Lithonia or approved equal.
   B. Minimum 2,000 lumens. Minimum allowable efficacy of 85 lumens per watt.

2.6 MATERIALS
   A. Metal Parts:
      1. Free of burrs and sharp corners and edges.
      2. Sheet metal components shall be steel unless otherwise indicated.
      3. Form and support to prevent warping and sagging
   B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
   C. Diffusers, and Globes:
      1. Acrylic: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
      2. Glass: Annealed crystal glass unless otherwise indicated.
      3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
   D. Housings:
      1. Extruded-aluminum housing and heat sink.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

B. Install lamps in each luminaire.

C. Supports: Sized and rated for luminaire weight.

D. Flush-Mounted Luminaire Support: Secured to outlet box.

E. Wall-Mounted Luminaire Support:
   1. Do not attach luminaires directly to gypsum board.

F. Ceiling-Mounted Luminaire Support:
   1. Ceiling mount with hook mount.

G. Suspended Luminaire Support:
   1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
   2. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
   2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119
SECTION 265219 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Emergency lighting units.
   2. Luminaire supports.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.
B. CRI: Color Rendering Index.
C. Emergency Lighting Unit: A lighting unit with integral or remote emergency battery powered supply and the means for controlling and charging the battery and unit operation.
D. Fixture: See "Luminaire" Paragraph.
E. Lumen: Measured output of lamp and luminaire, or both.
F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two year(s) from date of Substantial Completion.
B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
PART 2 - PRODUCTS

2.1  GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

A.  Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B.  Comply with NFPA 70 and NFPA 101.

C.  Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.

1.  Emergency Connection: Operate two lamp(s) continuously at an output of 1000 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.

2.  Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

3.  Test Push-Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
   a.  Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
   b.  Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.


5.  Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

6.  Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.2  EMERGENCY LIGHTING

A.  General Requirements for Emergency Lighting Units: Self-contained units.

B.  Emergency Luminaires:

1.  Lithonia, Bega or approved equal.
2.3 MATERIALS

A. Metal Parts:
   1. Free of burrs and sharp corners and edges.
   2. Sheet metal components shall be steel unless otherwise indicated.
   3. Form and support to prevent warping and sagging.

B. Diffusers and Globes:
   1. **Prismatic acrylic**
   2. Glass: Annealed crystal glass unless otherwise indicated.
   3. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   4. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

C. Housings:
   1. **Extruded aluminum** housing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

B. Install lamps in each luminaire.

C. Supports:
   1. Able to maintain luminaire position when testing emergency power unit.
   2. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
   3. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of fixture weight.

D. Wall-Mounted Luminaire Support:
   1. Do not attach fixtures directly to gypsum board.

E. Suspended Luminaire Support:
   1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
   3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
F. Ceiling Grid Mounted Luminaires:
   1. Secure to any required outlet box.
   2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.

G. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265219
SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete pavers.
   2. Garden curbs
   3. Quartz based stone pavers

1.2 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Samples: For each type of unit paver indicated and the following:
   1. Joint materials involving color selection.
   2. Exposed edge restraints involving color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

PART 2 - PRODUCTS

2.1 CONCRETE PAVERS

A. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936/C 936M, made from normal-weight aggregates.

   1. Manufactured by Nile Co, Cementa, El Soufi, or equal approved.
   2. Thickness: 80 mm.
   3. Face Size, Shape and color: as selected by the COR from manufacturer’s full range.

B. Quartz-Based Stone Pavers: Random polygonal flagstones made from quartz-based stone complying with ASTM C 616/C 616M.

   1. Manufactured by Nile Co, El Soufi, Toblat, or equal approved
   2. Finish: as selected by the COR from manufacturer’s full range
   3. Thickness: Not less than 25 mm unless otherwise indicated.
   4. Face Size: 305 mm square as a minimum.

1. Manufactured by Cementa, El Soufi, or equal approved.
2. Thickness: **150 mm**.
3. Face Size, Shape and color: as selected by the COR from manufacturer’s full range.

### 2.2 AGGREGATE SETTING-BED MATERIALS

A. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.

B. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 (1.18-mm) sieve and no more than 10 percent passing No. 200 (0.075-mm) sieve.

### 2.3 MORTAR SETTING-BED MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type II.

B. Sand: ASTM C 144.

C. Water: Potable.

### 2.4 GROUT MATERIALS

A. High-Performance Cement Grout: ANSI A118.7, sanded.

B. Water: Potable.

### 2.5 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimal performance characteristics. Discard mortars and grout if they have reached their initial set before being used.

B. Mortar-Bed Bond Coat: Mix neat cement and [latex additive] [water] to a creamy consistency.

C. Packaged Grout: Proportion and mix according to grout manufacturer's written instructions.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

B. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
1. For concrete pavers, a block splitter may be used.

C. Expansion and Control Joints: Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

D. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.2 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing mortar bed. Do not exceed 1.6-mm thickness for bond coat. Limit area of bond coat to avoid its drying out before placing setting bed.

C. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

E. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1.5-mm thick bond coat to mortar bed or to back of each paver with a flat trowel.

F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

G. Grouted Joints: Grout paver joints complying with ANSI A108.10.

H. Grout joints as soon as possible after initial set of setting bed.

   1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
   2. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

I. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.

J. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

   1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.

END OF SECTION 321400