

PROJECT MANUAL

INCLUDING SPECIFICATIONS FOR THE CONSTRUCTION OF

Tyvola Senior Center PV Panel Installation

MECKLENBURG COUNTY

CHARLOTTE, NORTH CAROLINA



Prepared by

Innovative Design, Inc.

Date of Issue:

October 18, 2024

These plans and specifications are to be provided only as a full and complete set of documents and can be obtained **digitally at no cost** from the County's **authorized Design Consultant** as indicated in the Notice-to-Bidders.

Prime Contractors wishing to submit a bid for this project must provide a **MANDATORY written Letter-of-Interest** to the County's **authorized Design Consultant** at least **48** hours in advance of the bid opening in order to be placed on the official Bidders List for automatic distribution of potential addenda and offered consideration by the County as a responsive bidder. **Bids submitted by Prime Contractors that have not provided a Letter-of-Interest may be considered non-responsive.**

If a contractor obtains a set of Contract Documents (plans and specifications) from any source other than the County's **authorized Design Consultant**, it will be that contractor's responsibility to obtain any addenda. If a contractor bids any portion of these plans without receiving the full and complete set of plans and specifications, they will do so at their own risk. If such bid is accepted by the County, the Contractor is liable for all work as described in the Plans, Specifications, and Addenda.

Sealed proposals will be received until **11 AM, on December 16, 2024**, in the office of **Mecklenburg County Asset & Facility Management Department, 3205 Freedom Drive, Suite 6000, Charlotte, NC 28208**, for the construction of the **Tyvola Senior Center PV Panel Installation** at which time and place Bids will be opened and read aloud. Single-prime, lump sum bids will be taken for construction as indicated in the bidding documents. Proposals must be made on standard forms furnished by the County. The project is located at **2225 Tyvola Rd.; Charlotte, NC 28210**.

The Contractor can obtain the Bid Documents digitally at **no cost** from the County's **Authorized Design Consultant**:

Innovative Design, Inc.

850 W. Morgan St.; Raleigh, NC 27603

Contact: **Louis Gerics, AIA, NCARB** | gerics@innovatedesign.net | (919)-832-6303.

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Plans and Specifications shall also be digitally provided to:

Charlotte Association of General Contractors (AGC) – *Partnered with iSqFt.com*

Dodge Data & Analytics (McGraw-Hill Construction)

Metrolina Minority Contractors Association

Hispanic Contractors Association of the Carolinas

Mecklenburg County Business Diversity & Inclusion (BDI) Program

Bid, Performance, and Payment & Material bonds shall be required for this project.

The laws of North Carolina and applicable regulations of various Licensing Boards and M/W/SBE provisions will be observed in receiving bids and awarding contracts.

No pre-bid meeting shall be held. **A site visit can be requested through the Design Consultant, no later than December 6, 2024.** .

Mecklenburg County reserves the right to reject any or all proposals and to waive informalities or technicalities, as it may deem to be in its best interest.

Upon request, this information will be made available in an alternative format for persons with disabilities. Please call 919-832-6303 for assistance.

*A true copy of this notice was published in the **Charlotte Observer** and on the **North Carolina Electronic Vendor***

Portal(EVP) website: <https://evp.nc.gov/>

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1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Louis J Gerics, AIA, NCARB
2. LICENSE NO: 6766
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.



10/18/2024

B. Electrical Engineer:

1. Todd Hedrick, PE
2. LICENSE NO: 049182
3. Responsible for the following
 - a. Division 26 - Electrical



07/10/2024

1. **FAMILIARITY WITH WORK AND CONDITIONS:** Before preparing Bids, Bidders are urged to visit the site to inform and familiarize themselves with all conditions involved and under which the project is to be constructed or apparatus erected or installed. The Owner will not be responsible to the Contractor for payments other than as set out in the Construction Contract should construction conditions be different from those assumed or contemplated by the Contractor. The Contractor is required to satisfy himself, before bidding, as to the correctness of the site as indicated by the Contract Documents.
2. **FAMILIARITY WITH LAWS, ETC.:** The Bidder shall be familiar with all Federal, State and Local Laws, ordinance and regulations, which may in any manner affect those engaged or employed in Work, or the materials or equipment in or upon the Work, or in any way affect the conduct of the Work, and no pleas of misunderstanding will be considered on account of the ignorance thereof. If the Bidder or Contractor shall discover any provisions in the plans, specifications or Construction Contract (hereinafter sometimes referred to as "Contract") which are contrary to or inconsistent with any such law, ordinance, or regulation, he shall immediately report it to the Consultant in writing before the bid opening.
3. **INTERPRETATIONS OF PLANS AND SPECIFICATIONS:** If any prospective Bidder is in doubt as to the true meaning of any part of the Contract Documents, he shall submit to the Consultant no later than seven (7) calendar days prior to the bid opening, a written request for an interpretation thereof.

Any interpretation of the proposed documents will be made only by Addenda to the Contract Documents, which will be sent to all persons to whom Contract Documents have been issued. Interpretations, corrections and changes in Contract Documents made in any other manner will not be binding.

All such addenda shall become part of the Contract Documents. The Consultant and the Owner will not be responsible for any other explanations or interpretations.

The Bid Proposal shall be based upon the materials and equipment described in the Contract Documents or on substitutions that have been approved for use on this project. The proposal shall include any fees associated with the Mecklenburg County permits & plan review and City of Charlotte plan review & permits.

4. **INSURANCE, PERFORMANCE & PAYMENT AND MATERIAL BONDS:** See the General Conditions for Insurance, Performance & Payment and Material Bond requirements.
5. **PROPOSAL FORM:** All forms included in the bidding documents shall be completed in ink or be typewritten. Both words and figures shall be indicated on the bid proposal form. If there is a discrepancy between the wording and the figures, the wording shall govern. With each bid, the Contractor shall include: Certification of Non-Discrimination in Employment, Certification of Compliance with Americans with Disabilities Act, Bidder's Qualification And

Affidavit, Bid Bond, and all Business Diversity & Inclusion (BDI) forms listed as 'Required' on the *BDI Solicitation Coversheet* found in Section V. BUSINESS DIVERSITY & INCLUSION (BDI) PROGRAM PROVISIONS GUIDE in this Project Manual. If there are any omissions, lines left blank on the bid form, alterations, or qualifiers of the bid form; the bid proposal shall be deemed as non-responsive unless such omission, alteration or qualifier is waived by the Owner as an informality or technicality in the Owner's sole discretion. If an Alternate does not change the "Base Bid" then the Contractor shall enter "No Change" in the blank. A person that is legally authorized to bind the Contractor to a contract with the Owner shall sign the proposal. The signer of the bid proposal shall initial any corrections.

The Contractor shall bid the number of calendar days, unless indicated otherwise within the Contract Documents, required to complete the Work.

6. **QUALIFICATIONS:** The Contractor shall include the Bidder's Qualifications And Affidavit Form with their bid. The Owner reserves the right to disqualify a bid if the bidder does not possess the minimum stipulated qualifications for the Work or has not provided the requested information

7. **BID BOND OR BID DEPOSIT:** Each proposal must be accompanied by a Bid Bond executed by a corporate surety licensed under the laws of North Carolina to execute such bonds, conditioned that the surety will, upon demand forthwith make payment to the Owner if the bidder fails to execute the Contract. The Bid Bond shall be in the amount of five (5%) percent of the total bid plus all of the alternates. The Bid Bond shall be valid for a minimum of one hundred and twenty (120) calendar days. In lieu of a Bid Bond, a deposit equal to five (5%) percent of the total bid plus all of the alternates in the form of a Cashier's Check or Certified Check on some bank or trust company insured by the Federal Deposit Insurance Corporation and payable to Mecklenburg County. The purpose of the Bid Deposit or Bid Bond is to ensure that the bidder will enter into a Contract with the Owner with the terms stipulated in the Bid Proposal and the bidder guarantees that a Performance, Labor & Material Bond will be executed. If the Contractor fails to execute a Contract, the Bid Bond or Bid Deposit shall be seized. Bid security shall be submitted separately for each project and bid.

8. **DIRECTING PROPOSALS:** Each proposal must be complete and independent including bid proposal forms, bid security, etc. No verbal or electronic bids will be accepted. Each proposal must be submitted in (2) opaque adhesively sealed envelopes, to conceal its contents as follows:
 - a. Inner Envelope shall contain all bidding documents indicated in Item-5 of Instructions to Bidders with the exception of the Bid Bond. The name of the Bidder, their address and license number shall be marked on the outside of the Inner Envelope.
 - b. Outer Envelope shall contain the sealed Inner Envelope and the Bid Bond. The Project Name and Bid Date shall be marked on the outside of the sealed Outer

Envelope as well as the address for submission as indicated in the "Notice to Bidders".

- 9. OPENING OF PROPOSALS:** Properly submitted bids will be opened publicly and read promptly at the time, date, and place set forth in the "Notice to Bidders". Bidders or their authorized agents and other interested parties are invited to be present.

- 10. BID ERROR:** After the bid opening, if the low bidder finds he has made an error that is clerical in nature and he can support his claim with evidence as defined by law he may request to withdraw the bid. This written request shall be submitted within a period of 72 business hours after the opening of bids. Following such event, if the Owner approves the bid withdrawal request in accordance with North Carolina law, action on the remaining bids shall be as if the withdrawn bid had not been received. The Contract shall be awarded to the next responsible, responsive low bidder.

- 11. BID VALIDITY:** The Bid Proposal shall be deemed valid for a period of one hundred and twenty (120) calendar days after the opening thereof, for purposes of execution of the Contract.

- 12. AWARDING OF CONTRACT:** The Owner will award a Contract conditioned on the availability of funds. The Owner shall have the right to accept Alternates in any order or combination as set forth in Section 012300. The Owner shall award the Contract to the lowest responsible, responsive bidder taking into considerations quality, performance, and the time specified in the Bid Proposal for the performance of the Contract. The Owner reserves the right to negotiate with the apparent lowest responsible, responsive bidder to reduce the scope of the Work to be within budget. The Owner also reserves the right to reject any or all proposals and to waive informalities or technicalities. After the project has been awarded to the Contractor by the Owner, the Owner shall prepare a Contract for the Contractor to execute. Notice to Proceed shall be issued after all parties have executed the Contract.

- 13. EXECUTION OF CONTRACT:** The successful bidder shall execute the Contract within ten (10) calendar days of receipt of the Contract. Failure to execute the Contract can result in the forfeit of the Bid Bond or Bid Deposit.

- 14. NON-DISCRIMINATION:** The County is committed to promoting equal opportunities for all and to eliminating prohibited discrimination in all forms. For purposes of this section, prohibited discrimination means discrimination against Contractor's employees providing services on County premises or in the solicitation, selection, and / or treatment of any subcontractor, vendor, or supplier providing services in connection with this Agreement which actions are illegal under either state or federal law. As a condition of entering into the Agreement, the Contractor represents, warrants and agrees that it does not and will not engage in or condone prohibited discrimination with respect to any Contractor employees assigned to work on behalf of County and that prior to being deployed to a County assignment or premises, employees and subcontractors will review and agree to abide by the County's

Harassment Policy as to the assigned employees.

Bidders must submit with their initial bid a signed statement certifying compliance with requirements of this proposal regarding non-discriminatory employment practices.

15. MINORITY/WOMEN/SMALL BUSINESS ENTERPRISE OPPORTUNITY:

It is the policy of the Owner to provide minorities, women, and small business enterprises equal opportunity for participating in all aspects of the County's contracting and procurement programs, including but not limited to employment, construction development projects, materials/services contracts and/or lease agreements, consistent with the laws of the State of North Carolina. It is further the policy of The Owner to prohibit discrimination against any person or business in pursuit of these opportunities on the basis of race, color, national origin, religion, sex, age, handicap or veteran's status. It is further the policy of the Owner to conduct its contracting and procurement programs so as to prevent such discrimination and to resolve any and all claims of such discrimination.

16. AMERICANS WITH DISABILITIES ACT REQUIREMENTS: The Owner will comply with the Americans with Disabilities Act (ADA), which prohibits discrimination on the basis of a disability. The Owner will make reasonable accommodations in all programs to enable participation by an individual with a disability who meets essential eligibility requirements. The Owner's programs will be available in the most integrated setting for each individual. If any accommodations are necessary for participation in any program or services, participants are encouraged to notify County Staff. Bidders must also submit a signed statement as provided herein, certifying compliance with the requirements of the Americans with Disabilities Act regarding non-discriminatory employment practices.

17. SUBSTITUTIONS: All Requests for approval of substitutions for specified products will be considered only upon submission of samples and manufacturers' data, in triplicate, of the product intended for substitution. The Consultant, no later than ten (10) calendar days prior to the bid opening, must receive all written requests for proposed substitutions for consideration. If the Consultant accepts any proposed substitutions, such acceptance will be set forth in an addendum.



END OF INSTRUCTIONS TO BIDDERS

ARTICLE 1 – GENERAL PROVISIONS

- 1.1 CAPITALIZATION:** Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs, and Clauses in the Documents or (3) the titles of Documents published by the American Institute of Architects.
- 1.2 INTENT OF THE CONTRACT DOCUMENTS:** The Contractor shall use all the Contract Documents in this project, because they are complimentary. The requirements of one of the Documents shall be as binding as if required by all. Performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as an instrument to produce the indicated results.
- 1.3 INTERPRETATION:** In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an”, but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.
- 1.4 GOVERNING LAW:** The Contract and Contractor shall be governed by the laws of North Carolina and the Federal Government.
- 1.5 USE OF SITE, CONSTRUCTION PROCEDURES AND SAFETY:** The Contractor shall confine construction operations to the limits of construction as indicated in the Contract Documents. The Contractor shall provide the Owner, Consultant, independent testing laboratories, and governmental agencies with jurisdictional interests access to the site and the Work at reasonable times for their observation, inspections and testing. The Contractor shall provide them proper and safe conditions for such access and advise them of the Contractor’s site safety procedures and programs so that they may comply.
- 1.6 SUCCESSORS AND ASSIGNS:** The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Construction Contract Documents. Neither party to the Contract shall assign the Construction Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

Any Monies paid to the Contractor by the County can not be assigned to any project other than this project.

- 1.7 CONTRACT DOCUMENTS:** The specifications shall govern in the case of discrepancy between the specifications and the drawings. In all cases, the figured dimensions shall govern in the case of discrepancy. Detailed drawings shall govern in the case of discrepancy between the general drawings and detailed drawings.

The organization of the Construction Documents has no intent to define or limit the scope of the Work performed by any trade, subcontractor, or supplier. Unless otherwise defined in the Contract Documents, words used will have the well-known technical or construction industry meanings.

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

- A. The form of Construction Contract.
- B. Addenda, with those of later date having precedence over those of earlier date.
- C. The Supplementary Conditions.
- D. The General Conditions.
- E. Drawings and Specifications. Full-size or large-scale details or drawings shall govern small-scale drawings which they are intended to amplify. Details or conditions indicated for a portion of the Work but not repeated fully for other portions shall apply throughout to all similar portions except as otherwise specifically noted. In the case of an inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Consultant's interpretation.

- 1.8 RIGHTS AND REMEDIES:** Duties and obligations imposed by the Construction Contract and Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

No action or failure to act by the Owner, or Consultant or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

- 1.9 TESTS AND INSPECTIONS:** Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. The Owner shall hire a Testing Firm for tests, inspections and approvals. The Contractor shall give the Testing Firm and Consultant timely notice of when and where tests and inspections are to be made so that they may be present for such procedures. The Consultant shall define

the nature of all testing criteria for testing contract proposes.

If such procedures for testing, inspection or approval reveals failure of the portions of the Work to comply with requirements established by the Contract Documents, laws, ordinances, rules or regulations. All necessary cost for re-testing, additional Consultant's fee, repair of the Work shall be paid by the contractor.

The Testing Firm shall distribute the certification of tests, inspections, or approvals to the Owner, Contractor, and Consultant.

1.10 SUBSTANTIAL COMPLETION: When the Contractor considers that the Work, or a portion thereof which the Owner and the Consultant agrees to accept separately, is substantially complete, the Contractor shall consult with the Owner, through the Consultant, to obtain preliminary verification that the Work is ready for its intended use. Once the Owner has stated its agreement the Contractor shall schedule a Substantial Completion walkthrough and notify the Owner, through the Consultant, a minimum of ten (10) days prior to the Substantial Completion meeting. After the Substantial Completion, the Contractor shall prepare and submit to the Consultant a comprehensive list of items to be completed or corrected prior to Final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Upon receipt of the Contractor's list, the Consultant will make an inspection to determine if the Work, or designed portion thereof, is substantially complete. If the Consultant's inspection disclose any items, whether or not included on the Contractor's list, which are not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Consultant. In such case, the Contractor shall then submit a request for another inspection by the Consultant to determine Substantial Completion.

When the Work or designated portion thereof is substantially completed, the Consultant will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designed portion thereof unless otherwise provided in the Certificate of Substantial Completion.

The Certificate of Substantial Completion shall be submitted to the Owner and the

Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

The Owner shall allow the Contractor reasonable access to complete or correct the list of items to be completed or corrected prior to Final payment.

1.11 PARTIAL OCCUPANCY OR USE: The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Consultant as described above. The Consultant shall determine the stage of the progress of the Work.

Immediately prior to such partial occupancy or use, the Owner, Contractor and Consultant shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

Unless otherwise agreed, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of the Work not complying with the requirements of Contract Documents.

1.12 PROGRESS PAYMENTS:

- A. After the Consultant has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents.
- B. The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-contractors in similar manner.
- C. The Consultant will, on request, furnish to a Subcontractor, if practicable, information regarding percentage of completion or amounts applied for by the Contractor.

- D. Neither the Owner nor the Consultant shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.
- E. Payment to material suppliers shall be treated in a manner similar to that provided in Article 3 and 4 in this section.
- F. The Contractor shall not be paid anticipated profit(s), or revenue, or other economic loss arising out of a result of the Contract being terminated for any cause or the reduction of the Work.
- G. The Owner shall pay a payment request within forty-five days (45) of receipt of an acceptable and correct payment request from the Consultant. The Contractor shall submit partial payment requests once a month. See Payment Procedures, in section 01 29 00.
- H. Provide a separate line item in the Schedule of Values for close out documentation as set forth in the Supplementary Conditions.
- I. Upon completion of the Work, the Consultant shall proceed with due diligence to measure up the Work and material and present his Final estimate to the County, whereupon the County shall pay or cause to be paid within forty five (45) days thereafter such amount, less payments previously made, in legal tender of the United States, and such payments of such Final Amount shall release the County from all claims for Work done or materials furnished under this Contract.

1.13 FINAL COMPLETION AND FINAL PAYMENT: Upon receipt of written notice that the Work is ready for Final inspection and acceptance and upon receipt of a Final Certificate for Payment, the Consultant will make an inspection and, when the Consultant finds the Work acceptable under the Contract Documents, has received all close out Documentation, and determines the Contract is fully performed, the Consultant will certify the Final Certificate for Payment. The Consultant's Final Certificate for Payment will constitute a further representation that the comprehensive list of items to be completed or corrected prior to Final payment has been reviewed and all items have been satisfactorily resolved as precedent to the Contractor's being entitled to Final payment have been fulfilled. See Payment Procedures, in section 01 29 00.

The making of Final payment shall constitute a waiver of Claims by the Owner except those arising from:

- A. Claims, security interests or encumbrances arising out of the Contract and unsettled;
- B. Failure of the Work to comply with the requirements of the Contract Documents; or
- C. Terms of special warranties required by the Contract Documents.

Acceptance of Final payment by the Contractor, or a Subcontractor or material supplier

shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of Final Certificate for Payment.

1.14 TERMINATION BY THE OWNER FOR CAUSE

- A. The Owner may terminate the Contract if the Contractor:
1. Persistently or repeatedly refuses or fails to supply appropriate properly skilled workers, or appropriate equipment and materials:
 2. Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors:
 3. Persistently disregards laws, ordinances, or rules, or regulations or orders of a public authority having jurisdiction:
 4. Otherwise is guilty of substantial breach of provision of the Contract Documents.
 5. Abandons the Work for 20 days without consent from the Consultant.
- B. When any of the above reasons exist, the Owner, upon certifications by the Consultant that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety seven (7) days written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
1. Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor:
 2. Accept assignment of subcontracts after termination of the Contract and only for those Subcontract agreements, which the Owner accepts by notifying the Subcontractor and Contractor in writing. Assignment is subject to the prior rights of the surety obligated under bond relating to the Contract.
 3. Finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

When the Owner terminates the Contract for one of the reasons stated above, the Contractor shall not be entitled to receive further payment until the Work is completed.

If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Consultant's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid

to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. This obligation for payment shall survive termination of the Contract.

The Contractor shall not be paid anticipated profit(s), or revenue, or other economic loss arising out of a result of the contract being terminated for any cause or the reduction of the Work.

1.15 SUSPENSION BY THE OWNER FOR CONVENIENCE

The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine. The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption and the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination. Adjustment of the Contract Sum shall not include anticipated profit. No adjustment shall be made to the extent:

- A. That performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- B. That an equitable adjustment is made or denied under another provision of the Contract.

1.16 TERMINATION BY THE OWNER FOR CONVENIENCE

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

- A. Cease operations as directed by the Owner in the notice;
- B. Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- C. Except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

1.17 HARASSMENT: Mecklenburg County is strongly committed to maintaining a workplace and service environment free of harassment and discrimination towards its employees, customers, contractors, and other service providers.

Harassment on the job site by the Contractors or Subcontractors toward another individual (this also includes the general public) because of sex, race, religion, age, national origin, or physical/mental challenge shall not be tolerated. Such behavior is illegal under Title VII of the Civil Rights Act and will be treated as an offense.

Definition – Harassment is verbal or physical conduct that denigrates or shows hostility or aversion toward an individual because of race, color, religion, gender, national origin, age, disability, or political affiliation, which has the purpose or effect of creating an intimidating, hostile, or offensive environment or interferes with an individual’s work performance or otherwise adversely affects an individual. Sexual harassment also includes unwelcome behavior such as gestures, comments, suggestions, jokes or derogatory pictures, cartoons or drawings, unwanted sexual advances (ie. including but not limited to whistling, yelling, “cat-calling”, etc.), and pressure for sexual favors.

Any person who is aware of any instance of harassment as defined above shall report the alleged act immediately to his or her supervisor or the County’s project manager. The County’s project manager will contact the Contractor’s project manager.

- A. The person(s) that have allegedly harassed someone shall be removed from the construction project site for the number of days required to investigate the alleged harassment.
- B. If the person(s) having allegedly harassed someone enters the project site or has any contact with those person(s) reporting the alleged harassment during the investigation, that person shall be removed from the site immediately, and a restraining order shall be served. Violation of the restraining order is subject to the legal terms of the order.
- C. The County’s project manager shall notify Mecklenburg County’s legal department and they will conduct the investigation. The Contractors and Subcontractors shall cooperate fully and completely with the legal department.
- D. All complaints will be investigated promptly, impartially, and discreetly and, upon completion of the investigation, the appropriate parties will be notified immediately of the findings. Any employee(s) of the Contractor or Subcontractor or Mecklenburg County who have been found to harass anyone will be subject to appropriate corrective action as deemed by the law.

1.18 EQUAL: For any equipment or product to be considered an equal, it shall perform equal to or better than the performance specifications of the product that is listed. This may

also include the weight of the equipment or product. If there are any modifications required to use the “Equal”, the cost of such modifications shall be borne by the Contractor. The “Allowance or Contingency” shall not be used for the purpose of modifying the “Work” to be able to use the proposed equipment or product”.

- 1.19 BASIS OF DESIGN:** If a model and manufacturer is listed as the basis for a design, it does not preclude any other manufacturer from being able to furnish said equipment or product. Also, it does not exclude manufactures from designing/manufacturing the equipment or product to meet the requirements. For the equipment or product submitted to be considered an “Equal or Substitution”, it shall meet the requirements of being an “Equal”. The design/manufacturing of said equipment or product will not increase the Owner’s cost for the “Work”.

ARTICLE 2 – OWNER’S RIGHTS AND RESPONSIBILITIES

- 2.1 COMMUNICATION TO THE CONTRACTOR:** All notices to the Contractor shall be in writing and shall be signed by an authorized representative of the Owner. Such notices can be delivered in person to the official representative of the Contractor or mailed to the Contractor's official address. Such delivery in person or by mail shall constitute service of the notice.
- 2.2 APPLICATION FOR PAYMENT:** The Owner shall make payment to the Contractor as indicated in Division I - General Requirements of the Technical Specifications entitled Payment Procedures. If any Application for Payment is not correct, it will be returned to the Contractor for correction and resubmission.
- 2.3 STAFF AUTHORIZATION:** The Owner through the Consultant shall have the right of approval of the Contractor’s superintendent and project manager. If at any time, the Owner or the Consultant deems either the Contractor’s superintendent or project manager is performing unsatisfactory, the Owner may request that he or they be replaced to the satisfaction of the Owner.

Within ten (10) calendar days after the Contract is awarded, the Contractor shall furnish in writing, to the Consultant, a list of all Subcontractors. The Consultant will promptly reply to the Contractor in writing stating whether or not the Owner or the Consultant, after due investigation, has reasonable objection to any such proposed Subcontractor(s).

- 2.4 CONSTRUCTION BY THE OWNER OR BY SEPARATE CONTRACTOR(S):** The Owner reserves the right to perform Construction with his own forces or to award separate Contract(s) for the following conditions:
- A. When the Contract Documents indicates a portion of the work shall be performed by the Owner’s own forces or be performed by another separate contractor.
 - B. The Contractor does not correct work as indicated in “Stop Work Order”.
 - C. Failure of the Contractor to adequately correct the Work or complete the Work on approved schedule as determined to be adequate by the Consultant.
 - D. Termination of the Contractor.

The Owner shall provide for coordination/supervision of the activities of the Owner’s own forces and of each separate Contractor(s) with the Work of the Contractor. All contractors and the Owner’s forces shall cooperate with each other, the Consultant, and the Owner. The Contractor shall participate with other separate Contractor(s) and the Owner in reviewing their construction schedule when directed to do so by the Consultant. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement of the Contractor, separate Contractor(s), the

Consultant, and the Owner. The new construction schedule shall then constitute the schedule to be used by the Contractor, separate Contractor(s), and the Owner until a subsequent revision is made.

- 2.5 MUTUAL RESPONSIBILITY:** The Contractor shall afford the Owner and separate Contractor(s) reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and coordinate the Contractor's construction and operations with the Separate contractor'(s) operations as required by the Contract Documents.

If part of the Contractor's Work depends on the proper execution or results by construction or operations by the Owner or a separate Contractor(s), the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Consultant any apparent discrepancies or defects in the Work that would render it unsuitable for proper execution and results. Failure of the Contractor to report shall constitute an acknowledgment that the Owner's forces or Separate contractor'(s) completed or partially completed work is fit and proper to receive the Contractor's Work, except as to defects not reasonably discoverable.

Damages to the Contractor, or separate Contractor(s), or Owner caused by delays or improperly timed activities or defective construction shall be borne by the party responsible for the damages.

- 2.6 OWNER'S RIGHT TO CLEAN UP:** If a dispute arises among the Contractor, separate Contractor(s) and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in the Contract Documents, the Owner may clean up and allocate the cost among the responsible parties as determined by the Consultant to be just.

- 2.7 OWNER'S RIGHT TO CONTRACT MODIFICATIONS:** Contractors should note that Owner retains the exclusive right to modify the Contract and Scope of Work for budgetary or other reasons.

- 2.8 STOP WORK:** The Consultant, after concurrence with and on behalf of the Owner, may issue a "Stop Work Order" for the project or portions thereof when the Contractor fails to correct any Work that is deemed not to be in accordance with the Contract Documents. If the Contractor fails to correct said deficiencies within seven (7) days, upon the direction from the Consultant, the Owner shall issue to the Contractor a construction change order or change directive to correct the deficiencies and deduct all costs (including the Owner's expenses, Consultant's fees, legal costs, and any other associated costs) from any future payments to the Contractor. If payments then or thereafter due to the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

The Owner may occupy or use any completed portion of the Work as designated by the Contract Documents. Occupying any portion of the Work shall occur after the Consultant has issued a Certificate of Substantial Completion and the Code Enforcement Agency has issued a Temporary Certificate of Occupancy (TCO).

The Owner shall have the right to terminate the Contractor's Contract in accordance with the Construction Contract.

ARTICLE 3 – ADMINISTRATION OF THE CONTRACT

- 3.1 REPRESENTATION:** The Consultant shall be the Owner's representative during construction, and during the warranty period after Substantial Completion. The Consultant will have authority to act on behalf of the Owner to the extent provided in the Contract Documents unless otherwise modified by written instrument.
- 3.2 COMMUNICATIONS:** The Owner shall communicate to the Contractor through the Consultant about matters arising out of or relating to the execution of the Work and Contract. The Consultant shall not communicate with the Contractor's Subcontractors and suppliers unless the Contractor grants consent. The Consultant shall be responsible for scheduling, managing, facilitating, and conducting the construction meetings.
- 3.3 EVALUATION OF WORK:** The Consultant shall evaluate the executed Work, the schedules, the amounts of Work completed, and substantial and final completion of the Work. The Consultant will review the Contractor's Applications for Payment, certify the amount due the Contractor, and forward to the Owner for execution.
- 3.4 INTERPRETATION OF CONTRACT DOCUMENTS:** The Consultant shall render an interpretation of the requirements of the Contract Documents. Interpretations and decisions made by the Consultant shall be consistent with the Contract Documents or reasonably inferable from them as an instrument to produce the indicated results. The Owner or the Contractor may make written request to the Consultant concerning such interpretations. The Consultant's decisions concerning the interpretations and aesthetic effects of the Contract Documents will be final and consistent with the intent expressed in the Contract Documents.
- 3.5 SITE VISITS:** The Consultant will visit the project site at intervals appropriate to the stage of construction. The purpose of the visits will be:
- A. to observe and become familiar with the progress and quality of the Work, and render interpretations necessary for its execution;
 - B. to endeavor to guard the Owner against defects, insufficiencies, shortages omissions, and deficiencies in the Work;
 - C. to determine if the Work is in accordance with the Contract Documents and approved Contractor's submittals; and
 - D. to report to the Owner and Contractor concerning the mentioned purposes.
- 3.6 WORK ACCEPTANCE AND TESTS:** The Consultant shall have the authority to reject Work which does not conform to the Contract Documents and approved Contractor's submittals. When the Consultant considers it necessary or advisable for the

implementation of the intent of the Contract Documents, the Consultant will have authority to require additional inspections or testing of the Work whether or not such Work has been fabricated, installed or completed. However, neither the Consultant's authority to act nor any decision made by the Consultant in good faith either to exercise or not to exercise such authority, shall not release any duties or responsibilities of the Contractor and any Subcontractor(s) from performing any of the Work.

- 3.7 PROJECT MODIFICATIONS:** Refer to Section 01 25 00, of the Technical Specifications entitled Contract Modification Procedures for information and procedures related to change orders, construction change directives and minor changes to the work.

The Contractor, Owner, or Consultant may identify a need for modifications to the Contract Documents. Such modification may be accomplished by Change Orders, Construction Directives, or Minor Changes in the Work after the execution of the Contract. All modifications are subjected to the conditions of the Contract Documents.

Any modifications performed to the Work or Contract Documents without prior authorization by the Consultant shall not be considered for a Change Order.

The Contractor shall proceed with the modifications promptly, unless otherwise indicated in the Change Order, Construction Change Directive, or order for a minor change in the Work.

- 3.8 REVIEW OF SUBMITTALS:** The Consultant will review and approve or take appropriate action upon the Contractor's Submittals of samples, product data, shop drawings, and as requested in the Contract Documents. The approval of submittals by the Consultant is for the limited purpose of verifying conformance with the Contract Documents. Such action will be done in accordance with Section 01 33 00, Submittal Procedures, Paragraph 1.4. The Contractor shall review and approve submittals prior to presenting them to the Consultant for his review and approval. This review by the Contractor will be regarding dimensional accuracy, completeness, quantities, performance, and all characteristics that shall remain the sole responsibility of the Contractor. Review of Submittals by the Consultant shall not indicate approval of an assembly of which the item is a component. The Consultant shall be responsible for reviewing the Contractor's submittal log.

- 3.9 CERTIFICATES FOR PAYMENT:** The Consultant will, within seven (7) days after receipt of the Contractor's Application for payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Consultant determines is properly due, or notify the Contractor and Owner in writing of the Consultants reasons for withholding certification.

The issuance of a Certificate for Payment will constitute a representation by the Consultant to the Owner, based on the Consultant's observations at the site and the data

comprising the Application and Certification for Payment, that the work has progressed to the point indicated and that, to the best of the Consultant's knowledge, information, and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by the Consultant. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified.

The Consultant may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Consultant's opinion the representations to the Owner cannot be made. If the Consultant is unable to certify payment in the amount of the Application, the Consultant will notify the Contractor and Owner. If the Contractor and Consultant cannot agree on a revised payment amount, the Consultant will promptly issue a Certificate for Payment for the amount for which the Consultant is able to make such representations to the Owner. The Consultant may also decide not to certify payment or, because of subsequent observations may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Consultant's opinion to protect the Owner from loss because of:

- A. Defective Work not remedied;
- B. Third party claims filed or reasonable evidence indicating probable filing of such claims;
- C. Failure of the Contractor to make payments properly to Subcontractors or for labor, materials, or equipment;
- D. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- E. Damage to the Owner or another contractor;
- F. Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- G. Persistent failure to carry out the Work in accordance with the Contract Documents.
- H. Completed Work has been damaged, requiring correction or replacement;
- I. The Contract Price has been reduced by Written Change Order;

When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

3.10 CLAIMS AND CONTRACT MEDIATION PROVISIONS:

CHANGES IN WORK; CLAIMS: No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph.

Notice: Written notice stating the general nature of each claim shall be delivered by the claimant to the other party to the Contract promptly, but in no event later than thirty (30) calendar days after the start of the event giving rise to the claim.

The responsibility to substantiate a claim shall rest with the party making the claim. The amount or extent of the claim, with supporting data, shall be delivered to the other party to the Contract within fifteen (15) calendar days after the initial Notice of the Claim. Each claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the claimant within thirty (30) calendar days after receipt of the claimant's last submittal.

The parties agree to make a good faith effort to resolve the claim or dispute prior to the time it must be submitted to the Consultant or to mediation as set forth in Section: DISPUTE RESOLUTION below.

DISPUTE RESOLUTION: Claims and Disputes arising under this Contract shall be subject to one of the following dispute resolution processes:

A. Claims and Disputes Not Subject to Mediation

The following claims and disputes, if validly submitted as provided in Section: CHANGES IN WORK; CLAIMS, are not subject to mediation, and are to be decided by the Consultant without mediation:

- 1) A claim or dispute seeking a non-monetary recovery; and
- 2) A claim or dispute seeking a monetary recovery of \$15,000 or less; and
- 3) A claim or dispute seeking the extension of any time limit shall be subject to mediation pursuant to the Contract Mediation Provisions only if the damages which would be suffered by the Party seeking the extension would exceed \$15,000. To the extent that liquidated damages are set forth in the Contract Documents and is the measurement of damages for failure by such Party(s) to meet the time limit, the liquidated damages shall be the exclusive standard for determining the amount of damages associated with such dispute.

CLAIMS NOT SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT FOR DECISION WITHIN SIXTY (60) DAYS AFTER THE START OF THE EVENT GIVING RISE TO THE CLAIM OR DISPUTE.

B. Claims and Disputes Subject to Mediation

Any other claim or dispute arising between or among the Parties listed herein that arises from the Project, including without limitation a breach of such Contract, shall be subject to non-binding mediation administered by the American Arbitration Association under its Construction Industry Mediation Rules, or to such other mediation process to which the parties may agree, except as otherwise expressly set forth in these Contract Mediation Provisions. To the extent any provision of the Construction Industry Mediation Rules is inconsistent with the provisions of these Contract Mediation Provisions, the provisions of the Contract Mediation Provisions shall control.

The Owner and any Party contracting with the Owner or with any first-tier or lower-tier subcontractor for the Project hereby agree to participate in good faith in any mediation of a claim or dispute subject to these Contract Mediation Provisions, including without limitation the following Parties: Consultant(s), architect(s), engineer(s), surveyor(s), prime contractor(s), surety(ies), subcontractor(s), and supplier(s).

The Contractor, and all other Parties, shall include these Contract Mediation Provisions in every agreement to which they are a Party for the Project, without variation or exception. Failure to do so will constitute a breach of the Construction Contract, and the Contractor or other Party failing to include these Contract Mediation Provisions in any agreement shall indemnify and hold harmless the remaining Parties from and against any and all claims, including without limitation reasonable attorney fees and other costs of litigation arising in any manner from such breach.

For purposes of these Contract Mediation Provisions, a claim or dispute is limited to the recovery of monetary damages from the same transaction or occurrence against a single Party or two or more Parties alleged to be jointly liable. Two or more claims or disputes may not be consolidated without the consent of all Parties to such disputes.

A request for mediation shall include the amount of the monetary relief requested.

A request for mediation must be made within ninety (90) days after giving notice of the claim or dispute as required by Section: CHANGES IN WORK; CLAIMS above.

Prior to requesting mediation, a Party must believe that it is entitled under applicable law to recover the monetary amount to be included in the request from one or more of the remaining Parties. Such belief must be based on a reasonable and prudent investigation

into the claim or dispute. The request for mediation must be based on such investigation and may not include any amount or the name of any remaining Party(s), unless supported by such investigation by the Party requesting the mediation.

If a Party does not perform a reasonable and prudent investigation, it shall indemnify and hold harmless all other Parties from any costs, including reasonable attorney fees and other costs of mediation, litigation, and damages incurred by such other Parties.

All expenses incurred by a Party in preparing and presenting any claim or defense, shall be paid by the Party preparing for mediation. Such expenses shall include, without limitation, any associated cost for witnesses, exhibits, and attorney fees. All other expenses, including filing fees and required traveling expenses by the mediator, and other expenses of the mediator, shall be borne as follows: (1) One half by the Party requesting the mediation, with the remaining parties paying equal shares of the remaining expenses and costs. (2) If the Owner is named as a party to the mediation, the Owner shall pay at least one-third of the mediation expenses and 2/3 of the expenses shall be divided among the remaining Parties. (3) If more than one Party to dispute requests mediation, the mediation expenses and costs to be divided among the Parties shall be borne equally by the Parties to the dispute; however, if the Owner is named as one of the parties to the mediation, the Owner shall pay at least one-third of the mediation expenses.

The mediation shall be held at a location agreeable to the mediator and all of the Parties. If no agreement can be reached, the mediation will be held at a location in Mecklenburg County as the mediator shall determine.

The provision of these Contract Mediation Provisions is subject to any other provisions of the Construction Contract concerning the submission, documentation and/or proof of any claim(s) or dispute(s).

C. Claims and Disputes Submitted to the Consultant

For purposes of this Contract, the “Consultant” shall be Innovative Design, Inc. Claims should be submitted to the Consultant at the following address:

850 W. Morgan St.
Raleigh, NC 27603

FINAL RESOLUTION OF DISPUTES: ANY VALIDLY SUBMITTED CLAIM OR DISPUTE UNRESOLVED AFTER SUCH MEDIATION, OR THAT DOES NOT REQUIRE MEDIATION, SHALL BE SUBMITTED TO THE CONSULTANT FOR FINAL RESOLUTION IN ACCORDANCE WITH THE FOLLOWING PROVISIONS:

CLAIMS NOT SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT FOR DECISION WITHIN SIXTY (60) DAYS AFTER THE START OF THE EVENT GIVING RISE TO THE CLAIM OR DISPUTE.

CLAIMS SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT WITHIN THIRTY (30) DAYS AFTER THE MEDIATION ENDS.

THE CONSULTANT WILL BE THE INTERPRETER OF THE REQUIREMENTS OF THIS CONTRACT AND THE JUDGE OF THE PERFORMANCE THEREUNDER BY THE OWNER AND CONTRACTOR.

IT IS AGREED BY AND BETWEEN THE PARTIES TO THIS CONTRACT THAT THE CONSULTANT SHALL RESOLVE ALL DISPUTES, INCLUDING, WITHOUT LIMITATION, DISPUTES INVOLVING (i) THE QUANTITY AND QUALITY OF THE SEVERAL KINDS OF WORK AND MATERIALS WHICH ARE TO BE PAID FOR UNDER THIS CONTRACT; (ii) THE APPORTIONMENT OF LIQUIDATED DAMAGES AMONG CONTRACTORS, INCLUDING THE CONTRACTOR; (iii) ALL QUESTIONS IN RELATION TO LINES, ELEVATIONS, AND DIMENSIONS OF THE WORK; AND (iv) THE PROPER INTERPRETATION OF THE PLANS AND SPECIFICATIONS.

IN MAKING ITS DECISION IN THESE MATTERS, THE CONSULTANT SHALL REQUIRE SUCH INFORMATION AND EVIDENCE, AS THE CONSULTANT, IN ITS SOLE DISCRETION, SHALL DEEM NECESSARY TO FULLY AND FAIRLY CONSIDER THE MATTER AND TO ALLOW IT TO RENDER A FULL, FAIR, AND IMPARTIAL DETERMINATION OF THE CLAIM OR DISPUTE SUBMITTED TO IT.

Consultant's Action: Consultant will review each claim or dispute and, within thirty (30) days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. Deny the claim in whole or in part; or
2. Approve the claim in whole or in part.

THE CONSULTANT'S DECISIONS UPON THESE CLAIMS AND DISPUTES SHALL BE FINAL AND BINDING UPON THE OWNER AND THE CONTRACTOR.

ARTICLE 4 – CONTRACTOR’S RESPONSIBILITIES

4.1 OBSERVANCE OF LAWS: The Contractor shall observe and comply with all Federal, State, and Local laws, ordinances, regulations, and all such decrees as exist at present or may be enacted during construction, by bodies or tribunals having any jurisdiction or authority over the Work, in any manner affecting the conduct of the Work. No plea of misunderstanding will be considered on account of the Contractor’s ignorance thereof.

4.2 PERMITS AND LICENSES: The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notice necessary and incident to the due and lawful prosecution of the Work.

4.3 WORK CONFORMANCE: The Contractor shall perform the Work in accordance with the Contract Documents and approved submittals, shop drawings, product data, and samples. The Contractor shall furnish the Owner and Consultant every reasonable facility to ascertain that the Work is performed consistent with the requirements of the Contract Documents.

The Contractor shall carefully study the Contract Documents and field conditions and shall promptly report to the Consultant, in writing, any errors, inconsistencies, or omissions. If the Contractor performs any construction activity knowing it involves an identified error, inconsistency, or omission in the Contract Documents, the Contractor shall be responsible for such performance and shall bear all costs for any corrections with no Contract modifications. The Contractor shall obtain approval from the Consultant for such corrections.

4.4 SUPERVISION AND CONSTRUCTION PROCEDURES: During the performance of the Contract, it shall be the responsibility of the Contractor to pursue the orderly progress of all Work stages throughout the project and to assure that all Work is completed within the time period bid by the Contractor, or stipulated herein as the Contract Time. The Contractor shall have sole responsibility and control of the work, including all means, methods, techniques, sequences, procedures, and coordination of the Work.

If the Contract Documents give specific instructions concerning site conditions, construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences, or procedures may not be safe, the Contractor shall give timely written notice, including recommendations for safer methods to accomplish the task to the Owner and Consultant and shall not proceed with that portion of the Work without further written instructions from the Consultant. If the Contractor is then instructed to proceed with the

required means, methods, techniques, sequences, or procedures without acceptance of recommendations proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage.

The Contractor shall employ a competent and qualified superintendent and necessary assistants, who shall be in attendance at the project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communication shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case. The Contractor shall keep a minimum of one (1) Superintendent on the job at all times, authorized to act for the Contractor and direct the work of all Subcontractors for the different phases of the work.

The General Contractor shall be the "Project Expeditor" and shall have the responsibility to coordinate, cooperate with, and obtain from the several Subcontractors on the job their respective schedules and to integrate them into a Construction Schedule.

The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Consultant and the administration of the Contract; or by tests, inspections made by testing firms, or approvals required or performed by persons other than the Contractor.

The Contractor shall be responsible for inspection of portions of the Work performed under this Contract to determine that such portions are in proper condition to receive subsequent Work, and are in accordance with the Contract Documents.

4.5 CONTRACT TIME: The Contract Time indicated within the Contract Documents shall begin on the date set forth in a Notice to Proceed from the Consultant to the Contractor and includes all weather and delivery delays. The anticipated Notice to Proceed is expected to be issued approximately one hundred and twenty (120) days after the bid opening.

The time limits stated in the Contract Documents are the essence of the Contract. By executing the Construction Contract, the Contractor confirms that the Contract Time is a reasonable amount of time for performing the Work. The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

If the Contractor is delayed at any time during the progress of the Work by an act of negligence by the Owner or Consultant, or a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or other causes beyond the Contractor's control, which the Consultant determines may justify a delay, then the Contract Time shall be extended by

a Change Order for such reasonable time as the Consultant may determine. Refer to Supplementary Conditions for additional information of Contract Time.

4.6 CONSTRUCTION SCHEDULES: The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner and Consultant’s information, a construction schedule. The construction schedule shall be a detailed bar chart or Critical Path Method, for the Work to be performed. The schedule shall not exceed time limits current under the Contract Documents and shall include weather delays and delays due to delivery of the equipment. The schedule shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of Work.

The Contractor shall maintain the construction schedule, making monthly adjustments, updates, and corrections. The construction schedule shall be reviewed at each construction meeting.

The Contractor shall also prepare a schedule of submittals which shall be coordinated with the Contractor’s construction schedule. The submittal schedule shall also be reviewed at each construction meeting and adjusted as necessary.

The following chart is the anticipated adverse weather delays for this project.

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
10	10	11	6	6	6	6	5	6	6	7	9

The construction schedule shall reflect the anticipated adverse weather delays.

National Oceanic and Atmospheric Administration (NOAA) data shall be used to claim addition construction days beyond the above chart for critical path activities.

Weather days occurring on holidays or Sundays will not be considered as delays significant to the Contract completion date. The request for a weather delay must be submitted to the Consultant in writing with supporting data within (20) days following the occurrence.

The Contractor shall allocate sufficient resources to meet the current construction schedule.

4.7 SAFETY PRECAUTIONS AND PROGRAMS: The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

4.8 SAFETY OF PERSONS AND PROPERTY: The Contractor shall take reasonable precautions for safety of and shall provide reasonable protection to prevent damage, injury or loss to:

- A. employees on the Work and other persons who may be affected thereby;
- B. the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-Subcontractors; and
- C. other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.

The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in "Work Acceptance and Tests" caused in whole or in part by the Contractor, a Subcontractor, a Sub-Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible except damage or loss attributable to acts or omissions of the Owner or Consultant or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent, unless otherwise designated by the Contractor in writing to the Owner and Consultant.

- 4.9 HAZARDOUS MATERIALS:** If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and

Consultant in writing.

The Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Consultant, the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance.

The Contractor and the Consultant will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Consultant has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Consultant have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. The Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional cost of shut-down, delay, and start-up, which adjustments shall be accomplished as provided in Article 3.7 of the General Conditions.

The Owner, to the fullest extent permitted by law, shall indemnify and hold harmless the Contractor, Subcontractors, Consultants, Consultants Sub-consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area, if in fact the material or substance presents the risk of bodily injury or death, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself) and provided that such damage, loss, or expense is not due to the sole negligence of a party seeking indemnity. The Owner shall not be responsible for materials and substances brought to the site by the Contractor unless such materials or substances were required by the Contract Documents. The Contractor shall act at his own discretion to prevent damages, injury, or losses as part of the original Work.

If, without negligence on the part of the Contractor, the Contractor is held liable for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred. These additional costs shall follow the procedures established for addition compensation and additional time extension to the Contract.

- 4.10 EMERGENCIES:** In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss.
- 4.11 WARRANTY:** The Contractor warrants to the Owner and Consultant that materials and equipment furnished under the Contract will be of good quality and new, unless otherwise required or permitted by other sections of the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Consultant, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. A one-year general warranty for the complete project shall start when the Contractor achieves Substantial Completion.
- 4.12 REPAIR OBLIGATION:** If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The period of one year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of Work.

During the 12 (twelve) months after the project is totally completed (unless otherwise specified), if the Owner finds a situation that is creating a health hazard:

1. The Owner shall immediately notify the Contractor of the hazard.
2. The Owner shall relocate employees and the general public from the area of concern.
3. Within the first eight (8) hours of being notified, the Contractor shall investigate the condition and contract with any agency qualified to identify and assess the work required to remediate the hazard.
4. The Contractor shall contain the hazard within twenty four (24) hours from being notified of the hazard.
5. Within three (3) calendar days or as quickly as a permit can be issued, the Contractor shall start abating the hazard.
6. Once the area is "Clean" the Contractor shall start reinstalling all of the components that were required to be removed for the abatement.

7. The Owner shall move employees back into the area once everything has been completed and a final permit has been issued.

If the Contractor fails to complete any of the task listed above in the time frame given, the Owner shall remediate the hazard. The Contractor has the option to reinstall the components required to be removed for the abatement.

The cost of the remediation and reinstalling the components shall be born One Hundred percent (100%) by the Contractor. It shall be the responsibility of the Contractor to collect from the insurance company and/or any Sub Contractors for any cost associated with the remediation.

4.13 LIMITATION OF WARRANTY: Nothing contained in the above sections shall be construed to establish a period of limitation with respect to other obligations, which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Section 4.11 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

4.14 PROJECT CONTINGENCY AND ALLOWANCES: The Contractor shall include in the Contract Sum the Project Contingency and all Allowances stated in the Contract Documents. Items covered by the Project Contingency and/or Allowances shall be supplied for such amounts as the Owner may direct.

A. Project Contingency: The Contingency or portion thereof is to be used only when directed to do so in writing by the Owner, through the Consultant. The unused portion of the Contingency shall be credited to the owner at the end of the project. The Consultant will prepare change orders at the appropriate time to be signed by the contractor for contingency credits where applicable.

B. Material Allowances: Unless otherwise provided in the Contract Documents:

1. Materials and equipment under an allowance shall be selected by performance specification promptly by the Owner, through the Consultant to avoid delay in the Work;
2. Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
3. Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the

allowances;

4. Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances as stated above and (2) changes in Contractor's costs as stated above.

4.15 TAXES: The Contractor shall pay sales, consumer, use, and similar taxes for the Work or portions thereof provided by the Contractor which is legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

4.16 SALES AND USE TAX: Upon submission of each Application and Certification for payment, the Contractor must furnish for itself as well as for all Subcontractors, certified statements stating the cost of the tangible property purchased from each vendor and the amount of sales and/or use taxes paid thereon. In the event the Contractor makes several purchases from the same vendor, such certified statements must indicate the invoice numbers, date of invoice, and the inclusive taxes paid thereon. Such statements must also include the cost of any tangible personal property withdrawn from the Contractor's warehouse stock and the amount of sales or use tax paid thereon by the Contractor. Similar certified statements by his Subcontractors must be obtained by the Contractor and furnished to the Consultant. The subtotal amounts of the prices of the items, state sales tax, and County sales tax, and use tax shall be totaled at the bottom of each page and a grand total of each at the bottom of the last page. Different tax rates (e.g. 7% versus 7-1/2%) shall be listed on separate, notarized tax statements.

Non-Tangible items such as silt fencing, tree-protection fencing, erosion control devices, small tools, owned or rental equipment, etc. shall not be claimed on the tax statement. Only material items, which have become a part of the building, structure, or Work shall be included. The Contractor shall attach copies of all listed invoices on the certified statement, only upon request by the Owner.

Use the State and County Sales /Use Tax Statement & Certification form provided.

4.17 CONTRACTOR'S WARRANTY OF TITLE: The Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner free and clear of all Liens no later than the time of payment.

4.18 UNCOVERING AND CORRECTION OF WORK

A. UNCOVERING OF WORK

If a portion of the Work is covered contrary to the Consultant's request, or to the Owner's or governing authority's request or requirements, or to requirements specifically expressed in the Contract Documents, the Contractor must, if required in writing by the Consultant, be uncovered for the Consultant's or governing Authority's examination and be replaced at the Contractor's expense without a change in the Contract Time.

If a portion of the Work has been covered which the Consultant has not specifically requested to examine prior to it's being covered, the Consultant may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, correction shall be at the Contractor's expense unless the Owner or a separate Contractor caused the condition. In such event, the Owner shall be responsible for payment of the costs.

B. CORRECTION OF WORK BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Consultant or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting rejected Work, including additional testing and inspections and compensation for the Consultant's services and expenses made necessary thereby, shall be at the Contractor's expense.

If, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Paragraph 4.11 or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it within seven (7) days after receipt of written notice from the Consultant to do, or within a mutually agreed upon schedule between the Contractor and the Consultant and Owner. This obligation shall survive acceptance of the Work under Contract and termination of the Contract. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Consultant, the Owner may correct the deficiencies at the Contractor's expense.

4.19 LIQUIDATED DAMAGES: If the Contractor fails to achieve Substantial Completion within the Contract Time, the Contractor shall be assessed liquidated damages. The rate of liquidated damages shall be as established in the Supplementary Conditions.

If the Contractor fails to correct defective Work as outlined on a list accompanying the Certificate of Substantial Completion within thirty (30) days from the date of Substantial Completion, liquidated damages shall start to accrue until all defective Work has been corrected.

4.20 CUTTING AND PATCHING: The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

The Contractor shall not damage or endanger any portion of the Work that was fully or partially constructed by the Owner or separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or separate Contractor except with written consent of the Owner and of such separate Contractor. Such consent shall not to be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor the Contractor's consent to cutting or otherwise altering the Work.

4.21 CLEAN UP: The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project waste material, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials.

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost shall be charged to the Contractor.

4.22 INDEMNIFICATION: To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Consultant, Consultant's Sub-Consultants and agents, and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performances of the Work, provided that such claim, damages, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property including loss of use resulting there from, but only to the extent caused in whole or in part by Contractor or anyone employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligations shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this paragraph.

In claims against any person or entity indemnified under this section by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this

section shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Consultant, the Consultant's Consultant(s), and agents and employees of any of them arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications, or (2) the giving of or the failure to give directions or instructions by the Consultant, the Consultant's Consultant(s), and agents and employees of any of them provided such giving or failure to give is the primary cause of the injury or damage.

4.23 COMPLIANCE PROVISION: The Contractor agrees to make itself aware of and comply with, and cause its subcontractors to comply with, all federal, state, and local laws, regulations and ordinances relating to the performance of this Contract, or to the products and services delivered hereunder, including without limitation, **E-Verify (Article 2 of Chapter 64 of the North Carolina General Statutes)**, Workers' Compensation, the Fair Labor Standards Act (FLSA), the Americans with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA), and Occupational Safety And Health Administration (OSHA). The Contractor further agrees to obtain all verifications, permits, and licenses applicable to the performance of this Contract. If any violation of this section has occurred or does occur, the Contractor will indemnify and save harmless the County from all losses, damages, costs, expenses (including reasonable attorneys' fees), obligations, duties, fines, penalties, interest charges, and other liabilities (including settlement amounts) incurred on account of such violation.

4.24 IRAN DIVESTMENT ACT CERTIFICATION: Contractor certifies that as of the date of this agreement, contractor is not currently listed on the Final Divestment List created and maintained by the North Carolina State Treasurer pursuant to G.S.143-6A-4. Further, pursuant to G.S. 143C-6A-5(b), Contractor agrees not to sub-contract with any person or entity to perform any part of the contract terms herein, if, at the time, the sub-contractor's name appears on the then-current version of the Divestment Act List. Contractor further agrees to notify the County Procurement Department if at any time during the term of this agreement, it is added to the "List." The Divestment List may be found on the State Treasurer's website at www.nctreasurer.com/iran.

ARTICLE 5 – BONDS AND INSURANCE

5.1 PERFORMANCE AND PAYMENT BONDS: The successful Bidder shall provide a Performance Bond and Payment Bond. The bond amounts shall be written in the amount of One-Hundred percent (100%) of the Contract Price, and conforming to the Owner's requirements. The bonds shall be delivered to the Owner with the executed Contract.

A. If the provided bonds or insurance do not meet the Owner's requirements, the Contractor shall have ten (10) calendar days after receipt of notice of rejection to provide satisfactory bonds. If the Contractor does not deliver proper bonds, the Contract may be awarded to the next lowest responsible, responsive bidder; or all bids may be rejected and the project re-bid.

5.2 INDEMNITY & INSURANCE: The Contractor shall indemnify and save harmless the Owner, its agents and employees and assigns from and against all loss, cost, damages, expense, and liability caused by an accident or other occurrence resulting in bodily injury, including death, sickness, and disease to any person; or damage or destruction to property, real or personal; arising directly or indirectly from operations, products, or services rendered under this Contract. The Contractor further agrees to purchase and maintain during the life of this Contract with an insurance company acceptable to the Owner authorized to do business in the State of North Carolina the following insurance:

Automobile: Bodily injury and property damage liability covering all owned, non-owned, and hired automobiles for limits of not less than \$2,000,000 each person, \$2,000,000 each occurrence bodily injury liability, and \$2,000,000 each occurrence property damage liability.

Comprehensive General Liability: Bodily injury and property damage liability insurance as shall protect the Contractor and any Subcontractor performing Work under this Contract from claims of bodily injury or property damage which arise from operations of this Contract whether such operations be performed by the Contractor, any Subcontractor, or anyone directly or indirectly employed by either. The amounts of such insurance shall not be less than \$1,000,000 bodily injury and property damage liability each occurrence/aggregate. This insurance shall include coverage for products/completed operations, and contractual liability assumed under the indemnity provision of this Contract. To be included in Comprehensive General Liability is the Broad Form Property Damage. On the policy, list "Mecklenburg County" as an "Additional Insured".

Workman's Compensation & Occupational Disease Insurance:

Meeting the statutory requirements of the State of North Carolina including employer's liability insurance for an amount of not less than \$250,000 for each accident, \$250,000

for disease each employee, and \$500,000 for policy limit.

Professional Errors & Omissions

Insurance with a limit of not less than \$1,000,000 per claim occurrence as shall protect the contractor and the contractor's employees for negligent acts, errors or omissions in performing the professional services under this contract.

Builder's Risk Insurance: The Owner shall purchase and maintain "all risk" Builder's Risk Insurance, including, without duplication of coverage, theft, vandalism, and malicious mischief. This insurance shall cover the entire Work at the site to which the Contract applies, to the full insurable value thereof and shall be for the benefit of the Owner and Contractor as their interest may appear, except that any loss not covered because of deductible clauses or policy exclusions shall be the sole responsibility of the Contractor.

The Owner's Builder's Risk Insurance shall not cover the Contractor's:

1. Tools
2. Equipment
3. Storage shed or office
4. Vehicles

Other Insurance Requirements:

- a) The Owner shall be exempt from and in no way liable for any sums of money which may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Contractor and/or subcontractor providing such insurance.
- b) Mecklenburg County shall be named as an additional insured under the general and automobile liability insurance policies
- c) The contractor shall be responsible for notifying Mecklenburg County of any material changes (including renewals) to or cancellation of the insurance coverages required above. Notice to Mecklenburg County must be completed in writing within 48 hours of the changes.
- d) Should any of the required insurance coverages be self-insured by the contractor, a copy of the Certificate of Self-Insurance or other documentation from the North Carolina Department of Insurance shall be furnished to the owner.
- e) If any part of the work under the Agreement is sublet, the **subcontractor shall be required to meet all insurance requirements** set forth in the Agreement. Nothing contained herein shall relieve the Contractor from meeting all insurance requirements or otherwise being responsible for the subcontractor.

Certificates of such insurance shall be furnished to the Owner and shall contain the provision that should any of the above described policies be cancelled before the expiration date thereof, the issuing insurance company will endeavor to mail thirty (30) days written notice to "Mecklenburg County". The Contractor agrees to notify the Owner by telephone and by providing written notice within two (2) days after receipt of information that the insurance company either intends to amend or terminate a policy or has amended or terminated any insurance policy providing the coverage referred to above.

ARTICLE 6 - DEFINITIONS

Whenever in these specifications and Contract Documents the following terms or pronouns in places of them are used, the intent and meaning shall be interpreted as follows:

AS-BUILT DRAWINGS: A set of Construction Documents used by the Contractor to indicate all changes, clarifications, and actual execution of the Work.

BIDDER: Any individual, firm, corporation, or partnership submitting a proposal of the work contemplated.

BID PROPOSAL: The approved prepared form on which the bidder is to, or has submitted his proposal for the contemplated work.

CHANGE ORDER: A written instrument prepared by the Consultant and signed by the Owner, Contractor, and Consultant, stating their agreement upon all to modification of the following:

- A. The Work;
- B. The Contract Sum;
- C. The Contract Time.

CHANGE PROPOSAL REQUEST: Outlines proposed changes in the Work and possible changes to the Contract Sum and/or Contract Time.

CONSTRUCTION CHANGE DIRECTIVE: A written order prepared by the Consultant and signed by the Owner and Consultant, directing a change in the Work prior to agreement on an adjustment, if any, in the Contract Sum or Contract Time, or both.

CONSULTANT: The person lawfully licensed to practice Architecture or Engineering or Landscape Architecture, or an entity lawfully practicing Architecture or Engineering or Landscape Architecture which is referred to throughout the Contract Documents as if singular in number. The "Consultant" is the duly authorized representative of the Owner.

CONSTRUCTION CONTRACT: Represents the entire and integrated agreement between the Owner and Contractor and supersedes prior negotiations,

representations, or agreements, either written or oral, and consists of the Form of Construction Contract and the Contract Documents. The Construction Contract shall not be construed to create a contractual relationship of any kind (1) between the Consultant and Contractor, (2) between the Owner and a Subcontractor or Sub-Subcontractor, (3) between the Owner and Consultant or (4) between any persons or entities other than the Owner and Contractor. The Construction Contract may also be referred to as the "Contract".

CONSTRUCTION DOCUMENTS:

The Bid Package, including without limitation, any Addendum to the Bid Package, the Notice to Bidders, Instructions to Bidders, the General Conditions, the M/W/SBE Provisions, all information in the Project Manual including the Technical Specifications, the Contractor's Itemized Proposal, and all other specifications and drawings referenced therein.

CONTRACT:

The "Construction Contract".

CONTRACT DOCUMENTS:

Consist of all documents shown as incorporated by reference into the "Sample Construction Contract" between the Owner and the Contractor as provided therein. Contract Documents are also sometimes referred to as "Construction Documents".

CONTRACT MODIFICATION:

Defined as (1) a Change Order, (2) a Construction Change Directive or (3) a clarification, interpretation, or a written order for a Minor Change in the Work issued by the Consultant.

CONTRACT TIME:

The consecutive calendar days, including authorized adjustments, allotted in the Contract for Substantial Completion of the Work. The commencement date of the Work is the date established in the Notice to Proceed.

CONTRACTOR:

Any individual, firm, corporation, or partnership, or his/her/their/its employees, agents, or assigns with whom a contract is made with the Owner for the construction of the total project (including, but not limited to Plumbing, Mechanical, Electrical, Landscape, Structural Construction, and Fire Protection work).

- CONTRACT SUM:** As stated in the Construction Contract and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.
- DRAWINGS:** The graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.
- DAY(S):** The term "day" as used in the Contract Documents shall mean calendar day.
- EVALUATION:** The word "evaluation" and any derivative thereof, as used in reference to Consultant means, to become familiar with the progress and quality of the portion of Work.
- FURNISH:** Unless specifically noted otherwise, the word "furnish", and any derivatives thereof, means furnishing to the Project site items specified such as materials, equipment apparatus, appurtenances, and all other necessary items.
- INSPECT:** The word "inspect" and any derivative thereof, as used in reference to the Consultant shall mean; type of evaluation that a reasonably prudent Consultant, in the exercise of ordinary care, would make to determine if the Work is in general accordance with the Contract Documents at Substantial and Final inspections.
- INDICATED:** The words "indicated" or "shown" and any derivative thereof shall mean; as detailed, scheduled, schematically depicted, or stated in the Contract Documents.
- INSTALL:** The word "install", and any derivative thereof, means to incorporate into the Work all necessary labor, materials, and connections required to perform and properly complete in-place, testing, inspection and approval by Governing Agencies, and make the resulting product ready for operation or use.
- LIQUIDATED DAMAGES:** An amount estimated in advance, to cover the losses incurred by the Owner by reason of failure of the Contractor to complete the Work within the time specified in the Contract Documents.

MINOR CHANGES

IN THE WORK:

A written order prepared by the Consultant for modifications in the Work not involving adjustment in the Contract Sum or Contract Time and not inconsistent with the intent of the Contract Documents.

OWNER:

As referred to in these documents is Mecklenburg County.

PROJECT:

The total construction, of which the Work performed under the Contract may be the whole or a part, and which may include construction by the Owner or by separate Contractors.

PROJECT MANUAL:

The compilation of all of the written material that is part of the Contract Documents. It contains, but is not limited to, bidding requirements, sample forms, conditions of the Contract, schedule of drawings, technical specifications, and all addenda.

PROVIDE:

The word “provide”, and any derivatives thereof means, to furnish and install as defined.

RECORD DRAWINGS

A set of drawings produced and certified by the Consultant based on information shown on the “As-Built Drawings” provided by the Contractor.

RIGHT-OF-WAY:

The area that has been acquired for the location, installation, and maintenance of a public or private utility, roadway drainage facility, sewer lines and water lines, etc.

SEE:

In interest of conciseness, references to specification sections and drawing details are preceded by the word “see” to mean to refer to that work item, section, or part thereof.

**SINGLE PRIME
CONTRACTOR:**

Any individual, firm, corporation, or partnership, with whom a contract is made by Mecklenburg County for the total project. The word “Contractor” is referred to throughout the Contract Documents as if singular in number and means a Contractor or an authorized representative of the Contractor.

SPECIFICATIONS:

That portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards, and

workmanship for the Work, and performance of related services.

STOP WORK ORDER: A written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

SUB-CONTRACTOR: Any individual, firm, corporation, or partnership whom has a direct contract with the Single-Prime Contractor to perform a portion of the Work. The word "Sub-Contractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-Contractor or an authorized representative of the Sub-Contractor.

SUB-SUBCONTRACTOR: Any individual, firm, corporation, or partnership whom has a direct contract with a Sub-Contractor to perform a portion of the Work. The word "Sub-Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-Subcontractor or an authorized representative of the Sub-Subcontractor.

SUBSTITUTION: Any product, not specified, to be considered to be used in the place of a product in the construction of the Work that was not in the Construction Documents.

SURETY: The corporate body, which is bound with and for the Contractor, who is primarily liable and which engages to be responsible for the Contractor and his acceptable performance of the work for which he has contracted.

SUBSTANTIAL COMPLETION: The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

THE CONTRACTOR SHALL: In interest of conciseness; sentences, statements, and clauses may be verb phrases with expressive verbs such as "furnish", "install", "provide", "perform", "construct", "erect", "comply", "apply", "submit", etc. Any such sentences, statements, and clauses are to be interpreted to include the applicable form of the phrase "the Contractor shall" preceding the expressive verb, with the requirements described interpreted as mandatory elements of the Contract.

WORK:

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project. The Work also includes providing supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, complete, and functional installation.

WRITTEN NOTICE:

A written communication delivered to the Contractor, or to a partner of the firm in the case of a partnership, or to a member of the contracting organization, or an officer or an employee of the organization in the case of a corporation, or sent to the last known business address of the contracting organization.

END OF GENERAL CONDITIONS OF THE CONTRACT

ARTICLE 1 – GENERAL PROVISIONS

1.12 PROGRESS PAYMENTS:

Revise paragraph H to read as follows:

- H. Provide a separate line item in the Schedule of Values for closeout documentation in the amount of **3%** of the Contract amount.

ARTICLE 4 – CONTRACTOR’S RESPONSIBILITIES

4.2 PERMITS AND LICENSES:

Add the following paragraphs:

The Contractor shall include in his contract all fees related to connection of all utilities to the building such as potable water, irrigation water, fire line, storm drainage, sewer, power, natural gas, etc.

The General Contractor shall be responsible for coordinating the connection and division of responsibilities between site contractors and mechanical, plumbing, electrical, plumbing and fire protection contractors for all utilities entering and leaving the building.

4.5 CONTRACT TIME:

Delete the last sentence and replace with the following paragraph:

The Contractor shall commence work to be performed under this agreement on a date to be specified in a written order from the Consultant and shall fully complete all work hereunder within **270** consecutive calendar days from the date of the written order. For each day in excess of **270** consecutive calendar days, the Contractor shall pay the Owner **\$500.00** per day as liquidated damages which have been reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor to complete the work within the time specified, such time being in the essence of this Contract and a material consideration thereof.

END OF SUPPLEMENTARY CONDITIONS



**MECKLENBURG COUNTY
BUSINESS DIVERSITY & INCLUSION (BDI)
PROGRAM PROVISIONS GUIDE**

BUSINESS DIVERSITY & INCLUSION (BDI) PROGRAM OVERVIEW

Mecklenburg County has made great strides to ensure business is conducted fairly and with diverse populations in our community. Mecklenburg County’s Office of Economic Development engaged Griffin & Strong, P.C. (GSPC) to conduct a disparity study on the availability and utilization of minority and women-owned business enterprises by the County and to examine the relevant evidence of race – or gender – based discrimination in the County’s contracting process.

The [2020 Mecklenburg County Disparity Study](#) revealed areas for improvement, for which GSPC made recommendations to assist the County in remediating the disparities to ensure that all qualified firms within the relevant market are given equal opportunity to succeed in doing business with the County. The full report and recommendation list can be found on the Mecklenburg County website.

Because the implementation of the Disparity Study recommendations will impact internal and external stakeholders, the County has decided on a phased transitional approach to implement the objectives.

Mecklenburg County Government will provide Minority-owned, Women-owned, and Small Business Enterprises (collectively “MWSBE”) as well as other responsible vendors with fair and reasonable opportunity to participate in conducting business with Mecklenburg County.

The BDI Program Provisions Guide requires Contractors and Subcontractors to take all reasonably necessary steps to ensure maximum inclusion opportunity for the participation of Minority Business Enterprises and Women Business Enterprises certified through NC Historically Underutilized Businesses (NCHUB), herein referred to as MBE, WBE or MWBE firms in its contracting activities with Mecklenburg County. Businesses that are not certified MBE or WBE as previously mentioned, will be herein referred to as non-certified. It is further the intent of the Program to broaden opportunities for the participation, increase competition, and to ensure the proper and diligent use of public funds. The BDI Program Provisions Guide includes Contract-by-Contract and Achievement goals for MWBE utilization in proportion to the availability of qualified vendors in particular areas of procurement.

1. Program Statement.

It is the practice of the Mecklenburg County’s Business Diversity and Inclusion Program (the “BDI Program”), in conjunction with the County Procurement Division, to foster greater competition, increase opportunities for participation by all segments of the business community, and maximize value for the taxpayers’ dollars through efficient use of public funds. The BDI Program accordingly is intended to promote full and equal business opportunities for all businesses contracting with Mecklenburg County by increasing the opportunity for purchase of goods and services from minority-owned and women-owned enterprises.

Consistent with the Mecklenburg County Solicitation Terms & Conditions, which encourage Bidders and Contractors to take all reasonably necessary and responsible steps to ensure that minority, women, and small business enterprises have the maximum opportunity to participate in County contracts, it is the practice of the BDI Program to encourage Contractors to actively seek MWBE participation to the greatest

extent possible, and to monitor compliance.

2. Promotion of Equal Opportunity.

The BDI Program seeks to ensure that firms desiring to participate in contracting and procurement activities with the County are not prevented from doing so based on the race, color, national origin, or gender of their owners. It is the intent of the BDI program that no firm, business enterprise, or person shall be denied the benefit of, or otherwise be discriminated against, on the grounds of race, color, national origin, or gender in connection with the award or performance of any contract paid for, in whole or in part, with funding from Mecklenburg County.

3. Program Objectives.

The objectives of the Mecklenburg County BDI Program are to promote and encourage full and open competition in all County contracting and purchasing; to encourage all County personnel involved in procurement and contracting activities to utilize appropriate procedures to identify and remedy any participation by the County in unintended unlawful discrimination (active or passive).

Mecklenburg County engaged a consultant, Griffin & Strong P.C. (“GSPC” or the “consultant”), to conduct a Disparity Study assessing County purchasing, contracting and the MWSBE Program. The consultant produced its Study Report to the County in 2020, and the BDI Program has the objective of implementing recommendations included in the Study. For example, the consultant found that there is a factual predicate for the continuation of the MWSBE (now BDI) Program. Moreover, the results of the study confirmed that the race and gender-neutral policies and program elements thus far employed by the County have proven insufficient to remedy the present effects of past discrimination in purchasing/contracting in the relevant market. The consultant therefore recommended implementation of certain race conscious and gender conscious elements as part of the Program.

4. Commitment to Program Objectives.

In the 2020 Disparity Study, GSPC recommended that Mecklenburg County increase staffing to facilitate recommendations relating to supportive services, monitoring and compliance, forecasting, and goal-setting. The County is committed to achieving the BDI Program objectives and, accordingly, to providing the necessary budgetary, staffing, and support resources necessary for the success of the BDI Program.

For assistance, contact the Office of Economic Development’s BDI Team.

Mecklenburg County - Office of Economic Development
Business Diversity & Inclusion (BDI) Program
Charlotte-Mecklenburg Government Center
600 East 4th Street Charlotte, North Carolina 28202

Phone: 980.314.2945
Email: BDI@mecknc.gov
Website: oed.mecknc.gov/BDI

BDI SOLICITATION COVERSHEET

The County maintains a strong commitment to the inclusion of MWBEs in the County’s contracting and procurement process. Accordingly, BDI provides information and forms that Bidders will supply to be considered for the Program.

Bidders are expected to review the entire BDI Program Provisions Guide and this BDI Solicitation Coversheet as they are planning to submit the BDI form(s) with their Bid/Proposal. The Bid/Proposal should outline any supplies and/or services to be provided by Subcontractors, including each certified Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) for the Contract. Submittals (forms) and time frames can be referenced in Section-4.

PROJECT NAME: Tyvola Senior Center PV Panel Installation

INDUSTRY CATEGORY

Architect & Engineering Construction Professional Services Other Services Goods

Review the established participation goal type selected with the below for this specific solicitation.

PARTICIPATION GOAL TYPES

A. CONTRACT-BY-CONTRACT GOALS
THE ESTABLISHED **SUBCONTRACTOR** PARTICIPATION GOALS FOR THIS PROJECT ARE:

 % MBE 2% WBE
**Note: the goals must be achieved independently and not in combination*

Required Bid forms associated with this participation goal type are:

- [Form A] Listing of Good Faith Efforts (GFE)
- [Form B] Identification of Subcontractor Participation
- Joint Ventures Documentation (include when is selected)

ALL PRIME CONTRACTORS MUST DEMONSTRATE GOOD FAITH EFFORTS IN SOLICITING CERTIFIED NCHUB MBE & WBE SUBCONTRACTORS TO ACHIEVE THE SUBCONTRACTING GOALS NOTED ABOVE.

Reference: A. Contract-by-contract goals stated above cannot be fulfilled by Prime.

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SECTION-1 | FORMAL AND INFORMAL PURCHASING

The BDI Program Team applies the [general purchasing procurement policies and procedures](#) as required by law and enacted by Mecklenburg County, including all applicable purchasing thresholds and approval requirements, as if fully set forth herein.¹ Mecklenburg County’s Procurement Policies are incorporated in this document by reference, and can be found on the Mecklenburg County website noted in Section-10(2).

SECTION-2 | PARTICIPATION GOALS

1. Achievement Goals

Achievement Goals may be included only in those County solicitations that **do not contain contract-by-contract goal-setting** for specific MWBE goals, and when included, shall be advisory, and must also be accompanied by the full definition of the term in such solicitations as stated in this Program Provisions Guide.

Achievement Goals for MWBE participation in County contracts in the categories of Construction (including Construction-related Professional Services), Architecture and Engineering, non-construction Professional Services, Other Services, and Goods are established as follows and are based upon the MBE and WBE Availability by industry / commodity in accordance with the findings of the 2020 Disparity Study.

Industry Category	MBE Goal	WBE Goal
Construction	8%	8%
Architecture & Engineering	14%	4%
Professional Services	10%	4%
Other Services	11%	4%
Goods	5%	4%

**Note: the goals must be achieved independently and not in combination*

2. MWBE Inclusion Plan

(submitted with Bid/Proposal, when selected in the BDI Solicitation Coversheet)

Purpose:

Create defined metrics of success, by creating a MWBE Inclusion Plan

MWBE Inclusion Plan:

Create a detailed description of the strategies and actions the Bidder/Participant will take to outreach fairly and equitably, to support, and to contract with MWBEs.

The following are elements to incorporate into the MWBE Inclusion Plan to help collaborate with MWBEs by addressing any of the following, but not limited to:

- the firms you contacted, when, and how you made contact, and their contact information;
- the outreach strategy used to meet this Contract’s MWBE achievement goals;
- the specific resources and resource contacts utilized to locate MWBE firms for this Contract, when, and how you made contact, and their contact information;

¹ See Mecklenburg County, North Carolina Procurement Policy, ¶¶ 7-8, 10-11.

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- the plan for building a connection with MWBEs and developing a project team;
- the plan to strengthen business relationships;
- the methods that will be used to improve lines of communication;
- the approach(es) that will be taken to resolve disputes;
- detailed description of the supportive services and activities that will be established for business development and how the plan will be executed;
- the mentorship opportunities that will be made available and how those opportunities will be executed; and
- the efforts that will be made available for capacity building and how those efforts will be executed.

Resources:

To assist in locating MWBEs, the Bidder/Participant may utilize an MWBE Diversity consultant and/or contact Certification Agencies, Advocacy Groups, Business Resource Agencies, Regional and Diversity Chamber of Commerce Organizations, Industry/Trade Associations, Mecklenburg County's Procurement Department, and the BDI Program Office, etc.

Some Resources: Metrolina Minority Contractors Association, Hispanic Contractors Association of the Carolinas, The Institute, and the HUB Office or hire a diversity consultant.

3. Goal-Setting Committee

The Goal-Setting Committee (GSC) is to be chaired by the BDI Director (or designee) with consultation from the County Attorney's Office when applicable. The GSC shall also include, at a minimum, the BDI Compliance Officer assigned to the solicitation (or designee), the Procurement Director (or designee), the Director of the Originating Department(s) (or designee) including the respective BDI liaison, a member from the Mecklenburg County business community, and, if the goal is for a Construction or Architecture & Engineering contract, the project manager or engineer assigned to the solicitation, all without duplication of designees. Any of these committee members may, on an as-needed basis, also designate a subject matter expert to participate in the goal-setting for the particular contract(s) at issue.

The GSC establishes BDI Program goals (e.g., contract-by-contract subcontracting goals) based upon Industry Categories (or commodity codes), vendor availability, and contract-specific characteristics.

At the BDI Director's discretion, additional personnel from the Originating Department(s) and/or industry experts in relevant fields can be appointed, and one or more GSCs may be appointed to serve in this capacity simultaneously if it serves the County's best interests in efficiently processing Bid solicitations and applying Program elements to them. At a minimum, the GSC shall:

- a) Meet as often as it deems necessary to accomplish its duties as outlined in this Program Provisions Guide, but not less than once monthly;
- b) Review in advance proposed contract bid specifications to ensure that they are not unnecessarily restrictive and do not adversely affect the ability of MWBE firms to competitively bid without adequate business justification;

- c) Formulate and recommend to the County Manager (or designee), and implement additional rules and procedures for BDI Program goal-setting and other aspects of its duties in selecting and applying specific Program elements to County contracts in an efficient and effective manner; and
- d) Support the implementation and efforts of the BDI Program.

4. Contract-by-Contract Goals

The Goal-Setting Committee (GSC) will set specific percentage-based MWBE Subcontracting goals on a contract-by-contract basis for Contracts valued in excess of \$300,000 and shall have the authority to establish such goals based upon the type of Contract, the type of subcontracting work that will be required, and the availability of MWBEs to perform the work for that specific Contract.

The GSC shall not establish Subcontracting Goals on contracts where (a) there are no subcontracting opportunities identified for the contract; or (b) there are not at least three MBE and/or WBE firms that are available and capable to perform a Commercially Useful Function for the overall subcontracting opportunities on the contract. This process is determined by the BDI Program Office.

All subcontracting goals authorized under the BDI Program are intended to be established by the GSC and implemented only on a contract-by-contract basis. It is intended that such goal-setting will be based upon careful analysis of the availability of Commercially Useful subcontracting opportunities within a given contract and the relative availability of MWBE firms to perform required tasks on such subcontracting opportunities. Contract-by-contract goal-setting shall be based upon reasonably reliable MWBE Subcontractor availability data. Compliance with contract-specific subcontracting goals shall also require compliance with Good Faith Efforts as established in this Program Provisions Guide.

The GSC shall not establish a Subcontracting goal for a contract where there are no subcontracting opportunities identified for the contract or there is insufficient availability of MBEs or WBEs (as applicable) to perform scopes of work or provide products or services that the GSC regards as realistic opportunities for subcontracting. Accordingly, in establishing Contract Goals, the GSC shall:

- a) Review in advance proposed contract bid specifications to ensure that they are not unnecessarily restrictive and do not adversely affect the ability of MWBE firms to competitively bid;
- b) Formulate, recommend to the BDI Director (or designee), then implement additional rules and procedures for MWBE goal-setting and other aspects of its duties in selecting and applying specific Program elements to contracts with Mecklenburg County in an efficient and effective manner; and
- c) Monitor and support the implementation of the contract-by-contract goals aspect of the BDI Program.

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5. Special Projects

For qualifications-based selections for Construction Manager at Risk (CM@R), Public Private Partnerships (P3), Master Developers, Design Build, and other Alternative Build Methods, the County’s overall goals for the project are based upon the Availability of firms in the Industry Categories of Construction and Architecture & Engineering. The overall goals will be included in the solicitation that the Participant(s) will agree to make Good Faith Efforts to meet the goals. At the time of qualification submittals, Participant(s) should submit an ‘MWBE Inclusion Plan’ that represents how the Participant(s) intends to meet or exceed the goal. As construction bid requests or packages are issued by the selected Contractor(s) and Developer(s), they shall include the BDI Provisions Guide, Good Faith Efforts, and the MWBE Participation Goals for each contract and the requirement for its tiered subcontractors.

Industry Category	MBE Goal	WBE Goal
Construction	15%	8%
Architecture & Engineering	15%	8%

6. Program Waiver

Should the BDI Program Office determine after consideration of all relevant documents and other information that there are no subcontracting opportunities identified for a particular contract or there is insufficient availability of MBEs or WBEs (as applicable) to perform scopes of work or provide products or services that identifies realistic opportunities for subcontracting, no subcontracting goal shall be assigned to such contract and a Program Waiver notification shall be issued. As defined herein, a Program Waiver applies to “[a] particular solicitation for which goals are not required and is therefore waived.”² This is not the same as a “Waiver based on Good Faith Efforts.”

7. Joint Ventures

Based upon the scope of work and market availability, the County Manager (or designee) shall determine if a joint venture for a construction project is required with input from the BDI Program Team and the Originating Department. Utilization efforts to form a joint venture shall be required for such project. Only Construction projects valued over \$5,000,000 are eligible for consideration under this section.

On such projects in which utilization efforts to form a joint venture relationship is required, no Bid shall be accepted unless submitted by a joint venture, unless the BDI Program Team determines that in its discretion and judgement sufficient utilization efforts to enter into a joint venture have been demonstrated based on a careful review of relevant facts, documents, and circumstances.

Also, on such eligible projects, the joint venture member businesses/partners must have different race ownership, different gender ownership, or both. MWBE members of the joint venture must be certified as such (as required by the BDI Program Office), and the joint venture team shall include in its Bid submittal the proof of MWBE Certification of each MWBE joint venture member. A Bid submitted by a joint venture comprised of Bidders with both the same race and gender ownership shall be deemed non-responsive and rejected.

² See Definitions, *infra*.

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As to each joint venture under this section, a written joint venture agreement must be completed by all parties to the joint venture and executed before a notary public, which clearly delineates the rights and responsibilities of each member or partner, complies with any requirements of the BDI Program Office as set forth in Bid documents or otherwise, and provides that the joint venture shall continue for, at a minimum, the duration of the Contract.

The BDI Program Team shall review and approve all contractual agreements (with consultation from the County Attorney's Office when applicable) regarding the terms and provisions of each joint venture relationship prior to the award of a contract on eligible projects. The joint venture agreements should at a minimum include the following information:

- the initial capital investment of each venture partner;
- the proportional allocation of profits and losses to each venture partner;
- the sharing of the right to control the ownership and management of the joint venture;
- actual participation of the venture partners on the project;
- the method of and responsibility for accounting;
- the method by which disputes are resolved; and
- any additional or further information required by the office of contract compliance as set forth in Bid documents or otherwise.

The joint venture, and each member of the joint venture, shall provide the BDI Program Team access to review all records pertaining to joint venture agreements before and after the award of a contract in order to reasonably assess compliance with this subdivision.

A Bid submitted by a joint venture that does not include a satisfactory written joint venture agreement in accordance with the requirements of this section shall be deemed non-responsive and rejected.

SECTION-3 | THE BIDDING PROCESS AND RESPONSIBILITIES

The formal and informal bidding process is governed by state law and the relevant provisions of the Mecklenburg County, North Carolina Procurement Policy.³ The following outlines or underscores relevant steps and processes that most often arise in the context of the BDI Program.

The RFP/RFQ process is set out in the County's policies and the BDI Provisions adopt the County's policies and clarify unique BDI requirements.

All parties listed below (1-5) must adhere to the BDI Program Provisions Guide.

³ See N.C.G.S. §§ 143.128, 143.129; Mecklenburg County, North Carolina Procurement Policy, ¶ 11.

a) Bidder/Participant Responsibilities

a) Time of Bid

In adherence to the Bid due date, along with the Bid documents, the Bidder is required to fully complete and submit the appropriate BDI Program Form(s) relating to potential MWBE utilization on the project. The specific forms to be utilized are noted on the Bid Solicitation Information Coversheet per the Participation Goal Type.

- Form A – Listing of Good Faith Efforts (GFE)
- Form B – Identification of Subcontractor Participation
- Form C - Statement of Intent to Perform Contract with Own Workforce
- [Form D] MWBE Inclusion Plan
- Joint Venture Documentation (if applicable)

Descriptions of the aforementioned forms are included in Section-4.

Bid responses will be reviewed and validated for compliance by the County.

b) Time of Intent to Award

The Bidder that is determined to be the lowest responsible and responsive Bidder (construction) or the best value responsible and responsive Bidder (procurement) is required to submit the appropriate BDI Program Form(s) relating to confirmed MWBE utilization and Good Faith Efforts accomplished (if applicable).

- Form B1 - Identification of Subcontractor Participation – Alternates (Construction Only)
- Form E - Subcontractor Utilization Commitment
- Form E1 – Tier 2 Subcontractor Utilization Commitment (Special Projects Only)
- Form F – Certificate of MWBE Unavailability
- Good Faith Efforts (GFE) Documentation (if applicable)

Descriptions of the aforementioned forms are included in Section-4.

c) During Contract Period

The apparent lowest responsible and responsive Bidder/Participant (construction) or the apparent best value responsible and responsive Bidder/Participant (procurement) is required to complete and submit the appropriate BDI Program Form(s), any additional documentation requested, and attend and participate in communication efforts and meetings relating to MWBE utilization on the project, compliance efforts, and dispute resolution(s). The Bidder/Participant should also engage in ongoing communication with the project team (inclusive of Subcontractors/suppliers). After award of fully executed Contract, the contractor is required to utilize the contract compliance solution system when applicable/directed.

- Form E - Subcontractor Utilization Commitment

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- Form E1 – Tier 2 Subcontractor Utilization Commitment (Special Projects Only)
- Form G – Prime Contractor/Project Identification
- Form H – Statement of Payments to Subcontractors/Suppliers

Descriptions of the aforementioned forms are included in Section-4.

b) BDI Program Office Responsibilities

- a) At the time of advertisement for Bids, the BDI Program Team will notify certified Minority and Women Business Enterprise firms of the opportunities available to them and will provide them with a list of potential prime Bidders upon request or within 72-hours. The BDI Program Team will provide the Bidders/Participants with an updated list of certified MWBE firms that may be able to provide sub-bids and/or quotes for scopes of service and/or goods upon request or within 72-hours.
- b) The Originating Department and the BDI Program Team shall review and validate the Bid information and forms.
- c) The BDI Program Team will also collect and review all required BDI program forms and documentation submitted by Bidders/Participants, and any additional documents required, in its discretion, to evaluate the compliance and sufficiency of the GFEs claimed.
- d) The BDI Team will conduct meetings and engage in communication efforts with Contractors (prime/sub) prior to and throughout the contract period. The BDI Program Team will utilize the Contract Compliance Solution System when applicable.
- e) BDI Program Team encourages utilization of MWBEs for Contracts and business opportunities under \$30,000 and for any dollar amount when formal advertisement and Bidding requirements are not applicable.
- f) The [Office of Economic Development](#) provides supportive services to all businesses.

c) County Department Responsibilities

As set forth in the Mecklenburg County, North Carolina Procurement Policy, Department Directors are required to adhere to certain procedures regarding Bids and awards.⁴

It shall further be the responsibility of each Department to ensure that solicitations emanating from the Department adhere to the procedures and provisions set forth in this BDI Program Provisions Guide:

- (a) The Department Director (or designee) shall assume primary responsibility for achieving the objectives of this BDI Program Provisions Guide within the Department and shall review, on a continuing basis, all aspects of the Program's operations to assure that the purpose is being achieved.

⁴ Mecklenburg County North Carolina Procurement Policy, ¶ 17.

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- (b) Departments shall provide copies of the pre-bid attendance list within two (2) business days of the session ending.
 - (c) Departments shall provide copies of the interested bidders list upon request and/or within two (2) business days following the pre-bid meeting.
 - (d) Departments shall provide copies of the BDI forms submitted with the Bid from all the Bidders within 24 hours of the Bid opening/Bid due date to the BDI Office.
 - (e) Departments and the BDI Program Team shall review and validate the Bid information and forms.
 - (f) Departments shall communicate the selected apparent lowest responsible and responsive Bidder/Participant (construction) or the apparent best value responsible and responsive Bidder/Participant (procurement).
 - (g) Departments shall maintain accurate records for each contract awarded, including unsuccessful Bidders, dollar value, the nature of the goods or services to be provided, the name of the contractor awarded the contract, the efforts it employed to solicit responses from MWBEs, and all subcontracts awarded by the Prime Contractor identifying for each its dollar value, the nature of the goods or services provided and the name of the Subcontractor(s).⁵ Departments will utilize the Contract Compliance Solution System when applicable/directed.
- d) BDI Program Team encourages utilization of MWBEs for Contracts and business opportunities under \$30,000 and for any dollar amount when formal advertisement and bidding requirements are not applicable.

d) MWBE Responsibilities

It is the responsibility of the MWBE firm to contact the BDI Program Team for Contract opportunities, to provide quotes, and/or sub-bids when requested. The MWBE will also be responsible for completing Form E, the Subcontractor Commitment Form, in a timely manner and return it to the Prime Contractor.

This paragraph only applies to Achievement Goals. This does not apply to Contract-by-Contract Goals. The MWBE firm must be certified by the NC Office of Historically Underutilized Businesses (MWBE) for their Contract dollar amounts to be counted as MWBE participation. If the MWBE firm is not certified at the time, the firm commits to provide services, the MWBE should apply for the approved Certification designation with the County's approved Certification agency within thirty (30) business days. If the MWBE firm fails to submit an application for Certification within the specified time frame or if the MWBE firm is not certified, the non-certified firm's Contract dollar amount will not be counted as MWBE participation. The Prime Contractor must complete efforts to fulfill the committed MWBE participation goal(s).

MWBE firms who are contacted by Owners or Bidders/Participants must respond promptly whether or not they wish to submit a Bid (or sub-bid).

⁵ See N.C.G.S. § 143-128.2(i); N.C.G.S. § 132-1.

Lastly, the MWBE firm is required to complete and submit the appropriate BDI Program Form(s), any additional documentation requested, and may be asked to attend and participate in communication efforts and meetings relating to MWBE utilization on the project, compliance efforts, and dispute resolution(s). The MWBE firm may also be asked to submit additional documentation when requested.

e) Contract Compliance Solution System

When applicable, the BDI Office, the Prime Contractor(s), and Mecklenburg County designees will utilize the web-based Contract Compliance Solution System to document, monitor, and track the project/contract information (including payments), and compliance efforts. Training and supportive services will be provided by the Procurement Department, with the BDI Office serving as their backup, to assist with use of the system.

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SECTION-4 | SUBMITTALS AND TIME FRAME

The specific forms to be utilized are noted on the Bid Solicitation Coversheet per the Participation Goal Type.

“Failure to file a required affidavit or documentation that demonstrates that the contractor made the required good faith effort is grounds for rejection of the Bid.” NCGS 143-128.2(c)

Form Name/Description	Submission Requirements	Required Form #
<p>Listing of Good Faith Efforts (GFE) Completed by Bidder(s). Identifies the statutory Good Faith Efforts undertaken to recruit and solicit MWBEs to meet or exceed the participation goal for this Contract SEE BDI SOLICITATION COVERSHEET FOR ESTABLISHED SUBCONTRACTING GOALS</p>	<p>Due with Bid/Proposal when noted on Bid Solicitation Information <i>(if subcontracting)</i></p>	Form A
<p>Identification of Subcontractor Participation Completed by Bidder(s). Identifies MWBEs and non-certified firms (their scope of work and dollar value) that are anticipated to receive a subcontract for this Contract.</p>	<p>Due with Bid/Proposal <i>(if subcontracting)</i></p>	Form B
<p>Identification of Subcontractor Participation - Alternates Completed by Bidder(s)/Participant(s). Identifies certified NCHUB MWBEs and non-NCHUB MWBEs that are anticipated to receive a subcontract for this Contract in the event Construction Alternates are selected by the County.</p>	<p>Due within three (3) business days after receiving a request from the County <i>(if subcontracting)</i></p>	Form B1
<p>Statement of Intent to Perform Contract with Own Workforce Completed by Bidder(s). Indicates that the Bidder does not customarily subcontract elements of this type of project, normally performs, has the capability to perform, and will perform ALL elements of the work on this Contract with its own current workforce AND will not purchase any material or supplies for the project in the performance of this Contract.</p>	<p>Due with Bid/Proposal <i>(if self-performing)</i></p>	Form C
<p>MWBE Inclusion Plan Completed by Bidder(s)/Submitter(s). A detailed description of the strategies and actions the Bidder/submitter will take to outreach fairly and equitably, support, and contract with MWBEs.</p>	<p>Due with Bid/Proposal when noted on Bid Solicitation Information Coversheet <i>(if subcontracting)</i></p>	Form D
<p>Subcontractor Commitment Completed by Prime Contractor(s) and ALL of the Subcontractors (Suppliers/Subconsultants). This document shall not serve in a manner as an actual subcontract between the two parties. A separate binding agreement will describe in detail the contractual obligation of the Prime Contractor and the Subcontractor conditioned upon the execution of a contract with Mecklenburg County.</p>	<p>Due within three (3) business days after receiving a request from the County <i>(if subcontracting)</i></p>	Form E
<p>Tier 2 Subcontractor Commitment (Special Projects Only) Completed by Tier 1 Subcontractor and ALL of the Tier 2 Subcontractors (Suppliers/Subconsultants). This document shall not serve in a manner as an actual subcontract between the two parties. A separate binding agreement will describe in detail the contractual obligation of the Tier 1 Firm conditioned upon the execution of a contract with the Prime and Mecklenburg County and Tier 1 Firm and the Prime.</p>	<p>Due within three (3) business days after receiving a request from the County <i>(if subcontracting–Tier 2)</i></p>	Form E1
<p>Certificate of MWBE Unavailability Completed by Bidder(s)/Participant(s). This document identifies the MWBE firms that were originally committed to Subcontract in good faith but became unavailable prior to signing a formal Agreement/Contract.</p>	<p>Due with the Subcontractor Commitment Form (Forms E/E1)</p>	Form F
<p>Prime Contractor / Project Identification Completed by Prime Contractor. Identifies the Prime Contractor and Project information.</p>	<p>Due within three (3) business days after receipt of fully executed County Contract</p>	Form G
<p>Statement of Payments to Subcontractors/Suppliers Completed by Prime Contractor(s) (and Tier 1 Subcontractors when applicable). Prime Contractors must submit this form with each request for payment showing work that has been approved and completed for all Subcontractors (suppliers, manufacturers, brokers, and/or members of a joint venture) in connection with the Contract.</p>	<p>Due with Pay Applications</p>	Form H
<p>Good Faith Efforts (GFE) Documentation Completed by Bidder(s). If the established MBE and WBE goals are not achieved at the time of Bid, the Bidder shall provide the backup documentation using the GFE Points System as a guide for documentation submission to support the Good Faith Efforts selected on Form A.</p>	<p>Due upon the time specified by the County, if not specified then within three (3) business days after the bid due date</p>	Backup Documentation using the GFE Points System
<p>Joint Venture Documentation Completed by Prime Contractor(s). Documentation that acknowledges a joint venture, the terms, and percentage breakdown.</p>	<p>Due with Bid/Proposal when noted on Bid Solicitation Information Coversheet <i>(if subcontracting)</i></p>	Backup Documentation

SECTION-5 | GOOD FAITH EFFORTS (GFE) POINTS SYSTEM

North Carolina law (N.C.G.S. § 143.128.2(f)) permits local governments some level of discretion in setting and applying the Good Faith Efforts (GFE) point system for MWBE inclusion, but a local government cannot require a Bidder to earn more than fifty (50) points. “Failure to file a required affidavit or documentation that demonstrates that the contractor made the required good faith effort is grounds for rejection of the Bid” as being non-responsive. N.C.G.S. § 143-128.2(c) Id. Accordingly, the County has established the following GFE point system:

- The County will evaluate all efforts made by the Bidder/Participant to determine compliance with good faith efforts categories. The BDI Program Team will assess whether the efforts employed by the Bidder are those a Prime Contractor would reasonably be expected to take if they were actively and aggressively trying to meet each Goal established for the Contract. The assessment will be made on a case-by-case basis taking all available facts into account, including documentation provided by the Bidder/Participant.
- The BDI Program Team (or designee) may take into account the performance of other Bidders/Participants in meeting the established Goals. Mere *pro forma* efforts will not be sufficient. The focus will be on the likely effectiveness of steps taken.
- To avoid any impression of unfair Bid practices, all actions necessary to earn the GFE points must be undertaken prior to the Bid opening/Bid due date. For each subcontracting Goal that is unmet, the Bidder/Participant must earn at least fifty (50) GFE points (the “Minimum GFE Points”) from the GFE categories described below to be considered responsive and responsible.
 - a) **Subcontractor Solicitation - (15 pts)** Bidder/Participant solicited Bids from MWBEs that would meet the Goals stated for the respective Contract, that reasonably could have been expected to submit a quote, and that were known to the Bidder/Participant or available on State or local government-maintained lists, at least **ten (10) Business Days** before the Bid Opening/Bid due date and notified them of the nature and scope of the work to be performed.

Factors considered for these points may include, but are not limited to:

- Providing a contact log (telephone and/or email) of initial communication to, responses from, and follow-up communication to and from each firm solicited.
 - the Bidder’s/Participant’s solicitation of Bids from MWBE Subcontractors, while also considering total number of available MWBE firms that would meet the Goals stated in the respective Contract;
 - whether the Bidder/Participant solicited Bids from MWBEs listed as performing scopes of work sufficient to meet each Goal;
 - whether the solicitations were made at least **ten (10) Business Days** before Bid opening/Bid due date;
 - how the solicitations occurred and whether they were documented in a verifiable way (and in compliance with any forms provided by the County);

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- whether the substance of the Bidder's/Participant's solicitation was reasonably sufficient to generate a response from MWBEs;
- whether the Bidder/Participant promptly and adequately responded to inquiries received from MWBEs; and
- whether the Bidder/Participant initiated follow-up communications to MWBEs that did not respond to the Bidder's/Participant's initial solicitation.

- b) **Plan Availability – (10 pts)** The Bidder/Participant made the Project Documents (e.g., project descriptions, scopes of work, construction plans, specifications, and/or requirements) available for review by prospective MWBE Subcontractors or provided these documents to them at least **ten (10) Business Days** before the Bids are due. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)) and it responds promptly to any request(s) made for access to the project documents.**

The ways a Bidder/Participant made Project Documents available for these points include:

- providing a telephone number or email address for MWBE firms to request copies of the Project Documents via email, fax, regular mail, or other means of document transfer, at no cost; and/or
- providing an address within the Charlotte-Concord-Gastonia MSA where MWBEs can physically access/review the Project Documents at no cost; and/or
- posting the Project Documents on a website that MWBEs can access at no cost.

- c) **Breaking Down Work – (10 pts)** The Bidder/Participant separated or combined elements of work into economically feasible units to facilitate MWBE participation. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)).**

In deciding whether to award points for this GFE, the BDI Program Team will consider:

- the number and dollar value of the scopes of work the Bidder/Participant listed in its written invitation to Bid for MWBE participation,
- whether those scopes would be sufficient to meet the contract subcontracting Goals and how the Bidder/Participant notified MWBEs of its willingness to break down the work into such units.

Simply restating the County's subcontracting scopes as listed in the solicitation documents may not be sufficient to earn this GFE; the Bidder/Participant should provide written documentation to demonstrate negotiations with MWBEs after having proposed broken-down or combined elements of work.

- d) **Working with an MWBE Assistance Organization – (10 pts)** The Bidder/Participant must document it worked with MWBE trade, community, or

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contractor organizations identified by the BDI Program Team, the NC Office of Historically Underutilized Businesses, and/or included in the Bid documents that provide assistance in recruitment of MWBE businesses, at least **fifteen (15) Business Days** before Bids are due. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)).**

The Bidder/Participant must document that it worked with an MWBE assistance organization to provide assistance in recruiting MWBEs for the Contract for which Bids are sought. In deciding whether to award points for this GFE, the BDI Program Team will consider:

- the timing and nature of how the Bidder/Participant worked with the MWBE organization, and;
 - whether such efforts were reasonably likely to result in significant MWBE participation for the Contract for which Bids are sought.
- e) **Attending Pre-Bid – (10 pts)** The Bidder/Participant attended any pre-Bid meetings scheduled by the public owner.
- f) **Bonding or Insurance Assistance – (10 pts) After the Bidder/Participant received a Bid from an MWBE Subcontractor**, the Bidder/Participant committed to providing assistance to the MWBE in obtaining required bonding or insurance or provided alternatives to bonding or insurance. **Mere willingness to offer such assistance in the absence of some MWBE Subcontractor participation will not result in credit for these points.**

To document satisfaction of this GFE, the Bidder/Participant must submit:

- the name and contact information of the MWBE;
- a description of the assistance the Bidder/Participant will provide;
- the date the Bidder/Participant will provide the assistance;
- the name of a contact person with the MWBE who can verify that the Bidder/Participant committed to providing the assistance; and
- any additional information requested by the County.

No credit will be given for assistance provided to an Affiliate of the Bidder/Participant or assistance provided that is required by law.

In deciding whether to award points for this GFE, the BDI Program Team will consider how significant and meaningful the assistance was, how many MWBEs the assistance was offered to, and what impact it likely had on the Bidder's/Participant's efforts to recruit MWBEs for the project.

- g) **Negotiating in Good Faith with MWBEs- (20 pts)** The Bidder/Participant must demonstrate that the Bidder/Participant negotiated in good faith with interested MWBE businesses (which, at a minimum, means showing some back-and-forth negotiations between the Bidder/Participant and prospective MWBEs), and did not reject any MWBEs as unqualified without sound reasons based on their capabilities

and shall document in writing the reasons for rejecting any MWBEs for lack of qualifications.

The County will determine if the rejection is valid based on the following information to be provided by the Bidder/Participant:

- copies of all Subcontractor proposals/responses received from each MWBE firm responding to the Bidder's/Participant's solicitation;
- letter from Bidder/Participant detailing reasons for rejecting MWBEs due to lack of qualifications;
- for subcontracts where a MWBE firm is not considered the lowest responsible Subcontractor, copies of proposals/responses received from all firms submitting proposals for that particular scope of work;
- if the rejection is due to self-performance of a specified work area, Bidder/Participant must submit Bidder's/Participant's own estimate for the scope of work.

The Bidder/Participant must not alter any dollar amounts and/or scopes of work. If a revision is required a revised proposal must be submitted. All telephone proposals must be followed up with a written proposal. All proposals must be received prior to Bid opening/Bid due date.

h) **Financial Assistance – (15 pts) After the Bidder/Participant received a Bid from an MWBE Subcontractor**, the Bidder/Participant committed to providing one of the following types of assistance to an MWBE in connection with the Contract, once awarded:

- assistance in obtaining equipment, a loan, capital, lines of credit, joint pay agreements or guaranties to secure loans, the purchase of supplies, or letters of credit, including waiving credit that is ordinarily required, or
- assistance in obtaining the same unit pricing with the Bidder's/Participant's suppliers as the Bidder/Participant.

To receive credit for this GFE, Bidders/Participants must provide:

- language in the Bidder's/Participant's solicitation letter and publication advertisement stating the Prime Contractor's Financial Assistance Policy;
- the name and contact information of the MWBE;
- the description of the assistance to be provided by the Bidder/Participant;
- the date the Bidder/Participant will provide the assistance; and
- the name of a contact person with the MWBE firm who can verify that the Bidder/Participant committed to providing the assistance.

In deciding whether to award points for this GFE, the BDI Program Team will consider how significant and meaningful the assistance was, how many MWBEs assistance was offered to, and what impact the assistance likely had on the Bidder's/Participant's efforts to recruit MWBEs for the project. **Mere willingness**

to offer such assistance in the absence of some MWBE Subcontractor participation will not result in credit for these points. No credit will be given for assistance provided to an Affiliate of the Bidder/Participants.

- i) **Joint Venture Arrangement – (20 pts)** The Bidder/Participant must demonstrate that the Bidder/Participant negotiated joint venture/partnership/association arrangements with MWBE in order to increase opportunities for MWBE participation on this project.
 - To receive credit for this GFE, Bidders/Participants must provide:
 - the name and contact information of the MWBE;
 - a copy of the Joint Venture agreement or other formal business arrangement;
 - evidence of the date the MWBE entered into the agreement; and
 - the name of a contact person with the MWBE firm who can verify the existence of the agreement.

No credit will be given for a Joint Venture with an Affiliate of the Bidder/Participant. **Mere willingness to offer such arrangement in the absence of some MWBE Subcontractor participation will not result in credit for these points.**

- j) **Quick Payment Commitment – (10 pts)** After the Bidder/Participant received a Bid/Proposal from an MWBE Subcontractor, the Bidder/Participant committed to providing quick pay agreements and policies to enable such MWBE Subcontractor(s) and/or supplier(s) to meet cash-flow demands. **Mere willingness to offer such agreement in the absence of some MWBE Subcontractor participation will not result in credit for these points.**
 - Quick Pay Agreements are defined herein at Section-10(1) (Definitions).
 - To receive credit for this GFE, Bidders must provide the BDI Program Team with:
 - language in the Bidder’s/Participant’s solicitation letter and publication advertisement stating the Prime Contractor’s Quick Pay Policy;
 - a copy of the Bidder’s Quick Pay Commitment related to the specific Contract;
 - documentation indicating that all MWBEs notified under the above Subcontractor Solicitation GFE (subsection (a)) have received a written copy of the Bidder’s Quick Pay Commitment prior to the Bid opening/Bid due date.

GFE Documentation

To demonstrate GFE compliance, a Bidder/Participant must submit the GFE Supporting Documentation within the time specified by the BDI Program Office. If the BDI Program does not specify a time, the Bidder/Participant must submit GFE Supporting Documentation within **three (3) Business Days** after the Bid due date. The BDI Program Office may request GFE Supporting Documentation from other Bidders in order to evaluate the MWBE participation achievement and the GFEs of the apparent low/best value Bidder relative to others. Regardless of when the GFE Supporting Documentation is due, **all actions necessary to earn the GFE points must be undertaken and dated prior to Bid opening/Bid due date.**

Consistent with the NC general statute, “Failure to file a required affidavit or documentation that demonstrates that the contractor made the required good faith effort is grounds for rejection of the Bid.” N.C.G.S. § 143-128.2(c).

MWBE Good Faith Efforts Appeal Process

If a Bid/Proposal is rejected because the BDI Program Office determined after reviewing all relevant information that the submitted documentation was inadequate to establish sufficient Good Faith Efforts, the Bidder/Participant may request a review of this determination in accordance with the following process: The Bidder/Participant who wishes to dispute the Good Faith Efforts decision of the BDI Program Office may have that decision reviewed by the Hearing Committee provided the Bidder/Participant submits a request for review in writing to the Originating Department within five (5) business days of the date of the decision to reject the proposal. The request shall contain specific reasons and any supporting documentation for why the Bidder/Participant believes that the Good Faith Efforts decision was in error.

The Originating Department shall refer the matter to the Hearing Committee (send a copy to the BDI Program Office). A hearing shall be scheduled within fifteen (15) business days of the receipt of the review request. The Hearing Committee will be provided all relevant documents in possession of the BDI Program Team. The Hearing Committee, upon its discretion, may seek review of the Good Faith Efforts decision with the Bidder and/or its representative and the BDI Director (or designee). The Hearing Committee shall make a decision and notify the Bidder in writing within five (5) business days following the hearing. The Hearing Committee may affirm, reverse, or modify the Good Faith Efforts decision of the BDI Program Office. The decision of the Hearing Committee shall be final.

SECTION-6 | REQUIRED FORMS

Listed below.

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Form A – Listing of Good Faith Efforts (GFE)

[Submit with Bid]

Name of Bidder:

(Company Name) _____

Project Name: _____

Solicitation #: _____

Prior to submission, review your documents for accuracy and ensure all items are complete

I have reviewed and made a good faith effort to comply with [Section-5 Good Faith Efforts \(GFE\) Points System](#) and have marked the following by selecting the checkbox(es) below and totaling the final points attained.

Bidders must earn at least fifty (50) points from the good faith efforts listed for their Bid to be considered responsive. (1 NC Administrative Code 30 I.0101). **The Bidder agrees to provide any additional information and/or documentation per [Section-5 Good Faith Efforts \(GFE\) Points System](#) requested by the Owner in support of the Bidder's good faith efforts.**

NOTE: All actions necessary to earn GFE Points must be undertaken prior to Bid opening/Bid due date.

- (a) – 15 pts** **Subcontractor Solicitation:** Bidder/Participant solicited Bids from MWBEs that would meet the Goals stated for the respective project, that reasonably could have been expected to submit a quote, and that were known to the Bidder/Participant or available on State or local government-maintained lists, at least **ten (10) Business Days** before the Bid date and notified them of the nature and scope of the work to be performed.

- (b) – 10 pts** **Plan Availability:** The Bidder/Participant made the Project Documents (e.g., project descriptions, construction plans, specifications, and/or requirements) available for review by prospective MWBE Subcontractors or provided these documents to them at least **ten (10) Business Days** before the Bids are due. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)) and it responds promptly to any request(s) made for access to the project documents.**

- (c) – 10 pts** **Breaking Down Work:** The Bidder/Participant separated or combined elements of work into economically feasible units to facilitate MWBE participation. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)).**

- (d) – (10 pts)** **Working with an MWBE Assistance Organization:** The Bidder/Participant must document it worked with MWBE trade, community, or contractor organizations identified by the BDI Program Team, the state Office of Historically Underutilized Businesses, and/or included in the Bid documents that provide assistance in recruitment of MWBE businesses, at least **fifteen (15) Business Days** before Bids are due. **A Bidder/Participant may receive credit for this GFE only if the Bidder/Participant receives credit for the above Subcontractor Solicitation GFE (subsection (a)).**

- (e) – (10 pts)** **Attending Pre-Bid:** The Bidder/Participant attended any pre-Bid meetings scheduled by the Owner.

- (f) – (10 pts)** **Bonding or Insurance Assistance: After the Bidder/Participant received a Bid/Proposal from an MWBE Subcontractor,** the Bidder/Participant committed to providing assistance to the MWBE in obtaining required bonding or insurance or provided alternatives to bonding or insurance. **Mere willingness to offer**

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such assistance in the absence of some MWBE Subcontractor participation will not result in credit for these points.

(g) – (20 pts)

Negotiating in Good Faith with MWBEs: The Bidder/Participant must demonstrate that the Bidder/Participant negotiated in good faith with interested MWBE businesses (which, at a minimum, means showing some back-and-forth negotiations between the Bidder/Participant and prospective MWBEs), and did not reject any MWBEs as unqualified without sound reasons based on their capabilities and shall document in writing the reasons for rejecting any MWBEs for lack of qualifications.

(h) – (15 pts)

Financial Assistance: After the Bidder/Participant received a Bid/Proposal from an MWBE Subcontractor, the Bidder/Participant committed to providing one of the following types of assistance to an MWBE in connection with the Contract, once awarded:

- assistance in obtaining equipment, a loan, capital, lines of credit, joint pay agreements or guaranties to secure loans, the purchase of supplies, or letters of credit, including waiving credit that is ordinarily required, or
- assistance in obtaining the same unit pricing with the Bidder's/Participant's suppliers as the Bidder/Participant.

(i) – (20 pts)

Joint Venture Arrangement: The Bidder/Participant must demonstrate that the Bidder/Participant negotiated joint venture/partnership/association arrangements with MWBE in order to increase opportunities for MWBE participation on this project.

(j) - (10 pts)

Quick Payment Commitment: After the Bidder/Participant received a Bid / proposal from an MWBE Subcontractor, the Bidder/Participant committed to providing quick pay agreements and policies to enable such MWBE Subcontractor(s) and/or Supplier(s) to meet cash-flow demands. **Mere willingness to offer such agreement in the absence of some MWBE Subcontractor participation will not result in credit for these points.**

The undersigned will enter into a formal agreement with the firms listed on the Identification of Subcontractor Participation Form (Form B), conditional upon the scope of contract to be executed with the Owner. Substitution of Contractors must be in accordance with GS143-128.2(d). Failure to abide by this statutory provision will constitute a breach of the contract, giving rise to all contract and/or statutory remedies, including but not limited to cancellation of the contract.

The undersigned hereby certifies that he or she has read the terms of the BDI Program Provisions Guide and the formal agreement with the firms listed on Form B and is authorized to bind the Bidder/Participant to the commitment herein set forth.

Total GFE Points _____ (Calculate the total GFE points selected with above)

For each Participation Goal (MBE and WBE) that is unmet, the Bidder must earn at least fifty (50) GFE points (the "Minimum GFE Points") to be considered responsive. Be prepared to submit the documentation following the Bid opening/Bid Due date.

Date: _____

Name of Authorized Person: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20 _____

Notary Public Name/Signature _____

My commission expires _____

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Form B – Identification of Subcontractor Participation

[Submit with Bid]

SEE BDI SOLICITATION COVERSHEET FOR ESTABLISHED SUBCONTRACTING GOALS

The County maintains a strong commitment to the inclusion of MWBEs in the County’s contracting and procurement process when there are viable subcontracting opportunities. Bidders must submit this form with their Bid/Proposal outlining any supplies and/or services to be provided by all Subcontractors, including each MBE, WBE, and non-certified firms for the Contract.

Prior to submission, review your documents for accuracy and ensure all items are complete

Name of Bidder: _____ **Certification Status** MBE WBE NCSBE
 (Company Name) (check all that apply): CBI-SBE NCDOT-DBE

Project Name: _____ **Solicitation #:** _____ **Total Bid Amount:** _____

Authorized Person: _____ **Telephone:** _____ **Email:** _____

I, the Authorized Person, do hereby certify that on this Contract, we intend to use the following certified **MWBEs** and non-certified firms as Subcontractors (subconsultants, vendors, suppliers, and/or providers of professional and/or other services). We intend to expend the amounts/percentages below of the total dollar amount of the contract with the businesses listed

****MBE and WBE Certification with the NCHUB Office is required to be counted toward participation goals.**

Total Utilization Amount	Total Utilization Percentage	Total MBE Amount	Total MBE Percentage	Total WBE Amount	Total WBE Percentage	Total Non-Certified Amount	Total Non-Certified Percentage

#	Firm Name / Contact Person	Telephone / Email	County / State	Scope of Work	MBE Amount	WBE Amount	Non-Certified Amount
1							
2							
3							
4							
5							
6							

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Mecklenburg County Government

Formal Documents

7						
8						
9						
10						
11						
12						
13						
14						
15						

(add additional sheets if needed)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with the firms listed on this form, conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract, giving rise to all contract and/or statutory remedies, including but not limited to cancellation of the contract.

The undersigned hereby certifies that he or she has read the BDI Program Provisions Guide and the terms of this commitment and is authorized to bind the Bidder to the commitment herein set forth.

Signature of Authorized Person

Title

Date

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Form B1 – Identification of Subcontractor Participation - ALTERNATES

[Do not submit with Bid – Due within three (3) business days after receiving a request from the County]

In the event Construction Alternates are selected by the County, the established Subcontracting goal(s) for this Contract will apply to the total contract amount, including contingency and the selected Alternates (“Total Contract Amount”). In such an instance, Bidders/Participants must identify additional MWBE commitments and submit Form B1 showing all commitments made after Bid Opening.

The County maintains a strong commitment to the inclusion of MWBEs in the County’s contracting and procurement process when there are viable subcontracting opportunities. Bidders must submit this form outlining any supplies and/or services to be provided by all Subcontractors, including each MBE, WBE, and non-certified firms for the Contract.

Prior to submission, review your documents for accuracy and ensure all items are complete

Name of Bidder

(Company Name): _____

Total Contract Amount: _____

Project Name: _____

Solicitation #: _____

Authorized Officer Title: _____

Telephone: _____

Email: _____

I, the Authorized Person, do hereby certify that on this Contract, we intend to use the following certified **MWBEs** and non-certified firms as Subcontractors (subconsultants, vendors, suppliers, and/or providers of professional and/or other services). We intend to expend the amounts/percentages below of the total dollar amount of the contract with the businesses listed

****MBE and WBE Certification with the NCHUB Office is required to be counted toward participation goals.**

Total Utilization Amount	Total Utilization Percentage	Total MBE Amount	Total MBE Percentage	Total WBE Amount	Total WBE Percentage	Total Non-Certified Amount	Total Non-Certified Percentage

#	Firm Name / Contact Person	Telephone / Email	County / State	Scope of Work	MBE Amount	WBE Amount	Non-Certified Amount
1							
2							
3							
4							

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Mecklenburg County Government

Formal Documents

5							
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11							
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14							
15							

(add additional sheets if needed)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with the firms listed on this form, conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract, giving rise to all contract and/or statutory remedies, including but not limited to cancellation of the contract.

The undersigned hereby certifies that he or she has read the BDI Program Provisions Guide and the terms of this commitment and is authorized to bind the Bidder to the commitment herein set forth.

Signature of Authorized Person

Title

Date

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Form C – Statement of Intent to Perform Contract with OWN Workforce

[Submit with Bid]

Prior to submission, review your documents for accuracy and ensure all items are complete

Name of Bidder: _____ **Certification** MBE WBE NCSBE
 (Company Name) _____ **Status:** CBI-SBE NCDOT-DBE
Telephone: _____ **Emails:** _____

Project Name: _____ **Solicitation #:** _____

Total Bid Amount: _____

I hereby certify that it is our intent to perform 100% of the contract required for this Contract.

1. In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type of project, normally performs, has the capability to perform, and will perform **all elements of the work** (labor) on this project with his/her own current workforces – including any aggregation of material, equipment or supplies required for the project provided by the Bidder's company for utilization on a County Project, with the total value of which is ten percent (10%) or more of the value of the contract or \$2,000, whichever is less; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

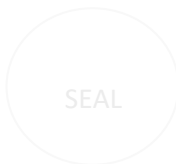
2. If it should become necessary to subcontract some portion of the work at a later date, the Bidder will comply with all "Good Faith Efforts" requirements in providing equal opportunity to MWBE firms to subcontract the Work. The BDI Program Office should be notified immediately and approved, and respective BDI Program Provisions and Forms should be adhered to.

The undersigned hereby certifies that he or she has read the BDI Program Provisions Guide and this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Person: _____

Signature: _____

Title: _____



State of _____, County of _____
Subscribed and sworn to before me this _____ day of _____ 20 _____

Notary Public Name/Signature _____

My commission expires _____

Form D – MWBE Inclusion Plan

[Submit with Bid/Submission, when selected in the BDI Solicitation Coversheet]

Create a detailed description of the strategies and actions the Bidder will take to outreach fairly and equitably, support, and contract with MWBEs.

Prior to submission, review your documents for accuracy and ensure all items are complete

The following are elements to incorporate into the MWBE Inclusion Plan to help collaborate with MWBEs by addressing the following, but not be limited to:

- the firms you contacted, when, and how you made contact, and their contact information
- the outreach strategy used to meet this Contract’s MWBE achievement goals;
- the specific resources and resource contacts utilized to locate MWBE firms for this Contract;
- the plan for building a connection with MWBEs and developing a project team;
- the plan to strengthen business relationships;
- the methods that will be used to improve lines of communication;
- the approach(es) that will be taken to resolve disputes;
- detailed description of the supportive services and activities that will be established for business development and how the plan will be executed;
- the mentorship opportunities that will be made available and how those opportunities will be executed; and
- the efforts that will be made available for capacity building and how those efforts will be executed.

(add additional sheets if needed)

DO NOT SUBMIT WITH BID

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Form E – Subcontractor Commitment

[Do not submit with Bid – Due within three (3) business days after receiving a request from the County]

This document standing alone shall not be considered an actual subcontract between the two parties. A separate binding agreement will describe in detail the contractual obligation of the Prime Contractor and the Subcontractor. The undersigned will enter into a formal agreement for the scope of work mentioned, conditioned upon the execution of a contract with Mecklenburg County. Breach of this commitment constitutes breach of Bidder's/Participant's contract if awarded. **If subcontracting with MBE/WBE Firms, any changes in this commitment must be approved in advance by the BDI Office.**

To be completed by the Prime Contractor			
Project Name:		Solicitation Number:	
Company Name:			
Authorized Person:		Title:	
Email:		Telephone:	
Reason for Out-of-State Sub Selection (if applicable):			

If the Prime Contractor has entered into a Quick Pay Agreement, in association with this Commitment, attach a copy of the executed Agreement with the undersigned business.

Upon execution of a Prime Contract with the County for the above referenced project, the Bidder/Participant certifies that it intends to utilize the business listed below, and that the description, cost of work to be performed by the business as described below is accurate. Both parties have or will enter into a formal agreement conditioned upon the execution of a Contract with Mecklenburg County.

Signature of Authorized Person (Prime Contractor) _____ Date _____

To be completed by the Subcontractor (Supplier/Subconsultant)			
Company Name:			
Authorized Person:		Title:	
Telephone:		Email:	
Address, City, St, Zip:			
County:		Ownership is Minority Female:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Source of Ownership Category:	** Please Select **	Ownership Category:	** Please Select **
Contract Date:		Attended the Pre-Bid:	<input type="checkbox"/> Yes <input type="checkbox"/> No

Identify in complete detail the scope of work to be performed and/or item(s) to be supplied with projected start and end timeframe. The undersigned intends to and is prepared to perform the work and/or provide the supplies (described below) in connection with the above project at the following Price (\$): _____

NIGP Code	Scope of Work	Projected Start Date	Projected End Date

The subcontracting firm certifies that it has read the BDI DBE Program Guide and agreed to provide such work/supplies for the amount stated above. Both parties have or will enter into a formal agreement conditioned upon the execution of a Contract with Mecklenburg County.

Signature of Authorized Person (Subcontractor/Supplier) _____ Date _____

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Form E1 – Tier 2 Subcontractor Commitment (Special Projects Only)

[Do not submit with Bid – Due within three (3) business days after receiving a request from the County]

This document standing alone shall not be considered an actual subcontract between the two parties. A separate binding agreement will describe in detail the contractual obligation of the Tier 1 Subcontractor and the Tier 2 Subcontractor. The undersigned will enter into a formal agreement for the scope of work mentioned, conditioned upon the execution of a contract between the Prime Contractor with Mecklenburg County and with the Prime Contractor and the Tier 1 Subcontractor. **If subcontracting with MBE/WBE Firms, any changes in this commitment must be approved in advance by the BDI Office.**

To be completed by the Tier 1 Subcontractor			
Project Name:			
Company Name:			
Authorized Person:		Title:	
Email:		Telephone:	
Reason for Out-of-State Sub Selection (if applicable):			

If the Subcontractor has entered into a Quick Pay Agreement, in association with this Commitment, attach a copy of the executed Agreement with the undersigned business.

Upon execution of the above-mentioned executed Contracts, the Tier 1 Subcontractor certifies that it intends to utilize the business listed below, and that the description, cost of work to be performed by the business as described below is accurate. Both parties have or will enter into a formal agreement conditioned upon the above-mentioned executed Contracts.

Signature of Authorized Person (Tier 1 Subcontractor) Date

To be completed by the Subcontractor (Supplier/Subconsultant)			
Company Name:			
Authorized Person:		Title:	
Telephone:		Email:	
Address, City, St, Zip:			
County:		Ownership is Minority Female:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Source of Ownership Category:	** Please Select **	Ownership Category:	** Please Select **
Contract Date:		Attended the Pre-Bid:	<input type="checkbox"/> Yes <input type="checkbox"/> No

Identify in complete detail the scope of work to be performed and/or item(s) to be supplied with projected start and end timeframe. The undersigned intends to and is prepared to perform the work and/or provide the supplies (described below) in connection with the above project at the following Price (\$): _____

NIGP Code	Scope of Work	Projected Start Date	Projected End Date

The subcontracting firm certifies that it has read the BDI DBE Program Guide and agreed to provide such work/supplies for the amount stated above. Both parties have or will enter into a formal agreement conditioned upon the above-mentioned executed Contracts.

Signature of Authorized Person (Tier 2 Subcontractor/Supplier) Date

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Form F – Certificate of MWBE Unavailability

[Do not submit with Bid – Due within three (3) business days after receiving a request from the County]

This document identifies the MWBE firm that was originally committed to Subcontract in good faith but became unavailable prior to providing the work/supplies, originally agreed upon for this project.

To be completed by the Prime Contractor			
Project Name:		Solicitation Number:	
Company Name:			
Authorized Person:		Title:	
Email:		Telephone:	
Reason for Out-of-State Sub Selection (if applicable):			

The undersigned certifies that the below MWBE was contacted in “**Good Faith**” and agreed to participate on the Project mentioned above with the stated price and scope of work but is now unavailable per the reason they have stated below.

Signature of Authorized Person (Prime Contractor)

Date

To be completed by the Subcontractor (Supplier/Subconsultant)			
Company Name:			
Authorized Person:		Title:	
Telephone:		Email:	
Address, City, St, Zip:			
County:		Ownership is Minority Female:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Source of Ownership Category:	** Please Select **	Ownership Category:	** Please Select **
Contract Date:		Attended the Pre-Bid:	<input type="checkbox"/> Yes <input type="checkbox"/> No

Price (\$)	Scope of Work	Reason for Unavailability

The firm certifies that it is no longer available to provide such work/supplies for the amount stated above, per the reason stated.

Signature of Authorized Person (Subcontractor/Supplier)

Date

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Form G – Prime Contractor / Project Identification Form

[Do not submit with Bid – Due within three (3) business days after receipt of fully executed County contract]

To be completed by the Prime Contractor			
Project Name:		Solicitation #:	
Company Name:			
Owner Name:		Owner Email/Telephone:	
Authorized Person:		Title:	
Email		Telephone:	
Address, City, County, State, Zip:			
Bid Opening Date:		Self-Performing:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Contract Date:		Contract #:	
Original Contract Value:		Current Certification(s):	
Primary Type of Work for this Contract <i>(Construction)</i>	**Please Select**	Primary Discipline for this Contract <i>(Construction)</i>	**Please Select**
Construction Method <i>(Construction)</i>	**Please Select**	Type of Service <i>(Construction)</i>	**Please Select**
Scope of Work <i>(Services/Goods)</i>			
Ownership Category	** Please Select **	Ownership is Minority Female	<input type="checkbox"/> Yes <input type="checkbox"/> No
Source of Ownership Category	** Please Select **		

Signature of Authorized Person

Date

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Form H – Statement of Payments to Subcontractors (Suppliers/Subconsultants)

[Do not submit with Bid – Due with pay applications]

Prime Contractors (Tier 1 Subcontractors when applicable) must submit this form or when applicable, input this information into the Contract Compliance Solution System with each request for payment showing work that has been approved and completed for all Subcontractors (suppliers, manufacturers, brokers, and/or members of a joint venture) in connection with the Contract.

Copy this form as needed.

Project Name:		Contract Number:	
Company Name:			
Authorized Person:		Title:	
Email:		Telephone:	
Address, City, County, State, Zip:			
Payment Period <i>(dates – from/to):</i>		Payment/Invoice #:	
Invoice Amount:		County Project Manager Name:	
Notes:			

FINAL PAYMENT: Check this box only when submitting with the Final Pay Request **Final Contract Total Value:** _____

No Payments: Certify that no Subcontractors (suppliers/subconsultants) were used in performing the Contract for the payment period indicated above.

PAYMENTS TO ALL SUBCONTRACTORS

Complete the fields below for all Subcontractors (suppliers/subconsultants) on the contract for the above-mentioned period regardless of dollar amount.

Firm's Name	Cert.	Scope of Work	NIGP	Amount to be Paid from this pay request	Total Payments to Date	Total Amount Committed
	Select					
	Select					
	Select					
	Select					
	Select					
	Select					
	Select					
	Select					
	Select					
	Select					

SECTION-7 | PROMPT PAYMENT

Prompt payment of Prime Contractors and Subcontractors.⁶

The County shall pay the Prime Contractor in compliance with N.C.G.S. § 143 - 134.1(a), which mandates payment within forty-five (45) days of a complete and satisfactory invoice/demand.

Upon payment to the Prime Contractor by the County, the Prime Contractors shall thereafter ensure the prompt and full payment of any Subcontractors working on the contract. **Prime Contractors shall pay Subcontractors within seven (7) days of the Prime Contractor's receipt of payment, in compliance with N.C.G.S. § 143 - 134.1(b).**

Every contract with the County for the performance of work shall contain a provision requiring the Prime Contractor to certify in writing that all Subcontractors and suppliers have been paid promptly for work and materials from previous progress payments received (less any retainage) by the Prime Contractor prior to receipt of any further progress payments. A Prime Contractor is required to pay Subcontractors or suppliers funds due from progress payments within seven (7) days of receipt of payment from the County (see § 143 - 134.1(b) above).

During the contract and upon completion of the contract, the County may request documentation to certify payment to Subcontractors or suppliers. This subsection in no way creates any contractual relationship between any Subcontractor and the County or any liability on the County for a Prime Contractor's failure to make timely payment to the Subcontractor.

A Prime Contractor who fails to ensure the prompt and full payment of Subcontractors for goods or services delivered and accepted shall be subject to the penalties set forth in (N.C.G.S. § 143 - 134.1(b)).

SECTION-8 | ADDITIONAL RACE AND GENDER-NEUTRAL PROGRAM ELEMENTS

1. Vendor Rotation

For certain contracts in Construction, Architectural & Engineering, Professional Services, and Other Services that have the respective contract values listed below and are of a fairly routine nature, the BDI Program Office in conjunction with the Originating Department may reserve such contracts for award to an on-call list or pre-qualified panel of firms on a rotating basis. In determining whether the Vendor Rotation Program should be considered for a particular contract, the BDI Program Team and Department shall consider: a) whether there are at least three (3) firms that are available and capable to perform as Prime on such contracts; and b) whether the anticipated frequency of such contract opportunities will warrant multiple awards on a rotating basis.

- Professional Services and Other Services: contracts valued at \$30,000 or over, may be required to have additional review by the BDI Director (or designee) with consultation from the County Manager (or designee) when applicable;

⁶ Subcontractor payments are monitored and tracked by the BDI Program Office, as appropriate.

- Construction: contracts valued at \$30,000 or over, may be required to have additional review by the BDI Director (or designee) with consultation from the County Manager (or designee) when applicable;
- Architectural & Engineering: contracts valued at \$50,000 or over, may be required to have additional review by the BDI Director (or designee) with consultation from the County Manager (or designee) when applicable;

SECTION-9 | PROGRAM COMPLIANCE & GRIEVANCE PROCEDURES

1. Prime Contractor and Subcontractor Non-Compliance

The BDI Director, along with contracting staff of each County user Department, shall monitor compliance with these BDI Program requirements by Prime Contractors and Subcontractors during the term of the contract. If it is determined there is cause to believe a Prime Contractor or Subcontractor has failed to comply with any of the requirements of this Program, or with the contract provisions pertaining to MWBE utilization, the BDI Director (or designee) shall so notify the Director of the Originating Department, Procurement and the Contractor or Subcontractor in writing.

The BDI Director (or designee) may require such reports, information, and documentation from Prime Contractors, Subcontractors, and/or the Director of any County Department, division or office as are reasonably necessary to determine compliance with the Program requirements, within fifteen (15) business days after the notice of non-compliance.

If the requested materials are not received within fifteen (15) business days, then a finding of non-compliance is determined and appropriate penalties and sanctions will apply as stated in Section-9(3) of this Provisions Guide, set forth below.

It is the joint responsibility of the BDI Director (or designee) and the Director of the Originating Department (or designee) to attempt to resolve the non-compliance with the requirements of this Program, or the contract provisions pertaining to MWBE utilization, within thirty (30) business days.

If non-compliance cannot be resolved within the thirty (30) business days, the BDI Director (or designee) and the Director of the Originating Department (or designee) shall submit written recommendations to the County Manager (or designee) and/or the County Attorney (or designee) and if the County Manager and/or County Attorney (or respective designee) concurs with the finding, such sanctions as stated in Section-9(3) of this Provisions Guide shall be imposed.

2. Other Prime Contractor or Subcontractor Program Violations

It shall be a material violation of the BDI Program to:

- fraudulently obtain, retain, or attempt to obtain/retain (or aid another in fraudulently obtaining, retaining, or attempting to obtain/retain) Certification status as an MBE, WBE, or SBE for purposes of this Program;
- willfully falsify, conceal, or cover up by a trick, scheme, or device, a material fact pertaining to the provisions of this Program;

- knowingly make any false, fictitious, or fraudulent statements or representations, or make use of any false writing or document, knowing the same to contain any false, fictitious, or fraudulent statement or representation pertaining to the provisions of this Program;
- willfully obstruct, impede, or attempt to obstruct/impede any authorized official or employee who is investigating the qualifications of a business entity which has requested Certification as an MBE, WBE, or SBE;
- fraudulently obtain, attempt to obtain (or aid another person fraudulently obtaining or attempting to obtain) public monies to which the person is not entitled under the provisions of this Program; or
- make a false statement to any business entity or government representative that another entity is or is not certified as an MBE, WBE, or SBE for purposes of this Program;
- any person who violates the provisions of this section shall be subject to the penalties and sanctions set forth in Section-9(3) of this Provisions Guide, as well as any other remedies available under law up to the maximum penalty provided by law.

3. Penalties and Sanctions for Non-Compliance

Upon determination and recommendation of sanctions by the County Manager and/or County Attorney (or their respective designee) regarding the failure of a contractor, vendor, or other business representative to comply with any portion of the BDI Program, the non-complying party shall be subject to any or all of the following penalties:

- withholding of up to ten percent (10%) of all future invoiced payments for the eligible project until the BDI Program Office determines that the contractor is in compliance with the Program;
- withholding of all future payments under the eligible project until the BDI Program Office determines that the contractor is in compliance with the Program;
- rescission of the contract based upon a material breach of contract pertaining to BDI Program compliance;
- refusal to accept a Bid, proposal or response; and
- disqualification of the contractor, vendor, or other business from eligibility for Bidding Construction projects, providing goods or services (Professional or otherwise) to the County for a period not to exceed two (2) years.

4. Mediation of Disputes between Prime Contractors and Subcontractors; Joint Venture Partners

If, after the award of a contract, pursuant to the BDI Program, a dispute arises between the Prime Contractor and a Subcontractor regarding performance of work or provision of

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services or supplies on the eligible project, then such Prime Contractor or Subcontractor may seek review and mediation of the issue before the BDI Director (or designee). The request for review must be made in writing.

Within twenty (20) business days of receipt of a request for review, if the dispute has not already been resolved informally among the parties, the BDI Director (or designee) shall set a mediation date and shall provide written notice of the mediation date to each of the interested parties.

The BDI Director (or designee) shall have authority to make recommendations in an attempt to resolve the dispute.

In the event that the mediation with the BDI Director (or designee) does not resolve all disputes, the BDI Director (or designee) shall have the option of referring mediation proceedings to a qualified outside mediator, contingent upon the consent and at the expense of the interested parties.

However, any actions taken by the BDI Program Office to resolve contractor disputes or to ensure the fair and equitable treatment of Subcontractors (or joint venture partners) working on County contracts are done pursuant to the BDI Program Provisions Guide or general non-discrimination policy and shall not be construed as the County taking a position as to the merits of the dispute nor creating any privity of contract between the County and any contractor or Subcontractor. Further, no contractor working on a County contract shall have any claim against Mecklenburg County for any actions taken to ensure the fair and equitable treatment of Subcontractors (or joint venture partners) working on County contracts.

SECTION-10 | APPENDIX

1. Definitions

Affiliate(s): Two entities are affiliates of one another when: (a) one controls or has the power to control the other; (b) a third-party controls, or has the power to control, both; or (c) there is a significant relationship between the two entities based on common ownership, management or employees, shared equipment, assets, or facilities, physical proximity, percentage of revenue derived from the other entity, or loans, leases, contributions, and contracts.

Achievement Goal(s): An aspirational participation percentage applied on each contract for MBE and WBE Subcontractor participation for Construction, Professional Services, Goods and Other Services. The Achievement Goals are based upon the availability in the Relevant Market as determined by the disparity study which is conducted every five (5) years by the County.

Availability: In accordance with the most recent Disparity Study Means being qualified, ready, willing, and able to perform work for the County on a Contract. This means that the Bidder/Participant does business within an industry group from which the County or its Contractors make certain purchases; the firm's owner has taken steps to do business with the County and qualified itself to do such business by registering with the County as a vendor and/or being certified, as appropriate; and the firm is located within a relevant geographical area such that it can do business with the County.

Authorized Person: The authority of a person or business owner to legally sign responses to solicitations and contracts, make price negotiation decisions, sell or liquidate the business, and have the primary authority to direct the day-to-day management and operation of a business enterprise without interference from others.

Award: The final selection or approval of a Respondent for a specified (Prime) Contract.

Best Value Contracting: A purchasing solicitation process which may evaluate factors other than price. Evaluation criteria for selection may include a Respondent's previous experience and quality of product or services procured, and other factors identified in the applicable solicitation.

BDI: Business Diversity and Inclusion

BDI Director: The staff member that is primarily responsible for the management of the BDI Program with the County and ultimately responsible for oversight, tracking, monitoring, compliance, administration, implementation, and reporting of the MWSBE elements within the BDI Program. The BDI Director is also responsible for enforcement of contractor and vendor compliance with contract participation requirements and ensuring that overall Program goals and objectives are met.

BDI Program: The combination of race- and gender-neutral and race- and gender-conscious remedies, policies, procurement reforms, and Program Elements that are provided herein for the purpose of enhancing the ability of MWSBE firms to fairly compete for County contract opportunities, and for the purpose of establishing a broader marketplace environment that is less susceptible to the ongoing effects of discrimination.

BDI Program Team or Office: A group of staff members or designated representatives who work collectively and individually under the direction of the BDI Director. The team is responsible for executing the work of the BDI Program.

Bid: A quote, proposal, or offer to perform work or provide labor, materials, supplies, or services for Mecklenburg County for a price.

Bid Due: The date and time specified that Bids, Proposals, or other submittals are due.

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Bid Opening: The process of opening Bids conducted at the time and place specified in the Invitation to Bid and/or the advertisement. For Contracts that are subject to formal Bidding requirements under the North Carolina Bid statutes (N.C.G.S. § 143-128 and § 143-129), the Bid Opening shall be the date and time that Bids are opened by the County.

Bidder/Participant: Any person, firm, company, partnership, corporation, association, or joint venture seeking to be awarded a contract by the County on a project by submitting a Bid.

Business Days: Days on which the administrative offices of Mecklenburg County are open to the public for business.

Charlotte – Concord – Gastonia MSA: The Charlotte-Concord-Gastonia Metropolitan Statistical Area in effect as of 2013, consisting of: (a) the North Carolina counties of Mecklenburg, Union, Gaston, Cabarrus, Iredell, Rowan, and Lincoln Counties; and (b) the South Carolina counties of York, Chester and Lancaster.

Commercially Useful Function: An MWSBE firm performs a Commercially Useful Function when it is responsible for executing the contracted work and is carrying out its responsibilities by actually performing, staffing, managing and supervising the work involved. To perform a Commercially Useful Function, the MWSBE firm must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quantity and quality, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether an MWSBE firm is performing a Commercially Useful Function, an evaluation must be performed of the amount of work subcontracted, normal industry practices, whether the amount the MWSBE firm is to be paid under the contract is commensurate with the work it is actually performing and the MWSBE credit claimed for its performance of the work, and other relevant factors. An MWSBE firm does not perform a Commercially Useful Function if its role is limited to that of an extra participant in a transaction, contract or project through which funds are passed in order to obtain the appearance of meaningful and useful MWSBE participation, when in similar transactions in which MWSBE firms do not participate, there is no such role performed.

Contract: A legally binding agreement through which Mecklenburg County agrees to procure goods or services and a vendor or contractor agrees to provide goods or services for agreed upon consideration.

Contract Documents: All documents that constitute the agreement between the County, the Owner and/or the Contractor or Vendor, including documents incorporated by reference into the agreement.

County: Mecklenburg County, North Carolina.

Days: Any reference to “days” in this Program shall mean calendar days unless it is specifically indicated to be Business Days.

Disadvantaged Business Enterprise (DBE): For-profit small business concerns where socially and economically disadvantaged individuals own at least a fifty-one percent (51%) interest and also control management and daily business operations.

African Americans, Hispanics, Native Americans, Asian-Pacific and Subcontinent Asian Americans, and women are presumed to be socially and economically disadvantaged. Other individuals may also qualify as socially and economically disadvantaged on a case-by-case basis.

Formal Solicitations: An invitation to Bid (ITB), request for proposal (RFP), request for qualifications (RFQ), or other solicitation document issued by a County Department for a Contract that requires formal advertisement in accordance with the procurement rules adopted by the County Manager (or designee) and/or pursuant to statutory requirements (i.e., N.C.G.S. § 143.129). [Mecklenburg County's Procurement Policies](#)

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Goal: A numerical objective.

Goal-Setting Committee (GSC): Means a committee tasked with setting contract-by-contract goals for the MWBE elements within the BDI Program.

Good Faith Efforts (GFE): The activities of Bidders/Participants for County projects designed specifically to obtain participation of MWBE Subcontractors on their projects. Such activities shall be documented and verified when MWBE goals for a County project are not achieved. Actions and efforts taken by the Bidder/Participant in furtherance of meeting any MWBE goals, as further defined and outlined in N.C.G.S. § 143.128.2 and in Section-4 herein.

Good Faith Efforts Documentation: All forms and documentation as may be required by the County, including pursuant to N.C.G.S. § 143.128.2, described/listed in Form A, or otherwise requested or required by the County at its discretion, relating to the Good Faith Efforts taken by a Bidder/Participant to meet a Goal.

Good Faith Negotiations: The actions and efforts taken by the Bidders/Participants to show that they held discussions with MWBEs aimed at reaching an agreement with honesty or sincerity of intention to comply with Bid requirements.

Independently Owned and Operated: Ownership of an MWSBE firm may be by individuals and/or by other businesses provided the ownership interests in the MWSBE firm can satisfy the MWSBE eligibility requirements for ownership and Control as specified herein. The MWSBE firm must also be Independently Owned and Operated in the sense that it cannot be the subsidiary or captive Affiliate of another firm that does not itself (and in combination with the certified MWSBE firm) satisfy the eligibility requirements for MWSBE Certification.

Industry Categories: Procurement groupings for the County inclusive of Architect & Engineering, Construction, Professional Services, Goods and Other Services (e.g., manufacturing, wholesale, and retail distribution of commodities, and non-professional services). This term may sometimes be referred to as “business categories.”

Informal Solicitations: Solicitations for contracts that do not require Formal Bid Solicitations requirements. (See, N.C.G.S. § 143.129 and § 143.131). It is the policy of the County to obtain at least three (3) quotes. [Mecklenburg County's Procurement Policies](#)

Hearing Committee: A committee composed of three or more individuals, which shall review and make decisions on MWBE Good Faith Effort appeals.

Joint Venture: An association of two or more businesses to carry out a single business enterprise for profit, for which they combine their property, capital, efforts, skills, and knowledge.

Minority Business Enterprise (MBE): A legal entity, except a joint venture, that is organized to engage in for-profit transactions, which is Certified as being at least fifty-one percent (51%) owned, managed and controlled by one or more Minority Group Members, and that is ready, willing and able to sell goods or provide services that are purchased by Mecklenburg County. An MBE is a bona fide MBE only if the minority group ownership interests are real and continuing and not created solely to meet an MBE participation requirement. The MBE must also perform a Commercially Useful Function to be a bona fide MBE for Program purposes. Unless otherwise stated, the term “MBE” as used in this Program are not inclusive of non-minority women-owned business enterprises (WBEs).

Minority Group Members: African Americans, Hispanic Americans, Asian Americans and Native Americans legally residing in, or that are citizens of, the United States or its territories, as defined below:

- African American/Black: Persons having origins in any of the black racial groups of Africa.

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- Hispanic American: Person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands regardless of race.
- Asian American: Person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.
- American Indian/Native American: Person having no less than 1/16th percentage origin in any of the American Indian/Native American Tribes of North America as recognized by the U.S. Department of the Interior, Bureau of Indian Affairs and as demonstrated by possession of personal tribal role documents.
- Woman: female of any of the above listed minority groups
- See N.C.G.S. § 143.128.2(g) for additional definitional guidance.

MWSBE Certification: The process by which a firm is determined to be a bona fide minority-owned, women-owned, or small business enterprise.

MWSBE Directory: A listing of minority-owned, women-owned, and small businesses that have been certified as eligible to participate in, and benefit from, the application of the County's MWSBE elements within the BDI Program

NIGP: National Institute of Governmental Purchasing (NIGP) codes used to describe commodities purchased by governmental agencies.

Originating Department: The County Department or authorized representative of the County which issues a solicitation, or for which a solicitation is issued on behalf of, for the purchase of goods or services.

Owner: Mecklenburg County.

Payment Affidavit: A document detailing the total dollars paid by the Contractor to all Subcontractors and suppliers receiving payment in connection with a Contract. Payment Affidavits shall be in the format specified by the County.

Points: The numeric assignment of value for specific evaluation criteria in the vendor selection process used in some Construction, Professional Services, and Other Services contracts to meet Bid requirements (e.g., up to 10 points out of a total of 100 points assigned for the degree of MWBE participation of a Respondent/Bidder team).

Prime Contractor: The vendor or contractor to whom a purchase order or contract is issued by Mecklenburg County for purposes of providing goods or services to, or on behalf of, the County.

Program Elements: Refers to various race- and gender-neutral and race- and gender-conscious BDI Program tools that are used to encourage greater Prime and Subcontractor participation by MWBE firms, including, but not limited to, evaluation preferences, goals, and supportive services.

Program Waiver: A particular procurement solicitation for which goals are not required and is therefore waived. This is not the same as a "Waiver based on Good Faith Efforts."

Quick Pay Commitment: An agreement or commitment that a Prime Contractor makes to pay all Subcontractors participating in a Contract within twenty (20) days after the Prime Contractor confirms that the subcontracted work has been properly performed and properly completed. Such agreement or commitment exists outside of the State's Prompt Pay Act requirements, meaning that payment to the Subcontractors pursuant to such agreement is not contingent on the Prime Contractor receiving payment from the County.

Race-Conscious / Gender-Conscious Program Element(s): Any business classification or Program element which is defined by the race or gender of the business owner.

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Race-Neutral / Gender-Neutral: Any business classification or Program element wherein the race or gender of the business owner(s) is not taken into consideration.

Relevant Market: The Relevant Market encompasses the geographical area where Mecklenburg County awards at least seventy-five percent (75%) of its dollars.

Respondent: A vendor or Bidder/Participant submitting a Bid, statement of qualifications, or proposal in response to a solicitation issued by the County.

Responsible: A firm that is capable in all respects to fully perform the contract requirements and has the integrity, means, reputation and reliability which will assure performance of contract specifications within the required time.

Responsive: A firm's submittal (Bid, response, or proposal) that conforms in all material aspects to the solicitation (Invitation for Bid, Request for Qualifications, or Request for Proposal) and shall include compliance with BDI Program requirements.

Services Contract: A Contract for a business enterprise to provide an act or a variety of work for an agreed upon payment, and not otherwise defined by statute. Examples include, but not limited to, contracts for architectural, engineering, surveying, or construction management services, accounting or auditing services, computer (IT) consulting, janitorial services, etc.

Significant Business Presence: A business enterprise must have its headquarters or an established place of business in the Charlotte-Concord-Gastonia MSA, and from which at least twenty-five percent (25%) of its total full-time, part-time, and contract employees are regularly based. A location utilized solely as a post office box, mail drop, or telephone message center, or any combination thereof, with no other substantial work function, shall not be construed to constitute a significant business presence.

Small Business Enterprise (SBE): A business enterprise shall be eligible for Certification as a "Small Business Enterprise" (SBE) only if it meets the eligibility requirements for the NC Historically Underutilized Business Small Business Certification (NCSBE) or the City of Charlotte-Charlotte Business Inclusion Small Business Certification (CBI-SBE).

Special Projects: Construction Manager at Risk (CM@R), Public Private Partnerships (P3), Design Build, and other Alternative Build Methods.

State HUB Office: The Office of Historically Underutilized Businesses in the Department of Administration for the State of North Carolina.

Subcontracting Goal: The MBE goal and WBE goal established by the County.

Subcontractor: Any vendor or contractor that is providing goods or services to a Prime Contractor in furtherance of the Prime Contractor's performance under a contract or purchase order with the County. A Subcontractor may be either a first, second, or third-tier Subcontractor. A first-tier Subcontractor provides good or services directly to the Prime Contractor. A second-tier contractor is hired by a first-tier Subcontractor within the same contract or purchase order to provide a portion of the good and/or services the first-tier Subcontractor is obligated to provide under its subcontract to the Prime Contractor. A third-tier Subcontractor is hired by the second-tier Subcontractor within the same contract or purchase order to provide a portion of the goods and/or services it is obligated to provide under the second-tier Subcontractor's subcontract with the first-tier Subcontractor.

Utilization Documentation: A provision within the contract which includes the name of all Subcontractors to be utilized in the contract, specifying the MWBE Certification category for each, as approved by the BDI Program Office. This information is provided by the Bidder/Participant in Form B/Form B1.

BUSINESS DIVERSITY & INCLUSION (BDI) PROGRAM PROVISIONS GUIDE

Waiver based on Good Faith Efforts: An exception provided to the lowest responsive and responsible Bidder or best value Bidder who did not meet or exceed the MWBE goals on a specific project/contract but who satisfactorily provided Good Faith Efforts documentation.

Women Business Enterprises (WBEs): A legal entity, except a joint venture, that is organized to engage in for-profit transactions, which is Certified as being at least fifty-one percent (51%) owned, managed, and controlled by one or more non-Minority females, and that is ready, willing and able to sell goods or services that are purchased by the County. A WBE is a bona-fide WBE only if the non-Minority female ownership interest(s) is real and continuing and not created solely to meet a WBE participation requirement. The WBE must also perform a Commercially Useful Function to be a bona-fide WBE for Program purposes. Unless otherwise stated, the term “WBE” as used in this Program is not inclusive of MBEs.

Work: (sometimes referred as Scope of Work): The construction and/or services required by the Contract Documents, including all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill its obligations under the Contract.

2. Websites

(last updated per the revised date of this Document)

- **Mecklenburg County:** www.mecknc.gov
 - **Office of Economic Development:** oed.mecknc.gov
 - Business Diversity & Inclusion (BDI): oed.mecknc.gov/BDI
 - 2020 Disparity Study Full Report: oed.mecknc.gov/BDI
 - **Procurement Department:** www.mecknc.gov/finance/procurement/Pages/default.aspx
 - Procurement Policies: www.mecknc.gov/Finance/Procurement/Pages/policies.aspx
 - MeckProcure (Vendor Registration/Solicitation Search): meckprocure.com
- **State of North Carolina**
 - **NC Department of Administration:** ncadmin.nc.gov
 - NC Interactive Purchasing System (Vendor Registration/Solicitation Search): www.ips.state.nc.us/vendor/VendorPubMain.aspx
 - **NC Historically Underutilized Businesses (NCHUB):** ncadmin.nc.gov/businesses/historically-underutilized-businesses-hub
 - NCHUB/NCSBE Certifications: ncadmin.nc.gov/businesses/hub/hub-certification
 - Vendor Directory: www.ips.state.nc.us/vendor/searchvendor.aspx?t=h
 - **NC General Statutes:** ncleg.gov/Laws/GeneralStatutesTOC
- **City of Charlotte**
 - **Charlotte Business Inclusion (CBI):** CharlotteBusinessInclusion.com
 - Small Business Enterprise (SBE) Certification: charlottenc.gov/GS/procurement/cbi/Pages/getting-started.aspx
 - Vendor Directory: charlottenc.gov/GS/procurement/cbi/Pages/vendors.aspx

**SECTION 00-31-00
AVAILABLE PROJECT INFORMATION**

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Geotechnical Report: Entitled REPORT OF SUBSURFACE EXPLORATION TYVOLA SENIOR CENTER SOLAR PARKING CANOPY; 2225 TYVOLA ROAD; CHARLOTTE NORTH CAROLINA KLEINFELDER PROJECT NO. 24007432.001A, dated March 11, 2024.
 - 1. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
 - 2. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
 - 3. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.
 - 4. Geotechnical report is attached to the end of this Section.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00-31-00



March 11, 2024
Kleinfelder File No. GSO24R164193

Mr. Louis Gerics
Innovative Design, Inc.
850 W. Morgan St
Raleigh, NC 27603

**SUBJECT REPORT OF SUBSURFACE EXPLORATION
TYVOLA SENIOR CENTER SOLAR PARKING CANOPY
2225 TYVOLA ROAD
CHARLOTTE, NORTH CAROLINA
KLEINFELDER PROJECT NO. 24004732.001A**

Mr. Gerics:

This report presents the results of the subsurface exploration and geotechnical engineering evaluation completed by Kleinfelder for the subject project. The purpose of Kleinfelder's services was to assess the subgrade conditions below the proposed new construction with respect to support of the solar parking canopy. This work was authorized via signage of Kleinfelder's Client Professional Services Agreement on February 7, 2024, and was conducted in accordance with Kleinfelder's Proposal No. RAL24P163584, dated January 31, 2024.

PROJECT DESCRIPTION

The project is located within the parking lot of the existing Tyvola Senior Center at 2225 Tyvola Road, in Charlotte, North Carolina (the site). The Tyvola Senior Center is owned by Mecklenburg County (owner). Based on the information provided by Innovative, Kleinfelder understands that the owner plans to install solar panels on the site, including options for rooftop and/or parking area canopies. Kleinfelder understands that the geotechnical investigation will be utilized by the Structural Engineer-of-Record for foundation design associated with parking canopies. No geotechnical investigation was requested for the rooftop solar canopy option. Kleinfelder understands that the civil engineering design for the parking lot solar canopy is expected to be limited to minor improvements to the site, which may include pavement cutting and patching required for utility trenching, and/or minor curb and parking modifications required for canopy foundation installation. Grade changes are anticipated to be less than 1 foot.

EXPLORATION METHODS

Field Testing

Subsurface conditions at the site were explored by performing two soil test borings (B-1 B-2) at the approximate locations shown on the attached Exploration Location Plan and Vicinity Map, Figure 1. Kleinfelder proposed four soil test borings within the proposed canopy footprint, however, due to underground utility (Duke Power) conflicts, the remaining two borings were not completed.

The boring locations were selected by Kleinfelder based on the 2309-Tyvola Sr Ctr PV-A site plan provided by Innovative Design. Online mapping tools were used to obtain coordinates and elevations of each boring location. Kleinfelder staked the boring locations in the field using a handheld GPS unit with submeter accuracy.

The borings were advanced to a depth of 20 feet below the existing ground surface. The drilling technique consisted of hollow stem augers. Standard penetration testing (SPT) was performed at 2.5 feet intervals within the upper 10 feet and 5 feet intervals below 10 feet in accordance with ASTM D1586. SPT N-values were used to estimate the in-situ soil strength and density. Soil samples were obtained at each test interval. The boreholes were measured for groundwater during and after drilling and the borings were subsequently backfilled with the auger cuttings prior to departing the site. The pavement penetration was patched with cold mix asphalt.

A Kleinfelder geologist logged the borings by visually classifying the soils encountered according to the Unified Soil Classification System (USCS). The boring logs and legends for terms and symbols used on the logs are attached.

Laboratory Testing

One soil sample was subjected to routine index testing to confirm the soil classification and determine its engineering properties. Testing included moisture content, material finer than No. 200 sieve, and Atterberg Limits. The results of the laboratory testing are presented on the respective boring log and on individual laboratory test reports attached.

FINDINGS

Site Conditions

The site for the project is a row of 25 parking spaces along the north side of the existing parking lot. The parking lot surface is asphalt pavement and is edged with concrete curb-and-gutter. A grassed cover landscape area is directly adjacent to the north side of the parking lot. Multiple underground utilities are present throughout the proposed site. The site is generally flat with a maximum elevation change of 1 to 2 feet across the area.

Subsurface Conditions

Surface materials consisted of approximately 6 inches of topsoil in boring B-1, and approximately 8 inches of a composite asphalt pavement section in boring B-2 consisting of an aggregate base course (ABC) stone and asphalt wearing course. Fill, classified as sandy clay, was present in boring B-1 to a depth of approximately 3.0 feet below the ground surface. Fill is defined as any material placed to raise a grade or any disturbed soils from previous construction activities.

Residual soils were present below the fill and pavement section. Residual soils are formed by the in-place weathering of the parent bedrock. The residual soils consisted of silt (MH and ML) that transitioned to silty sand (SM) with depth. SPT N-values recorded in the residual soils ranged from 7 to 23 blows per foot. Each boring was terminated in residual soils.

Groundwater was not observed in any of the borings. Some fluctuation in groundwater levels can occur with climatic and seasonal variations, with the highest groundwater levels generally expected between March and May. Seasonal low groundwater levels are generally expected between September and November. Therefore, subsurface water conditions at other times may be different from those described in this report.

CONCLUSIONS AND RECOMMENDATIONS

Drilled Pier Foundation Option

Based on the subsurface conditions, a drilled pier foundation will provide adequate support for the solar canopy. The ultimate axial load capacity of the drilled pier foundation may be calculated using a skin friction value equivalent to 400 pounds per square foot (psf). The upper 2 feet of soil should be neglected when determining the embedment depth. Uplift may be calculated as the

weight of the concrete plus 75 percent of the skin friction value. The structural engineer should determine the proper factor of safety to be applied to the recommended capacity.

The following soil parameters are recommended for the LPile analysis.

TABLE 3 LPILE DESIGN PARAMETERS

DEPTH FT	SOIL TYPE LPile	EFFECTIVE UNIT WEIGHT PCF	UNDRAINED SHEAR STRENGTH PSF	FRICTION ANGLE ϕ'	P-Y MODULUS, K PCI	SOIL STRAIN FACTOR E_{50}
0 – 2	NEGLECT					
2 - 8.0	3	115	1,500	-	-	0.007
8.0 - 20.0	4	120	-	32	140	-

Stiff clay w/o free water
Sand

The performance of drilled piers is heavily dependent on construction methods and procedures. Construction methods that create large zones of disturbance around the drilled piers can lead to lower than expected skin friction values due to excessive stress relief around the pier length. The pier foundation should be constructed only by qualified contractors experienced in this type of construction under observation of a third party. The contractor should carefully review the boring log and perform their own assessment of potential construction difficulties.

Spread Footing Foundation Option

The elastic silt (MH) is not suitable for direct support of shallow foundations due to its potential for shrink/swell with variations in moisture content. MH soils encountered at the bearing level should be excavated to a depth of 3 feet below the finished grade. The excavation should be replaced with structural fill compacted as described in this report.

Shallow spread footings should be designed for a maximum allowable bearing pressure of 2,500 psf having a minimum dimension of 24 inches. Footings should bear a minimum depth of 1.5 feet below the ground surface for frost protection.

Uplift loads should be resisted by the mass of the footing and backfill. A unit weight of 115 pounds per cubic foot should be assumed for site soils.

Site or

The onsite residual soils, excluding the elastic silt (MH), are suitable for re-use as structural fill and utility trench backfill. Drying of backfill should be anticipated to achieve the recommended compaction.

Imported soils classifying as GW, GM, SW, and SM in the USCS are acceptable soil types for structural fill. They should not contain organic matter or other deleterious materials. Imported fill materials should be sampled and tested for approval by the geotechnical engineer prior to being transported to the site.

Fill and backfill in areas supporting pavement should be compacted to at least 95 percent of the material's maximum dry density per the Standard Proctor Test (ASTM D698). The optimum moisture content varies with the soil gradation and should be evaluated during construction. Fill and backfill material that is not near optimum moisture content should be moisture conditioned (wetted or dried) to within approximately three percent of the optimum moisture content prior to the compaction effort. Fill and backfill should be placed in uniform, horizontal lifts, and be compacted with appropriate equipment. The maximum lift thickness will vary depending on the material and compaction equipment used.

All confined excavations, such as trenches and footing excavations, should conform to applicable OSHA regulations. The soils at the site appear consistent with Type B and are expected to perform satisfactorily at inclinations of up to 1(H):1(V). Construction site safety is the responsibility of the contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations.

Pavement

New pavement sections should consist of 3 inches of S9.5B asphalt mix underlain by 8 inches of ABC stone placed on a prepared subgrade as described in the previous section. The asphalt wearing course should be placed in two 1.5-inch lifts and be compacted to the requirements of the approved NCDOT Job Mix Formula. The ABC stone should be compacted to at least 100 percent of the material's maximum dry density as determined by the Standard Proctor Test (ASTM D698).

CONSTRUCTION OBSERVATIONS

Kleinfelder should be retained to observed sitework to confirm the actual soil and groundwater conditions encountered during construction are consistent with those presented in this report. As a minimum, Kleinfelder recommends the following services be performed during construction:

- Observe and evaluate subgrade soils supporting structures and pavement for compatibility to the recommendations in this report; and
- Confirm drilled pier foundations were installed as planned.

Kleinfelder should be consulted to review the any soil test reports prepared during construction and make any applicable revisions to the geotechnical recommendations, if necessary. If site conditions, or the proposed construction changes, Kleinfelder should be retained to perform a supplemental evaluation.

LIMITATIONS

Kleinfelder's geotechnical services for this project were performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Kleinfelder's conclusions, opinions and recommendations are based on a limited number of observations and data. Due to the prevailing geology, it is possible that conditions could vary between or beyond the data evaluated. Consequently, there may be undisclosed subsurface conditions that may require special treatment or preparation once these conditions are revealed during construction. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement. Recommendations presented herein should not be extrapolated to other areas or used for other projects. If there are any changes in the field to the plans and specifications, or if subsurface conditions are encountered during construction which differ from those indicated by Kleinfelder's borings, Kleinfelder should be retained to review its recommendations in light of the new information and make any necessary changes.

CLOSURE

Kleinfelder appreciates the opportunity to be of service to you on this project. Should you have any questions or require additional information, please contact the undersigned.

Sincerely,
KLEINFELDER, INC.
Firm License No. F-1312



Christopher D. Carroll, PE
NC License No. 035766



A handwritten signature in blue ink that reads "Joshua D. Fregosi".

Joshua D. Fregosi, PE
Program Manager

ATTACHMENTS: Boring Location Map
Boring Logs
Laboratory Test Reports
GBA Document

BORING LOCATION MAP

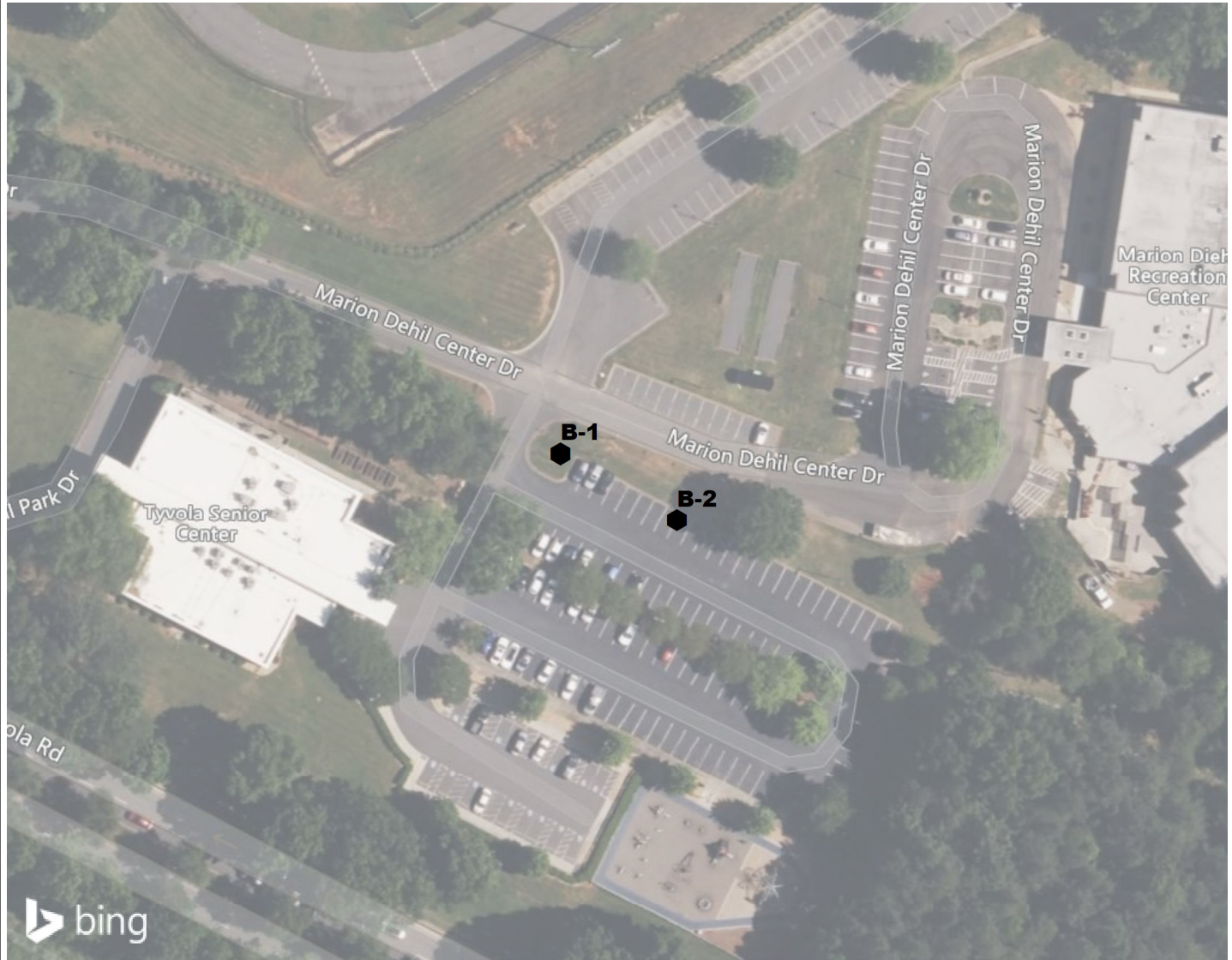


LEGEND	
	SOIL BORING



VICINITY MAP NOT TO SCALE


NOTE:
 BASE MAPPING AND VICINITY MAP CREATED FROM LAYERS
 COMPILED BY ESRI PRODUCTS AND 2024 MICROSOFT CORPORATION.
 COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE NORTH CAROLINA FIPS
 3200



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



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 PLOTTED: 3/7/2024 4:17:51 PM BY: C CARROLL





	PROJECT NO. 24004732.001A	EXPLORATION LOCATION PLAN AND VICINITY MAP	FIGURE 1
	DRAWN BY: ccarroll CHECKED BY: jfregosi DATE: 03-07-2024		

BORING LOGS

DRILLING METHOD/SAMPLER TYPE GRAPHICS

	HOLLOW STEM AUGER
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

GROUND WATER GRAPHICS

	WATER LEVEL (level where first observed)
	WATER LEVEL (level after stabilizing period)
	WATER LEVEL (additional levels after exploration)
	OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Solid lines separating strata on the logs represent approximate boundaries only, dashed lines are inferred or extrapolated boundaries. Actual transitions may be gradual or differ from those represented.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System (ASTM D2488/D2487) designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, i.e., CL-ML, GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.


























ABBREVIATIONS

- C_u - Coefficients of Uniformity
- C_c - Coefficients of Curvature
- WOH - Weight of Hammer
- WOR - Weight of Rod

REFERENCES

1. American Society for Materials and Testing (ASTM), 2011, ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

UNIFIED SOIL CLASSIFICATION SYSTEM¹

GRAVELS (More than 50% of coarse fraction retained on No. 200 Sieve)	CLEAN GRAVEL WITH <5% FINES		GW	WELL-GRADED GRAVEL, WELL-GRADED GRAVEL WITH SAND		
			GP	POORLY GRADED GRAVEL, POORLY GRADED GRAVEL WITH SAND		
		GRAVELS WITH 5% TO 12% FINES		GW-GM	WELL-GRADED GRAVEL WITH SILT, WELL-GRADED GRAVEL WITH SILT AND SAND	
				GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY), WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILT CLAY AND SAND)	
				GP-GM	POORLY GRADED GRAVEL WITH SILT, POORLY GRADED GRAVEL WITH SILT AND SAND	
				GP-GC	POORLY GRADED GRAVEL WITH CLAY (OR SILTY CLAY), POORLY GRADED GRAVEL WITH CLAY AND (OR SILTY CLAY AND SAND)	
	GRAVELS WITH > 12% FINES		GM	SILTY GRAVEL, SILTY GRAVEL WITH SAND		
			GC	CLAYEY GRAVEL, CLAYEY GRAVEL WITH SAND		
			GC-GM	SILTY, CLAYEY GRAVEL, SILTY, CLAYEY GRAVEL WITH SAND		
		SANDS (50% or more of coarse fraction passes the No. 4 Sieve)	CLEAN SANDS WITH <5% FINES		SW	WELL-GRADED SAND, WELL-GRADED SAND WITH GRAVEL
					SP	POORLY GRADED SAND, POORLY GRADED SAND WITH GRAVEL
			SANDS WITH 5% TO 12% FINES		SW-SM	WELL-GRADED SAND WITH SILT, WELL-GRADED SAND WITH SILT AND GRAVEL
	SW-SC			WELL-GRADED SAND WITH CLAY (OR SILTY CLAY), WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)		
	SP-SM			POORLY GRADED SAND WITH SILT, POORLY GRADED SAND WITH SILT AND GRAVEL		
	SP-SC			POORLY GRADED SAND WITH CLAY, POORLY GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)		
SANDS WITH > 12% FINES		SM	SILTY SAND, SILTY SAND WITH GRAVEL			
		SC	CLAYEY SAND, CLAYEY SAND WITH GRAVEL			
		SC-SM	SILTY, CLAYEY SAND, SILTY, CLAYEY SAND WITH GRAVEL			
FINE GRAINED SOILS (50% or more passes the No. #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	SILT, SILT WITH SAND, SILT WITH GRAVEL		
			CL	LEAN CLAY, LEAN CLAY WITH SAND, LEAN CLAY WITH GRAVEL		
			CL-ML	SILTY CLAY, SILTY CLAY WITH SAND, SILTY CLAY WITH GRAVEL		
	SILTS AND CLAYS (Liquid Limit 50 or greater)		OL	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL		
			MH	ELASTIC SILT, ELASTIC SILT WITH SAND, ELASTIC SILT WITH GRAVEL		
			CH	FAT CLAY, FAT CLAY WITH SAND, FAT CLAY WITH GRAVEL		
			OH	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL		

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.



PROJECT NO.:
24004732.001A

DRAWN BY: BL

CHECKED BY: CC

DATE: 3/7/2024

GRAPHICS KEY

Innovative Design Tyvola Senior Center
Marion Diehl Center Drive
Charlotte, North Carolina

GRAIN SIZE¹

DESCRIPTION		SIEVE SIZE	GRAIN SIZE
Boulders		>12 in.	>12 in. (304.8 mm.)
Cobbles		3 - 12 in.	3 - 12 in. (76.2 - 304.8 mm.)
Gravel	coarse	3/4 - 3 in.	3/4 - 3 in. (19 - 76.2 mm.)
	fine	#4 - 3/4 in.	0.19 - 0.75 in. (4.8 - 19 mm.)
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)
Fines		Passing #200	<0.0029 in. (<0.07 mm.)

SECONDARY CONSTITUENT¹

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

PLASTICITY¹

DESCRIPTION	CRITERIA
Non-Plastic	A 1/8 in. (3 mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

MOISTURE CONTENT¹

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CONSISTENCY - FINE-GRAINED SOIL^{2,3}

CONSISTENCY	SPT - N (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q _u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Easily penetrated several inches by fist
Soft	2 - 4	0.25 ≤ PP < 0.5	500 - 1,000	Easily penetrated several inches by thumb
Medium Stiff	4 - 8	0.5 ≤ PP < 1	1,000 - 2,000	Can be penetrated several inches by thumb with moderate effort
Stiff	8 - 15	1 ≤ PP < 2	2,000 - 4,000	Readily indented by thumb but penetrated only with great effort
Very Stiff	15 - 30	2 ≤ PP < 4	4,000 - 8,000	Readily indented by thumbnail
Hard	>30	4 ≤ PP	>8,000	Indented by thumbnail with difficulty

APPARENT DENSITY - COARSE-GRAINED SOIL²

APPARENT DENSITY	SPT-N (# blows / ft)
Very Loose	<4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

STRUCTURE¹

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. (6mm) thick, note thickness.
Laminated	Alternating layers of varying material or color with the layers less than 1/4-in. (6 mm) thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.
Homogeneous	Same color and appearance throughout

ANGULARITY¹

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

REACTION WITH HYDROCHLORIC ACID¹

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

CEMENTATION¹

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or little finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

REFERENCES

- American Society for Materials and Testing (ASTM), 2017, ASTM D2488: Standard Practice for Description and Identification of Soils (Visual Manual Procedures).
- Terzaghi, K and Peck, R., 1948, Soil Mechanics in Engineering Practice, John Wiley & Sons, New York.
- United States Department of the Interior Bureau of Reclamation (USBR), 1998, Earth Manual, Part I.



PROJECT NO.: 24004732.001A
 DRAWN BY: BL
 CHECKED BY: CC
 DATE: 3/7/2024

SOIL DESCRIPTION KEY
 (For additional tables, see ASTM D2488)

Innovative Design Tyvola Senior Center
 Marion Diehl Center Drive
 Charlotte, North Carolina

PLOTTED: 03/07/2024 11:44 AM BY: CCarroll

Date Begin - End: 2/16/2024 - 2/16/2024 **Drilling Company:** TRIGON
Logged By: B. LASSETER **Drill Crew:** E. ESTEP
Hor.-Vert. Datum: WGS 1984 - MSL **Drilling Equipment:** B57 Mobile **Hammer Type - Drop:** 140 lb. Auto - 30 in.
Plunge: -90 degrees **Drilling Method:** Hollow Stem Auger
Weather: 60 F, SUNNY **Auger Diameter:** 2.25 in. I.D.

BORING LOG B-1

Approximate Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION				LABORATORY RESULTS				
			Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Uncorrected N-VALUE (blows/ft)	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Additional Tests/ Remarks
			Latitude: 35.16026° Longitude: -80.85883° Approximate Ground Surface Elevation (ft.): 669 Surface Condition: Bare Earth and Grass								
			TOPSOIL								
			FILL Sandy CLAY (CL): coarse sand, medium plasticity, reddish yellow, moist, medium stiff, trace maganese	BC=1 2 4	6			18"			
665	5		RESIDUAL Elastic SILT (MH): medium plasticity, reddish yellow, moist, very stiff, modal	BC=5 7 9	16			18"	MH	31.8	Passing #200= 88 Atterberg Limits= Liquid Limits: 61 Plasticity Index: 27
			RESIDUAL SILT (ML): low plasticity, reddish yellow, moist, stiff, trace mica	BC=3 5 7	12			18"			
660	10		lensed maganese	BC=3 4 5	9			18"			
655	15		yellowish brown	BC=3 5 7	12			18"			
650	20		RESIDUAL Silty SAND (SM): fine sand, non-plastic, yellowish brown, moist, medium dense	BC=7 10 13	23			18"			
645	25		The boring was terminated at approximately 20.2 ft. below ground surface. The boring was backfilled with auger cuttings on February 16, 2024.				GROUNDWATER LEVEL INFORMATION: Groundwater was not observed during drilling or after completion. GENERAL NOTES: The exploration location and elevation are approximate and were estimated by Google Earth. Caving was observed at a depth of 12.4 ft. below ground surface after drilling.				
640	30										
635	35										

OFFICE FILTER: RALEIGH
 PROJECT NUMBER: 24004732.001A
 GINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2024.GLB [KLF_BORING WITH N-PLOT WITH DRILL NOTES]



PROJECT NO.:
24004732.001A

 DRAWN BY: BL
 CHECKED BY: CC
 DATE: 3/7/2024

BORING LOG B-1

Innovative Design Tyvola Senior Center
 Marion Diehl Center Drive
 Charlotte, North Carolina

PLOTTED: 03/07/2024 11:44 AM BY: CCarroll

Date Begin - End: 2/16/2024 - 2/16/2024	Drilling Company: TRIGON	BORING LOG B-2	
Logged By: B. LASSETER	Drill Crew: E. ESTEP		
Hor.-Vert. Datum: WGS 1984 - MSL	Drilling Equipment: B57 Mobile		Hammer Type - Drop: 140 lb. Auto - 30 in.
Plunge: -90 degrees	Drilling Method: Hollow Stem Auger		
Weather: 60 F, SUNNY	Auger Diameter: 2.25 in. I.D.		

Approximate Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION				LABORATORY RESULTS				
			Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Uncorrected N-VALUE (blows/ft)	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Additional Tests/ Remarks
			Latitude: 35.16015° Longitude: -80.85859° Approximate Ground Surface Elevation (ft.): 668 Surface Condition: Asphalt								
		ASPHALT									
		ABC STONE									
		RESIDUAL SILT (ML): medium plasticity, red, moist, stiff, with mica	BC=3 4 5	9		17"					
665		RESIDUAL Silty SAND (SM): fine sand, low plasticity, reddish yellow to yellowish brown, moist, loose to medium dense yellowish brown, lensed maganese	BC=4 4 3	7		17"					
5		stratified, white gray well-graded sand	BC=3 3 4	7		15"					
660		trace rock fragments	BC=7 7 6	13		17"					
655			BC=5 5 6	11		17"					
650			BC=7 7 11	18		17"					
645											
25											
640											
30											
635											

The boring was terminated at approximately 20.1 ft. below ground surface. The boring was backfilled with auger cuttings and patched at surface on February 16, 2024.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Google Earth.
Caving was observed at a depth of 11 ft. below ground surface after drilling.

PROJECT NUMBER: 24004732.001A
OFFICE FILTER: RALEIGH
GINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2024.GLB [KLF_BORING WITH N-PLOT WITH DRILL NOTES]



PROJECT NO.:
24004732.001A

DRAWN BY: BL

CHECKED BY: CC

DATE: 3/7/2024

BORING LOG B-2

Innovative Design Tyvola Senior Center
Marion Diehl Center Drive
Charlotte, North Carolina

LABORATORY TEST REPORTS

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

SECTION 01 10 00
SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS and REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Tyvola Senior Center PV Panel Installation
- B. Consultant Identification: The Contract Documents, dated 05-26-2023, were prepared for the Project by Innovative Design, Inc.
- C. The work consists of:
 - 1. Existing Conditions:
 - a. Building consists of a senior center. Building is steel frame structure with TPO roofing membrane.
 - b. Building has fourteen (14) existing roof mounted HVAC units plus exhaust fans and roof drains.
 - c. Parking area designated for a PV canopy is asphalt surface with concrete curb and gutter.
 - d. The building is occupied and will remain occupied during construction.
 - 2. Demolition:
 - a. None anticipated
 - 3. Renovation/New Construction
 - a. The scope includes adding solar panels on the roof, associated inverters, wiring, disconnects and breakers, electrical monitoring equipment required by Duke Energy and connection to the existing Utility Transformer and connections to the Building Automation system including any Tridium controls programming.
 - b. Scope includes constructing a PV parking canopy at the designated parking area, associated inverters, wiring, disconnects and breakers, electrical monitoring equipment required by Duke Energy and connection to the existing Utility Transformer and connections to the Building Automation system including any Tridium controls programming..

- D. Contractor shall furnish all material, labor, tools, supplies, equipment, transportation, superintendence, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items and equipment required to complete the construction of the Project, as set forth in the Contract Documents and as required to provide complete and operational systems.
- E. The Contractor shall act as the Project Expediter and be responsible for coordinating the work and schedules of others hired by him.

1.3 ADDITIONAL WORK REQUIRED AS PART OF THE GENERAL SCOPE

- A. Coordination with Roof Guarantee Holder
 - 1. The installing contractor shall communicate with the existing roofing guarantee Holder GAF Materials Corp. regarding Guarantee Number G2014-00004758. The installing contractor shall provide all the following and coordinate with roofing manufacturer for reinspection and approval. Final inspection by GAF Materials Corp. shall be provided and the cost shall be paid by the PV contractor. Repairs to meet all requirements of the inspector shall be completed by the PV contractor to maintain warranty. The original installer of the roofing system for reference is RADCO Construction Services of Mount Holly, NC. The following must be completed to maintain the warranty on the roof. The GAF Solar Installations & GAF Guaranteed Roofing Systems Guidelines is included with the Project Manual and is located under "Forms".
 - 2. GAF Guaranteed Roofing Systems Guidelines for PV installations on GAF guaranteed roofing systems is as follows:
 - a. For PV system installations on an existing GAF guaranteed roofing system, these steps must be followed:
 - 1. An initial inspection of the existing roofing system must be performed by GAF Field Services to assess the condition of the roof. The fee for this inspection is \$600.
 - 2. Shop drawings of the PV system layout and installation specifics must be provided to GAF for our guarantee records, including all flashing details that will be used to install the PV system. NOTE: GAF does not approve mounting systems; GAF only reviews the flashings to be incorporated into the GAF Guaranteed roofing system. GAF reserves the right to decline coverage where it believes that the installation may be deleterious to the long-term performance of the GAF roofing system.
 - 3. Any repairs/modifications to the existing roof system identified by GAF Field Services must be done at the owner's cost prior to the installation of the PV system.

4. An inspection of the roofing system must be completed by GAF Field Services after the installation of the PV system and any deficiencies/damage caused by the installation must be repaired. The fee for this inspection is \$600.
 5. GAF reserves the right to require additional inspections as necessary to ensure that our requirements are met. The fee for any re-inspection is \$600.
 6. After all requirements are met and fees paid, GAF will issue an addendum to the guarantee confirming coverage of the GAF products installed on the roof, subject to all terms and conditions set forth in the guarantee.
- B. Integration to Existing Building Automation System:
1. Integration to Existing Building Automation System shall be by Team Mechanical or Environmental Controls & Mechanical or other Controls contractor approved by Owner
 2. The following scope shall be provided by the building automation subcontractor as indicated on plans and specifications:
 - a. The building automation sub-contractor shall provide interconnection between the new inverter and existing building automation system JACE panel.
 - b. The building automation sub-contractor shall provide cable, final connections, and programming to integrate the inverter outputs to the BAS graphics.
 3. The following integration and graphics information shall be provided by this contractor:
 - a. Provide necessary upgrade to existing JACE storage to allow for not less than 2-years at 15-minute intervals.
 - b. The following points shall be recorded:
 - 1) Alarm output of each inverter, with partial or full failure points.
 - 2) KW output from each inverter.
 - 3) KWH total output from each inverter.
 - 4) KW output from whole PV system.
 - 5) KWH production from PV system.
 - 6) Quick select single page showing graph of demand during day.
 - 7) Quick select single page showing graph of building consumption vs PV production over time.
 - 8) Full graphic page showing PV system 1-line diagram from electrical drawings inclusive of all points listed above.

1.4 CONTRACT

- A. Project will be constructed as a Single Prime Contract.

1.5 WORK SEQUENCE

- A. The Work shall be conducted in one (1) phase.
 - 1. Phase-1: Install photovoltaic panels on the roof, install the canopy structure, install photovoltaic panels on the canopy and connect to the utility transformer.

1.6 WORK UNDER OTHER CONTRACTS

- A. Separate Contract: Owner reserves the right to award a separate contract for performance of certain construction operations at Project site. Those operations may be conducted simultaneously with Work under this Contract. Separate Work may include but is not limited to:
 - 1. Hazardous Materials Abatement Contract – n/a
 - 2. Telecommunications Contract – n/a
 - 3. Staff Relocation Contract – n/a
- B. Contractor shall cooperate fully with separate contractors so work on other contracts may be carried out smoothly, without interfering with or delaying Work under this Contract.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Technical Specifications Format: The Specifications are organized into Divisions and Sections using the 50-division format and Construction Specifications Institute / Construction Specifications Canada (CSI/CSC's) 2018 "Master Format" numbering system.
 - 1. Section Identification: The Technical Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
- B. Technical Specifications Content: The Technical Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Technical Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Technical Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS

2.1 PRODUCTS ORDERED IN ADVANCE

- A. Unless otherwise stated in the Contract Documents, Costs for receiving, handling, storage if required, and installation of material and equipment shall be included in the Contract Sum.

2.2 OWNER-FURNISHED PRODUCTS

- A. Not Used.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

**SECTION 01 14 00
WORK RESTRICTIONS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated on the drawings. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to designated roof area, designated roof access, mezzanine, and designated lay down area.
 - 2. Owner Occupancy: Allow for Owner use of the site.
 - 3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - 4. Construction hours shall be as follows:
 - a. The Contractor shall coordinate with the Park & Rec Recreation Center Management and Owners Representative for work scheduling. This may require some of the work to be done after hours or on weekends so as to not disrupt Recreation Center operation. If facility access for after hours is needed, the Contractor shall be responsible for coordinating with the Maintenance Provider: ARAMARK. The Contractor shall bear all costs for using ARAMARK services if needed..
 - 1) Normal business hours are defined as occurring **Monday through Friday** between the times of **8:00 am to 5:00 pm**.
 - 2) Normal business hours do not include nationally recognized holidays in which the Owner is not occupying the building.

- b. All work delineated within the contract documents to take place outside of normal business hours shall be provided as such.
 - 1) The contractor shall include all aspects of related work that will be required to complete work delineated to take place outside of normal business hours.
 - c. For work taking place outside of normal business hours, the Contractor shall include the cost of an onsite security officer chosen by the Owner's Representative as follows:
 - 1) Contractor shall calculate the cost of security at **\$22.10 dollars per hour (if notified within 72 hours--\$33.00 dollars per hour if notified less than 72 hours)** The contractor is solely responsible for an accurate estimate of the time needed to complete the work.
 - 2) The Contractor shall provide the Owner's Representative with the calculated cost of the required security as part of the Schedule-of-Values. (Refer to Section 01 29 00 Payment Procedures)
 - 3) The actual hours used for security will be reconciled monthly by means of a contract amendment (deduct change order).
 - 4) For the project scope defined in the contract documents, the Owner will invoice/charge the Contractor for any additional security hours that exceed the amount allocated in the Contractor's submitted Schedule-of-Values. Additional hours will be calculated at the same rate as stipulated above.
 - 5) If the required security does not exceed the Contractor's estimate as indicated in the Schedule-of-Values, all remaining funds allotted for that task shall be awarded to the Contractor.
 - d. The Contractor shall advise the Owner's Representative before submitting a bid/proposal if there are any portions of the work indicated to take place during normal business hours that cannot be accomplished while maintaining an occupied facility.
- B. Use of Existing Building: Maintain existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations.
- C. Protect building and its occupants during construction period. If the Work requires that the Contractor make any modifications to an existing fire alarm and/or fire protection system, the Contractor shall be responsible for Fire Watches.
- 1. **Fire Watches:** Additional security personnel may be required to perform Fire Watches. Refer to Section 01 50 00 Temporary Facilities for additional

information. Security personnel required for Fire Watches shall be calculated by the Contractor as follows:

- a. Contractor shall calculate the cost of security at **\$22.10 dollars per hour (if notified within 72 hours--\$33.00 dollars per hour if notified less than 72 hours)** The contractor is solely responsible for an accurate estimate of the time needed to complete the work.
 - b. The Contractor shall provide the Owner's Representative with the calculated cost of the required security as part of the Schedule-of-Values. (Refer to Section 01 29 00 Payment Procedures)
 - c. The actual hours used for security will be reconciled monthly by means of a contract amendment (deduct change order).
 - d. For the project scope defined in the contract documents, the Owner will invoice/charge the Contractor for any additional security hours that exceed the amount allocated in the Contractor's submitted Schedule-of-Values. Additional hours will be calculated at the same rate as stipulated above.
 - e. If the required security does not exceed the Contractor's estimate as indicated in the Schedule-of-Values, all remaining funds allotted for that task shall be awarded to the Contractor.
2. **Cleaning:** Any dirt or debris caused inside or around the facility due to Contractor activities shall be the responsibility of the Contractor to clean up and restore to original appearance.

1.3 OCCUPANCY REQUIREMENTS (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 14 00

**SECTION 01 21 00
PROJECT CONTINGENCY AND ALLOWANCES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances:
 - a. No Lump Sum Allowances included
 - 2. Contingency \$100,000.00
- C. Related Sections include the following:
 - 1. Division 1, Technical Specifications Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Consultant of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Consultant's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Consultant from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, on the "Proposal Request" and "Proposal Request Log" forms.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Consultant for Owner's purposes and amount(s) to be charged to the allowance.
- B. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 UNIT PRICES

- A. No Unit Prices included

1.7 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Consultant, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Consultant, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES (Not Used)

END OF SECTION 01 21 00

**SECTION 01 23 00
ALTERNATES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid.

1.4 PROCEDURES

- A Alternates may be accepted based on available funds and/or in the best interest of the Owner. The Owner reserves the right to accept any of the alternates in any order considering the project and total cost. Any alternate left blank on the proposal shall be considered as a “no-cost” bid and will be provided by the bidder at zero cost to the Owner if accepted.
- B. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate; equipment, labor, profit & overhead, sales tax, material, miscellaneous devices, accessory objects, and similar items required to execute the alternate as described.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. A List of Alternates is included at the end of this Section. Specification Sections referenced in the List contain requirements for labor and materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF ALTERNATES

- A Add Alternate #1: Add Contractor-provided, one-year additional maintenance plan to provide comprehensive system maintenance after the first year of operation.

END OF SECTION 01 23 00

**SECTION 01 25 00
CONTRACT MODIFICATION PROCEDURES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications whereas all parties agree to the following:
 - 1. A modification in the Work or Contract Documents.
 - 2. The amount of the adjustment in the Contract Sum, if any.
 - 3. The extent of the adjustment in the Contract Time, if any.

1.3 NOTIFICATION TO SURETY

- A. The Contractor shall notify the Surety of any modifications to the Work or provisions of the Contract Documents, including, but not limited to, the Contract Price or Contract Time.

1.4 MINOR CHANGES IN THE WORK

- A. The Consultant shall have authority to order Minor Changes in the Work not involving adjustment to the Contract Sum or extension of the Contract Time, and consistent with the intent of the Contract Documents. Such changes shall be in a form of a written order and shall be binding for both the Owner and Contractor when fully executed.

1.5 CLAIMS FOR ADDITIONAL COST:

- A. No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with the following:
 - 1. **Notice: Written notice stating the general nature of each claim shall be delivered by the claimant to the other party to the Contract promptly, but in**

no event later than thirty (30) days after the start of the event giving rise to the claim.

2. The responsibility to substantiate a claim shall rest with the party making the claim. The amount or extent of the claim, with supporting data, shall be delivered to the other party to the Contract within fifteen (15) days after the initial Notice of the Claim. Each claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the claimant within thirty (30) days after receipt of the claimant's last submittal. Prior notice is not required for Claims relating to an emergency endangering life or property.
- B. The Contractor shall submit a claim if he believes additional cost is involved for reasons including but not limited to the following:
1. A written interpretation from the Consultant,
 2. An order by the Owner to stop the Work where the Contractor was not at fault,
 3. A written order for a minor change in the Work issued by the Consultant,
 4. A change in the Scope of the Work by the Consultant.

1.6 PROPOSAL REQUESTS

- A. The Owner initiated Proposal Requests is generated by the Owner to modify the Work or Contract Documents. The Consultant will issue a detailed description of proposed modifications in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. The description is for information and shall be considered as a directive to automatically stop work or execute the proposed change.
1. Within ten 10-calendar days after receipt of the Proposal Request, the Contractor shall submit a Proposal Request Form with an estimate to adjust the Contract Sum and the Contract Time if necessary to execute the change. Proposal shall include support documents from Subcontractor, if applicable.
 - a. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.

- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen's compensation insurance.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start, and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 2. The Contractor may initiate proposals if latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Consultant.
 - a. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - b. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - d. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen's compensation insurance.
 - e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - f. Comply with requirements in Division 1 Section, of the Technical Specifications "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- B. An alternative method to price the changes in the work is to utilize current "Mean's Cost Data".

- C. Profit and Overhead shall not exceed ten percent (10%) of the cost of the changes to the Work.
- D. Use Proposal Request Form provided by Owner. A Sample is included under Project Manual Heading VII - Forms. The Contractor shall prepare three copies, one for the Consultant, one for the Owner and one for himself and for all parties to sign. Each shall keep a copy.
- E. The Contractor shall be responsible for keeping and updating a "Proposal Request Log", listing all Proposal Requests and Minor Changes. The log shall also indicate the date of the Proposal Request, approval date, action taken, running balances, and a complete description of the change.
- F. After all parties have signed "The Proposal Request Form", it shall be the Contractor's authorization to proceed with the changes to the Work.
- G. If the Owner and Contractor do not agree with the requested adjustment in the Contract Sum, the Contract Time or the method of determining each, the provisions for Mediation shall be utilized.

1.8 CHANGE ORDER PROCEDURES

- A. The Consultant shall issue a Change Order for signatures once all of the Proposal Request(s) amounts exceeds the contingency amount or at the end of the project.
- B. The Contractor shall not invoice for the Change Order until it has been executed by all parties.

1.9 CONSTRUCTION CHANGE DIRECTIVE

- A. The Consultant may issue a Construction Change Directive that has been signed by the Owner to the Contractor directing a change in the Work. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved. And the Contractor shall advise the Consultant

of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

- C. The Contractor shall maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROCESSING CHANGE ORDERS

- A. The Change Order will be issued describing the change or changes to the Work and/or Contract Documents and will refer to the Proposal Requests.
- B. The Consultant shall issue one copy of the Change Order to the Contractor. The Contractor shall promptly sign the copy and return the copy to the Consultant who will sign the Change Order and forward the Change Order to the Owner to execute.
- C. Once the Change Order has been full executed, a copy shall be forwarded to the Consultant and to the Contractor for their files.

END OF SECTION 01 25 00

SECTION 01 27 00
UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Allowances" for procedures for using unit prices to adjust quantity allowances.
 - 2. Division 1, of the Technical Specifications Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Division 1, of the Technical Specifications Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Technical Specifications Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent agent.
- D. List of Unit Prices: A list of unit prices is included at the end of this of the Technical Specifications Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES (Not Used)

END OF SECTION 01 27 00

**SECTION 01 29 00
PAYMENT PROCEDURES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 1, of the Technical Specifications Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 3. Division 1, of the Technical Specifications Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms AIA G702.

- b. Continuation Sheets (example of the Continuation Sheet form is in the Project Manual Heading VII Forms).
 2. Submit the Schedule of Values to the Consultant at earliest possible date but no later than fourteen days before the date scheduled for submittal of initial Applications for Payment.
 3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each of the Technical Specifications Section and line item for potential billing against the Construction Contingency Allowance.
 1. Identification: Include the following Project information on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Consultant.
 - c. Contract number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Technical Specifications Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractors.
 - d. Name of manufacturer or fabricator.
 - e. Name of suppliers.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 3. Group items that are “Non-Tangible & Non-Taxable and Tangible & Taxable Items” on the Schedule of Values (see VII. Forms, Continuation Sheet).
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include labor and materials and/or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Closeout documentation: Provide a separate line item in the Schedule of Values for close out documentation as set forth in the Supplementary Conditions.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Consultant and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involves additional requirements.
 2. Contractor **Coordination Drawings** are required within 60 calendar days of the issued Notice-to-Proceed. Failure to provide requirements shall result in delays of Application for Payment.
- B. Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

- C. Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for material and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such material and equipment or otherwise protect the Owner's interest, and shall include applicable insurance, storage and transportation to the site for such material and equipment stored off the site.

The Contractor warrants that title to all Work covered by an Application and Certificate for payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application and Certificate for payment all work for which Certificates for payment have been previously issued and payment received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of claims of liens, claims, security, interests, or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work.

- D. Payment Application Times: Each Month, the County can make a partial payment to the Contractor on the basis of a duly notarized Application and Certification for Payment approved and certified by the Consultant.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Consultant will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 3. The County shall retain five (5%) percent of each payment to up fifty (50%) percent completion of the Contract.
 - a. The Owner shall not retain more than five percent (5%) of any periodic payment due a prime Contractor.

- b. When the project is fifty percent (50%) complete, the Owner, with written consent of the surety, **shall not retain any further** retainage from periodic payments due the Contractor if the Contractor continues to perform satisfactorily and any nonconforming work identified in writing prior to that time by the Consultant or Owner has been corrected by the Contractor and accepted by the Consultant and Owner. If the Consultant determines the Contractor's performance is unsatisfactory, the Owner may reinstate retainage for each subsequent periodic payment application as authorized in this subsection up to the maximum amount of five percent (5%). The project shall be deemed fifty percent (50%) complete when the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the contract, except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the project is fifty percent (50%) complete.
- c. Within 60 days after the submission of a pay request and one of the following occurs, as specified in the contract documents, the Owner with written consent of the surety shall release to the Contractor all retainage on payments held by the Owner:
 - 1) The Owner receives a certificate of substantial completion from the Consultant in charge of the project; or (ii) the Owner receives beneficial occupancy or use of the project. However, the Owner may retain sufficient funds to secure completion of the project or corrections on any work. If the Owner retains funds, the amount retained shall not exceed two and one-half times the estimated value of the work to be completed or corrected. Any reduction in the amount of the retainage on payments shall be with the consent of the Contractor's surety.
- d. The existence of any third-party claims against the Contractor or any additive change orders to the construction contract shall not be a basis for delaying the release of any retainage on payments.
 - 1) Full payment, less authorized deductions, shall also be made for those trades that have reached one hundred percent (100%) completion of their contract by or before the project is fifty percent (50%) complete if the Contractor has performed satisfactorily. However, payment to the early finishing trades is contingent upon the Owner's receipt of an approval or certification from the Consultant of record or applicable engineer that the work performed by the subcontractor is acceptable

and in accordance with the contract documents. At that time, the Owner shall reduce the retainage for such trades to **five-tenths percent (0.5%)** of the contract. Payments under this subsection shall be made no later than 60 days following receipt of the subcontractor's request or immediately upon receipt of the surety's consent, whichever occurs later. Early finishing trades under this subsection shall include structural steel, piling, caisson, and demolition. The early finishing trades for which line-item release of retained funds is required shall not be construed to prevent an Owner or an Owner's representative from identifying any other trades not listed in this subsection that are also allowed line-item release of retained funds. Should the Owner or Owner's representative identify any other trades to be afforded line-item release of retainage, the trade shall be listed in the original bid documents. Each bid document shall list the inspections required by the Owner before accepting the work, and any financial information required by the Owner to release payment to the trades, except the failure of the bid documents to contain this information shall not obligate the Owner to release the retainage if it has not received the required certification from the Consultant of record or applicable engineer.

- 2) Notwithstanding 3-a & b of this section, following fifty percent (50%) completion of the project, the Owner shall be authorized to withhold additional retainage from a subsequent periodic payment, not to exceed five percent (5%) as set forth in 3-a of this section, in order to allow the Owner to retain two and one-half percent (2.5%) total retainage through the completion of the project. In the event that the Owner elects to withhold additional retainage on any periodic payment subsequent to release of retainage pursuant to 3-d-i of this section, the General Contractor may also withhold from the subcontractors remaining on the project sufficient retainage to offset the additional retainage held by the Owner, notwithstanding the actual percentage of retainage withheld by the Owner of the project as a whole.
- 3) Neither the Owner's nor Contractor's release of retainage on payments as part of a payment in full on a line-item of work under 3-d-i of this section shall affect any applicable warranties on work done by the Contractor or subcontractor, and the warranties shall not begin to run any earlier than either the Owner's receipt of a certificate of substantial completion from the Consultant in charge of the project or the Owner receives beneficial occupancy.

- e. Nothing in this section shall prevent the prime Contractor at the time of application and certification to the Owner from withholding application and certification to the Owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment, and materials; damage to prime Contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by the Owner.
 - f. Nothing in this section shall prevent the Owner from withholding payment to the Contractor in addition to the amounts authorized by this section for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner or reasonable evidence that a third-party claim will be filed.
4. Provide a separate line item in the Schedule of values for close out documentation as set forth in the Supplementary Conditions.
- F. Transmittal: Submit one (1) signed and notarized electronic (pdf format) copy of each Application for Payment to the Consultant.
- 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. With each Application and Certification for payment, the Contractor must furnish for themselves, as well as for all Subcontractors, certified statements stating the cost of the property purchased from each vendor and the amount of sales and/or use taxes paid. See General Conditions, Sales and Use Tax for additional information.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
- I. Neither Final payment nor any remaining retained percentage shall become due until the Contractor submits the following to the Consultant for approval:
- 1. An affidavit that payrolls, bills for material and other indebtedness connected with the Work has been paid or otherwise satisfied,

2. A certificate evidencing that insurance required by the Contract Document to remain in force after Final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner,
 3. Consent of surety to Final payment
 4. If required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of claim of liens, claims security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If the Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such claim of lien. If such claim of lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such claim, including all costs and reasonable attorneys' fees.
 5. MWBE form VI.
 6. A list of all suppliers and subcontractors that were involved with the project. As part of the list, the Contractor shall include the address, phone number, what they supplied or Work performed, and a contact name.
 7. "As-Builts" Drawings and all other specified closeout documents.
 8. Maintenance and Operation instructions and guarantees.
- J. Final Payment Application: Submit one (1) electronic copy (pdf format) of the final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Warranties and Test results required by the Contract Documents.
 2. Updated final statement, accounting for final changes to the Contract Sum.
 3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 5. AIA Document G707, "Consent of Surety to Final Payment."
 6. Additional Evidence that claims have been settled if required by the Owner. An example of the evidence could be a letter from a subcontractor indicating that he has been paid in full for the work that he has performed.

7. Certificates from all local and State Governing Agencies as required by Law.
8. Final liquidated damages settlement statement.
9. List of Subcontractors and Suppliers that has contributed to the completion of the Work. The list shall include:
 - a. Material they supplied or type of construction they performed.
 - b. Address
 - c. Contact person
 - d. Phone number
10. M/WSBE Form VI
11. Final Sales Tax Form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

**SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Consultant will chair and conduct project meetings and compile an agenda for each meeting throughout the construction period.
- B. This Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 1, of the Technical Specifications Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 1, of the Technical Specifications Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Technical Specifications to ensure efficient and orderly installation of each part of the

Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, the Consultant shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Refer to Division 23, of the Technical Specifications Section "Basic Mechanical Materials and Methods" and Division 26, of the Technical Specifications Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.
- B. Staff Names: Fourteen days prior to the Pre-Construction conference, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Agenda: The Consultant shall prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes:
 - a. The Consultant will compile minutes of each project meeting, and will distribute copies to the Contractor and required copies to the Owner.
 - b. Recipients of copies may make and distribute such other copies as they wish.
 4. Attendance:
 - a. To the maximum extent practical, assign the same person or persons to represent the Contractor at the project meetings throughout progress of the Work.
 - b. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

5. Minimum agenda:
 - a. Review, revise as necessary, and approve minutes of previous meetings.
 - b. Review progress of the Work since last meeting, including status of submittals for approval.
 - c. Identify problems which impede planned progress.
 - d. Develop corrective measures and procedures to regain planned schedule.
 - e. Complete other current business.

- B. Pre-construction Conference: Schedule a pre-construction conference before starting construction, at a time convenient to Owner and Consultant, but no later than 14 days after execution of the Construction Contract. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, Consultant, and their consultants; Contractor and its superintendent; major subcontractors and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. Security.
 - p. Working hours.

- C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Consultant of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written recommendations.
 - l. Temporary facilities and controls.
 - m. Space and access limitations.
 - n. Regulations of authorities having jurisdiction.
 - o. Testing and inspecting requirements.
 - p. Required performance results.
 - q. Protection of construction and personnel.

Record significant conference discussions, agreements, and disagreements.

Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

- E. Progress Meetings: Conduct progress meetings at a minimum of once every two weeks. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: Representatives at the meeting shall be the Owner, Consultant, Subcontractors, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Access.
 - 6) Work hours.
 - 7) Hazards and risks.
 - 8) Review of Record Drawings
 - 9) Review of construction defects that has been identified by the Consultant
3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFI's)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFI's shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project Name
 2. Date
 3. Name of Contractor
 4. Name of Consultant.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Format: Contractor's standard form, submitted as hard-copy or PDF electronic submittal.
- D. Standard Form
1. Identify each page of attachments with the RFI number and sequential page number.
- E. Consultant's Action: Consultant will review each RFI, determine action required, and return it. Allow seven (7) working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of substitutions.
 - b. Requests for coordination information already indicated in the Contract Documents.
 - c. Requests for adjustments in the Contract Time or the Contract Sum.
 - d. Requests for interpretation of Consultant's actions on submittals.
 - e. Incomplete RFIs or RFIs with numerous errors.
 2. Consultant's action may include a request for additional information, in which case Architect's time for response will start again.

3. Consultant's action on RFI's that may result in a change to the Contract Time or the Contract Sum does not constitute an approval to proceed with the additional Work. Contractor must submit a Change Proposal and receive written approval to proceed according to Division 1 Section "Contract Modification Procedures".
 - a. If Contractor believes the RFI response warrants a change in the Contract Time or the Contract Sum, notify Consultant in writing within five (5) days of receipt of the RFI response.

- F. On receipt of Consultant's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven (7) days if Contractor disagrees with response.

- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log biweekly. Include the following:
 1. Project Name
 2. Name and address of Contractor.
 3. Name and address of Consultant.
 4. RFI number including RFI's that were dropped and not submitted.
 5. RFI description
 6. Date the RFI was submitted.
 7. Date Consultant's response was received.
 8. Identification of the related Minor Change in the Work, Construction Change Directive and Proposal Request as appropriate.
 9. Identification of related Field Order, Work Change Directive and Proposal Request as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Preliminary Construction Schedule.
 2. Contractor's Construction Schedule.
 3. Submittals Schedule.
 4. Daily construction reports.
 5. CPM Reports
 6. Construction photographs.
- B. Related Sections include the following:
1. Division 1, of the Technical Specifications Section "Payment Procedures" for submitting the Schedule of Values.
 2. Division 1, of the Technical Specifications Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 3. Division 1, of the Technical Specifications Section "Submittal Procedures" for submitting schedules and reports.
 4. Division 1, of the Technical Specifications Section "Quality Requirements" for submitting a schedule of tests and inspections.
 5. Division 1, of the Technical Specifications Section "Closeout Procedures" for Project Record Documents at Project closeout.

1.3 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified. The date shall be submitted for any change of construction personal.
- B. Preliminary Construction Schedule: Submit three printed copies; one a single sheet, of the Preliminary Construction Schedule.
- C. Contractor's Construction Schedule: Submit three printed copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. If required, submit an electronic copy of schedule, using software indicated, on a CD and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- D. Daily Construction Reports: Submit two copies at monthly intervals.
- E. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Of the Technical Specifications Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Consultant's final release or approval.
- F. CPM Reports: If required by the Supplementary Conditions, Concurrent with CPM schedule, submit three printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- G. Construction Photographs: If required by the Supplementary Conditions, submit two prints of each photographic view within seven (7) days of taking photographs.
1. Format: 4-by-6-inch smooth-surface matte prints on single-weight commercial-grade stock, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Consultant.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

Negatives: Submit a complete set of photographic negatives in protective envelopes with each submittal of prints. Identify date photographs were taken.

1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and daily construction reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - a) At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed, through the date of Substantial Completion and Final Completion.
 1. Contract completion date shall not be changed, unless specifically authorized by Change Order.
- B. Activities: Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 60 days, unless specifically allowed by Consultant.

2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

PV panels, inverters, emergency shut off switch
 3. Submittal Review Time: Include review and re-submittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than 7 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Consultant's administrative procedures necessary for certification of Substantial Completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in the schedule and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work Restrictions: Show the effect of the following items on the schedule:
 - a) Coordination with existing construction.
 - b) Limitations of continued occupancies.
 - c) Uninterruptible services.
 - d) Partial occupancy before Substantial Completion.
 - e) Use of premises restrictions.
 - f) Environmental control.
 3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a) Submittals.
 - b) Purchases.
 - c) Mockups.
 - d) Fabrication.

- e) Sample testing.
 - f) Deliveries.
 - g) Installation.
 - h) Tests and inspections.
 - i) Startup and placement into final use and operation.
- D. Milestones: If not included in the Construction Documents, milestones shall be indicated in the Construction Schedule for the Consultant's and Owner's approval and shall be reference points of the construction progress.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.
- F. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
- 1. ProCore or similar, most current version, for Windows 10 or higher operating system.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven (7) days of date established for the Notice to Proceed
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Preliminary Network Diagram: Submit diagram within **14** days of date established for **the Notice to Proceed**. Outline significant construction activities for the first **60** days of construction. Include skeleton diagram for the remainder of the Work.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than **30** days after date established for **the Notice to Proceed**.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday as the unit of time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a) Preparation and processing of submittals.
 - b) Purchase of materials.
 - c) Delivery.
 - d) Fabrication.
 - e) Installation.
 2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.
- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.

2. Description of activity.
 3. Principal events of activity.
 4. Immediate, preceding, and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date.
 2. In second list, tabulate activity number, late finish date, dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests, coordinate timing with progress meetings.

- a) In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
- b) Submit value summary printouts **one week** before each regularly scheduled progress meeting.

2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of Subcontractors at Project site.
 2. List of separate Contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. High and low temperatures and general weather conditions.
 5. Accidents.
 6. Meetings and significant decisions.
 7. Unusual events (refer to special reports).
 8. Stoppages, delays, shortages, and losses.
 9. Services connected and disconnected.
 10. Equipment or system tests and startups.
 11. Visitors to the site
 12. Activities accomplished that day

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week 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 Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Consultant, Owner, separate Contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 CONSTRUCTION PHOTOGRAPHS

- A. Provide per 01 32 20.

END OF SECTION 01 32 00

SECTION 01 32 20
PHOTOGRAPHIC DOCUMENTATION (DIGITAL)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting construction photographs.

1.3 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each **photograph**. Indicate elevation or story of construction. Include the same label information as the corresponding **set of photographs**.
- C. Construction Photographs: Submit 1 PDF of each photographic view within **7** days of taking photographs.
 - 1. Format: Digital "PDF".

- a. All references to pdf format within the Project Manual are defined as “Portable Document Format” (pdf) as made standard by digital image-viewing software widely used throughout the design and construction industry.
2. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document. Identify electronic media with date photographs were taken. Submit images that have the same aspect ratio as the sensor, uncropped.

1.4 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities including temporary lighting.

PART 2 - EXECUTION

2.1 PHOTOGRAPHS, GENERAL

- A. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.

2.2 CONSTRUCTION PHOTOGRAPHS

- A. Preconstruction Photographs: Before starting construction, take color photographs of Project site and surrounding properties from different vantage points, as directed by Consultant.
 1. Take 4 photographs to show existing conditions of each side of building adjacent to the property before starting the Work.
 2. Take 4 photographs of existing buildings either on or adjoining the property to accurately record the physical conditions at the start of construction.
- B. Periodic Construction Photographs: Take color digital photographs to document progress with the cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since the last photographs were taken.
- C. Final Completion Construction Photographs: Take 10 digital color photographs of each project after date of Substantial Completion for submission as Project Record Documents. Consultant will direct photographer for desired vantage points.

1. Do not include date stamp.

END OF SECTION 01 32 20

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Payment Procedures" for submitting Applications for Payment.
 - 2. Division 1, of the Technical Specifications Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule **and construction photographs**.
 - 4. Division 1, of the Technical Specifications Section "Photographic Documentation" for submitting periodic construction photographs.
 - 5. Division 1, of the Technical Specifications Section "Quality Requirements" for test and inspection reports and Delegated-Design Submittals and for erecting mockups.
 - 6. Division 1, of the Technical Specifications Section "Closeout Procedures" for submitting warranties **Project Record Documents and operation and maintenance manuals**.
 - 7. Division 1, of the Technical Specifications Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 8. Division 1, of the Technical Specifications Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Consultant's responsive action.
- B. Informational Submittals: Written information that does not require Consultant's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. The Contractor shall provide the submittals as required by the Consultant's Submittal Log and the Contract Documents.
- B. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Consultant for Contractor's use in preparing submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Submittals Schedule: Comply with requirements in Division 1, of the Technical Specifications Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities. (Submittal Log)
- E. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Consultant's receipt of submittal.
 - 1. Initial Review: Allow seven (7) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Consultant will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Concurrent Review: Where concurrent review of submittals by Consultant's consultants, Owner, or other parties is required, allow twenty one (21) days for initial review of each submittal.

3. If intermediate submittal is necessary, process it in same manner as initial submittal.
 4. Allow seven (7) days for processing each re-submittal.
 5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- F. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately **4 by 5 inches** on label or beside title block to record Contractor's review and approval markings and action taken by Consultant.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Consultant.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including related specification section/number and revision number.
 - i. Number and title of appropriate Technical Specifications Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- H. Additional Copies: Unless additional copies are required for final submittal, and unless Consultant observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Consultant.
 2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Consultant will return submittals, without review, received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Consultant on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. Transmittal Form: Use on form to be defined by the Consultant.
- J. Distribution: Furnish copies of final submittals to manufacturers, Subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Use only final submittals with mark indicating action taken by Consultant in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Number of Copies: Submit 1 PDF copy of each submittal, unless otherwise indicated. Consultant will return 5 copies. Mark up and retain one returned copy as a Project Record Document.
- 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 printed 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:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.

- g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - o. Manufacturer's location.
- 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: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams and existing conditions.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches** but no larger than **30 by 40 inches**.
 - 4. Number of Copies: Submit 6 blue- or black-line prints of each submittal, print will be required for operation and maintenance manuals. Consultant will retain two prints; remainder will be returned.
- D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."
- E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups. Verify the samples are true presentation of the materials to be used.
2. 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.
3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Consultant's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
4. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations. The consultant will return submittal with the option selected.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
6. 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.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

- F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product.
 - 2. Number and name of room or space.
 - 3. Location within room or space.
- G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."
- H. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- I. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."
- J. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."
- K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit one PDF copy of each submittal, unless otherwise indicated. Consultant will not return copies.
 - 2. Certificates and Certifications: Provide a notarized 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.
- B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- C. Qualification Data: If requested, prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with

project names and addresses, names and addresses of Consultants and owners, and other information specified.

- D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- I. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation for the application.
- J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- K. Coordinate individual Specification Sections with paragraph below by including specific model code organization in that Section. If all are same, insert name below.
Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures Operation and Maintenance Data."
- L. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- M. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- N. Construction Photographs [and Videotapes]: Comply with requirements in Division 1 Section "Photographic Documentation."
- O. Material Safety Data Sheets: Submit two copies for the Consultant and the Owner and keep a copy at the job site. Post warning signs when appropriate.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Consultant.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 CONSULTANT'S ACTION

- A. General: Consultant will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Consultant will review each submittal, make marks to indicate corrections or modifications required, and return it. Consultant will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- C. Informational Submittals: Consultant will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Consultant will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded unless a justification is also submitted.

END OF SECTION 01 33 00

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This 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. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Consultant, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 1, of the Technical Specifications Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 2 through 48, of the Technical Specifications Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction comply with requirements. Services do not include contract enforcement activities performed by Consultant.
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 REGULATORY REQUIREMENTS

- A. Copies of Regulations: Obtain copies of the following regulations and retain at Project site to be available for reference by parties who have a reasonable need:
 - 1. NC Building Code 2018 for Existing Buildings
 - 2. NFPA

1.5 SUBMITTALS

- A. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Technical Specifications Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 QUALITY ASSURANCE

- A. 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.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent for a second option.
- F. Mockups: Before installing portions of the Work requiring mockups as indicated in of the Technical Specifications Sections 2-48 of the Construction Documents., build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Consultant.
 - 2. Notify Consultant seven (7) days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Consultant's approval of mockups before starting work, fabrication, or construction.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

- B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

- C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
 - 1. Testing agency will notify Consultant and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Consultant with copy to Contractor and to authorities having jurisdiction.
 - 3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 5. Testing agency will retest and re-inspect corrected work.

- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services as requested by the Consultant at the Contractor's expense, including retesting and re-inspecting, for construction that revised or replaced Work, at the Contractor's expense, that failed to comply with requirements established by the Contract Documents.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field-curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
 - 1. Distribution: Distribute schedule to Owner, Consultant, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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 Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
 - 2. Comply with the Contract Document requirements for Division 1, of the Technical Specifications Section "Cutting and Patching."
- 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 01 40 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- C. Temporary utilities include, but are not limited to, the following:
 - 1. Sewers and drainage.
 - 2. Water service and distribution.
 - 3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 4. Heating and cooling facilities.
 - 5. Ventilation.
 - 6. Electric power service.
 - 7. Lighting.
 - 8. Telephone service.
- D. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads and paving.
 - 2. Dewatering facilities and drains.
 - 3. Project identification and temporary signs.
 - 4. Waste disposal facilities.
 - 5. Field offices as required.
 - 6. Storage and fabrication sheds.
 - 7. Lifts and hoists.
 - 8. Temporary elevator usage.
 - 9. Temporary stairs.
 - 10. Construction aids and miscellaneous services and facilities.

- E. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Pest control.
 - 5. Site enclosure fence.
 - 6. Security enclosure and lockup.
 - 7. Barricades, warning signs, and lights.
 - 8. Temporary enclosures.
 - 9. Temporary partitions.
 - 10. Fire protection.

- F. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 2. Division 1, of the Technical Specifications Section "Execution Requirements" for progress cleaning requirements.
 - 3. Divisions 2 through 16, of the Technical Specifications for temporary heat, ventilation, and humidity requirements for products in those Sections.>

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Consultant, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary enclosures.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Consultant and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner's construction forces.
 - 2. Occupants of Project.
 - 3. Consultant.
 - 4. Testing agencies.
 - 5. Personnel of authorities having jurisdiction.

- B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.
- C. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.
- D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.
- E. Communications: Pay all charge associated with communications.
- F. Streets, Sidewalks, and Temporary Easements: Pay all charges associated with the Work where charges will occur.

1.5 SUBMITTALS

- A. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 1. Keep temporary services and facilities clean and neat.
 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS:

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if indicated on the plans and/or specifications. Provide materials suitable for use intended.
- B. Chain-Link Fencing: Minimum 2-inch , 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- C. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- D. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.
- E. Lumber and Plywood: Comply with requirements in Division 6 Section."
- F. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.
- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- H. Paint: Comply with requirements in Division 9 Section "Painting."

- I. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- J. Water: Potable.

2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: Prefabricated or Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure and the requirements of the local Governing agency.
- D. Self-Contained Toilet Units: Single-occupant units of chemical or aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 - 3. If existing easements cannot be used, the Contractor shall consult and coordinate with the Consultant and Owner to secure, as necessary, the temporary easement. Add provisions for work not in the Contract but served by temporary facilities if required.
- B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
 - 1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 - 2. Connect temporary sewers to municipal system or private system indicated as directed by sewer department officials.
 - 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
 - 4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
 - 1. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe as required by Fire Marshall. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.
 - 2. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
 - 3. If required, provide pumps to supply a minimum of 30-psi static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at pressures required to operate the system.

- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 - 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Subparagraph below may be excessive for small- and medium-size projects.
 - 3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations as required. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 - 4. Drinking-Water Facilities: Provide drinking-water.

- E. Heating and Cooling: Provide temporary heating and cooling as required by construction activities.

- F. Ventilation and Humidity Control: Provide temporary ventilation as needed for curing or drying of completed installations or for protecting installed gas or other utility services if required for Project.

- G. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear as required.

- H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 2. Provide warning signs at power outlets other than 110 to 120 V.
 3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 4. Provide metal conduit enclosures or boxes for wiring devices.
 5. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions for the duration of the construction.
- J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.
1. At each telephone, post a list of important telephone numbers in Spanish and English.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Consultant's office.
 - e. Engineers' offices.
 - f. Owner Representative's office.
 - g. Principal subcontractors' field and home offices.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: If required, Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 2. Maintain support facilities until approved by the Consultant to be removed.
- B. Temporary Roads and Paved Areas: If applicable/as needed, construct and maintain temporary roads and paved areas to avoid damage to the site. Locate temporary roads and paved areas in same location as permanent roads and paved areas. If applicable,

extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

- C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs. The General Contractor shall provide one construction sign. The construction sign shall be installed within the first two weeks of construction and shall be removed when the project is substantially complete. The sign shall be as follows:
 - a) Project Name
 - b) Mecklenburg County Park and Recreation Department
 - c) Name of Contractor
 - d) *Plans and Specifications prepared by:*
 - e) *In case of Emergency, call: John Doe at 888-888-8888*
 - f) Letter sizes to be as shown on the detail. All lettering shall be Optima Semi-Bold typeface.
 - g) Location shall be approved by Consultant.
 - h) Sign shall be constructed of marine grade $\frac{3}{4}$ inch plywood, size per detail, 4x4 post(s). The sign shall be single-sided with the plywood on one side.
 - i) The colors:
 - Top Panel/Border-Pratt & Lambert Yale Blue
 - Middle Panel- Pratt & Lambert Silver Mink #2291
 - Bottom Panel- Pratt & Lambert Old Mystic #2286
 - All other letters- 3M White #7216
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with "Construction and Demolition Waste Management Recycling.
- F. Common-Use Field Office: If required, provide an insulated, weather tight, air-conditioned and heated field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved.

- H. Existing Elevator Usage: Use of Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Storm water Control: Comply as indicated on the erosion control plan/measures before any earth disturbing activities start.
- C. Tree and Plant Protection: Comply with the plans and specifications for protection.
- D. Pest Control: Comply with the plans and specifications for control. Delete paragraph and subparagraphs below for restricted city and urban sites where a combination fence and covered walkway or sidewalk bridge is used.
- E. Site Enclosure Fence: Install enclosure fence with lockable entrance gates. Locate where indicated on drawings, or if not indicated on drawings, enclose the entire Project site or portion determined sufficient to accommodate secured construction operations.
 - 1. Provide a minimum 6-ft high chain link style fence system. Erosion control fencing is not acceptable as site enclosure fencing for areas that need to be securely maintained.
 - 2. Set gate fence posts in concrete bases.
 - 3. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations. (A minimum of two personal gates.)
 - 4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys if requested.
- F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

- G. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- I. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- J. Temporary Fire Protection:
 - 1. Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 2. The Contractor shall maintain existing fire-protection facilities that are already in service for the duration of the project.
 - a. The Contractor shall protect all fire-detection devices to avoid damage and prevent false alarms.
 - 1) The Contractor shall be responsible for locating and protecting both visible and hidden devices.
 - 2) The Contractor shall be responsible for all work associated with cleaning and/or replacing any fire protection devices that trigger false alarms as a result of the construction process.
 - b. If the Contractor disables (zone-out) any fire detection devices over the course of the work, the Contractor shall be responsible for returning those devices to full service at the completion of the project.
 - c. If required, it shall be the responsibility of the Contractor to place an existing fire alarm into test mode. The Contractor shall return the fire alarm system to full service as soon as possible.
 - 1) If a functioning fire alarm system in an occupied building is put into test mode for any period of time, the Contractor shall be responsible

for paying the Owner's chosen security personnel to perform code required Fire Watches every hour for the entire building over the course of time that the fire alarm system is not fully functioning.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- B. Temporary Facility Changeover: Except for using permanent fire protection as soon as available. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1, of the Technical Specifications Section "Closeout Procedures."

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in Work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.

- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace or clean stored or installed material that begins to grow mold.
 7. Perform Work in a sequence that allows any wet materials an adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After the completion and sealing of the building weather-tight enclosure, but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a 48 hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Consultant.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

END OF SECTION 01 50 00

SECTION 01 50 50
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Owner has established that this Project shall include proactive measures for waste management participation by all parties to the contract.
1. The purpose of this program is to ensure that during the course of the Project all diligent means are employed to pursue practical and economically feasible waste management and recycling options.
 2. Upon award, each subcontractor shall be required to furnish documentation from suppliers or manufacturers regarding waste management and recycling options for those products and procedures furnished.
 3. Waste disposal to landfills shall be minimized.
- B. Definitions:
1. Waste: Any material that has reached the end of its intended use. Waste includes salvageable, returnable, recyclable and reusable material.
 2. Construction waste: Solid wastes including, but not limited to, building materials, packaging materials, debris, and trash resulting from construction operations.
 3. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
 4. Hazardous waste: Any material or byproduct of construction that is regulated by the Environmental Protection Agency and that may not be disposed in any landfill or other waste end-source without adherence to applicable laws.
 5. Trash: Any product or material unable to be returned, reused, recycled or salvaged.
 6. Landfill: Any public or private business involved in the practice of trash disposal.
 7. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site.

1.2 SUBMITTALS:

- A. Project Information:
 - 1. Contractor's Construction Waste Management Plan.

1.3 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. Waste Management Plan shall include the following:
 - 1. Solid Waste Disposal and Diversion document.
 - a. Identification of materials recycled.
 - b. Identification of materials landfill.
 - c. Identification of hazardous wastes and disposal.
 - 2. Locations of sorting and waste storage facilities on Site Plan of project.
 - 3. Final documentation of subcontractor/supplier waste management/recycling data.
 - 4. Final documentation of hazardous waste disposal plan.
- B. Construction Waste Management Plan Implementation:
 - 1. The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting the Waste Management Plan.
 - 2. The "Summary of Construction Waste/Recycling" shall be completed each month and submitted as part of Application For Payment.
 - a. All materials identified in the Summary shall be reported by weight.
 - b. Where weight is not applicable, Contractor shall report materials by units applicable to material recipient.
 - c. Contractor shall procure receipts or other validation of waste management procedures and include them as part of the submittal.
 - 3. The Contractor shall distribute copies of the "Summary of Construction Waste/Recycling" to the Consultant, Owner and each subcontractor involved in the plan.
 - 4. The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse and return methods to be used by all parties at appropriate stages of the Work.

5. Separation facilities:
 - a. Contractor shall define specific areas to facilitate separation of materials for recycling, salvage, re-use or return.
 - b. Recycle and waste bin areas are to be maintained in an orderly manner and clearly marked to avoid contamination of materials.
 - c. Do not mix recyclable materials.
 - d. Store hazardous wastes in secure areas.

6. Hazardous wastes:
 - a. Hazardous wastes shall be separated, stored and disposed of in accordance with local and EPA regulations and additional criteria listed below:
 - 1) Building products manufactured with PVC or containing chlorinated compounds shall not be incinerated.
 - 2) Disposal of fluorescent tubes to open containers is not permitted.
 - 3) Unused fertilizers shall not be co-mingled with construction waste.

- C. Program profits:
 1. All profits from recycling of construction waste shall be granted to the Contractor.

PART 2 - PRODUCTS: (NOT USED)

PART 3 - EXECUTION: (NOT USED)

END OF SECTION 01 50 50

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Alternates" for products selected under an alternate.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.

2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Consultant's Action: Consultant will respond in writing to Contractor within 15 days of receipt of completed product list. Consultant's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Consultant's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products to allow for inspection and measurement of quantity or counting of units.
 6. Store materials in a manner that will not endanger Project structure.

7. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

PART 2 - PRODUCTS: (NOT USED)

PART 3 - EXECUTION: (NOT USED)

END OF SECTION 01 60 00

SECTION 01 70 00
EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1, of the Technical Specifications Section "Submittal Procedures" for submitting surveys.
 - 3. Division 1, of the Technical Specifications Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 1, of the Technical Specifications Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 5. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.

1.3 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by land surveyor or professional engineer as required.

1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A licensed professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS: (NOT USED)

PART 3 - EXECUTION:

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility, Owner, and Consultant that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Consultant, Owner, adjacent property owners not less than **two** days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Consultant's and Owner's written permission.
- C. 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.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Consultant. Include a detailed description of problem encountered, together with recommendations for modifications of the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Consultant promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.

5. Notify Consultant when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
7. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
8. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, 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 and piers from two or more locations.
9. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Consultant.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 1. Do not change or relocate existing benchmarks or control points without prior written approval of Consultant. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Consultant before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to

regulations. Dispose of material in accordance to Division 1, Section “Construction Waste Management”.

- 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 according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean surfaces and similar features before applying paint or other finishing materials.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 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.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 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. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 70 00

SECTION 01 73 10 CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 7, of the Technical Specifications Section "Through-Penetration Fire stop Systems" for patching fire-rated construction.
 - 2. Divisions 2 through 48, of the Technical Specifications Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.>

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Matched-veneer woodwork.
 - e. Preformed metal panels.
 - f. Roofing.
 - g. Firestopping.
 - h. Window wall system.
 - i. Stucco and ornamental plaster.
 - j. Terrazzo.
 - k. Finished wood flooring.
 - l. Fluid-applied flooring.
 - m. Aggregate wall coating.
 - n. Wall covering.
 - o. Swimming pool finishes.
 - p. HVAC enclosures, cabinets, or covers.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of the Technical Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION:

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing 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.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. 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 existing 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. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. 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 possible. Provide materials and comply with installation requirements specified in other Sections of the Technical Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

END OF SECTION 01 73 10

SECTION 01 73 20 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of a building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Repair procedures for selective demolition operations.
- B. Technical Specifications the following:
 - 1. Division 1, of the Technical Specifications Section "Summary" for use of the premises and phasing requirements.
 - 2. Division 1, of the Technical Specifications Section "Work Restrictions" for restrictions on use of the premises due to Owner or tenant occupancy.
 - 3. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for preconstruction photographs taken before selective demolition.
 - 4. Division 1, of the Technical Specifications Section "Photographic Documentation" for preconstruction photographs taken before selective demolition.
 - 5. Division 1, of the Technical Specifications Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 6. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.
 - 7. Division 1, of the Technical Specifications Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
 - 8. Division 2, of the Technical Specifications Section "Building Demolition" for demolition of entire buildings, structures, and site improvements.
 - 9. **Division 26**, of the Technical Specifications Sections for demolishing, cutting, patching, or relocating electrical items.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
 - 1. Coordinate with Owner's archaeologist or historical adviser, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified.
- B. Proposed Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.

2. Interruption of utility services.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Locations of temporary partitions and means of egress.
 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.

1.7 PROJECT CONDITIONS

- A. Owner will/may occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 2. Before selective demolition, Owner will remove the following items:
 - a. <Insert items to be removed by Owner.>

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Consultant and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION:

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Consultant.
- E. The consultant shall be immediately notified during selective demolition if the Contractor determines that the removal of any element may result in a structural deficiency of any portion of the structure or adjacent structure.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 72 hours notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Pest Control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.
- C. 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.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

- Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 3. Protect existing site improvements, appurtenances, and landscaping to remain.
 4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- E. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- F. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- G. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations at the end of completion of selective demolition. Return adjacent areas to condition existing before selective demolition operations began.

3.5 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:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.

10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Existing Facilities: Comply with building manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries and other building facilities during selective demolition operations.
- C. Removed and Salvaged Items: Comply with the following:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area [on-site] [off-site] [designated by Owner] [indicated on Drawings].
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items: Comply with the following:
 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Consultant, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
- F. Concrete: Demolish in small sections. Cut concrete to a depth of at least **3/4 inch** at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- G. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- H. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- I. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

- J. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- K. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
- L. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Patching: Comply with Division 1 Section "Cutting and Patching."

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Property disposal of material according to Division 1, Section, Construction Waste Management.
- B. Burning: Do not burn demolished materials.

END OF SECTION 01 73 20

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project As-Built Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Instruction of Owner's personnel.
 - 6. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
 - 3. Division 1, of the Technical Specifications Section "Photographic Documentation" for submitting Final Completion.
 - 4. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.
 - 5. Division 1, of the Technical Specifications Section "Execution Requirements" for progress cleaning of Project site.
 - 6. Division 1, of the Technical Specifications Section "Project Record Documents".
 - 7. Division 1, of the Technical Specifications Section "Operation and Maintenance Data".
 - 8. Divisions 2 through 48, of the Technical Specifications Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: The Contractor shall, before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, "As-Builts" drawings, operation and maintenance manuals, Final Completion construction photographs and photographic negatives if required, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 15. Deliver all contractor security badges to the Owner at the end of the project.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Consultant, that must be completed or corrected before certificate will be issued. The Consultant's Substantial Completion list is composed by verification of the punch list submitted by the Contractor and any additional defects in the work observed by the Consultant.
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.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1, of the Technical Specifications Section "Payment Procedures."
 2. Submit certified copy of Consultant's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Consultant. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes if required.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. The Contractor shall take immediate steps to correct the stated deficiencies, and send a written notice to the Consultant, certifying the Project is complete, at which time the Consultant will re-inspect the Work. This review and additional reviews by the Consultant where the Work is not considered Substantial Completion or Final Completion will be considered an additional service from the Consultant. The Contractor will be charged for these additional services incurred by such failure including travel time, observation time, and administrative time at the Consultant's hourly rate, as well as all expenses associated with the distribution of a written notice stating the reasons for failure to reach final completion.
 3. In the event the Contractor is granted Substantial Completion by the Consultant and the Contractor fails to complete and/or correct all of the items listed in the Substantial Completion within **30** calendar days of the date of Substantial Completion, the liquidated damages shall start to accrue until all of the items on the Substantial Completion list are completed and/or corrected and have been approved by the Consultant.
 4. If the Consultant is required to make more than two inspections for the project to achieve Substantial Completion, the Contractor shall pay for the Consultant's time and expense.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. 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.
 - 1. Organize list of spaces in sequential order, use the room number as indicated on the drawings and on the exterior areas include a location diagram indicating the defects.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Consultant.
 - d. Name of Contractor.
 - e. Page number.

1.6 PROJECT RECORD DOCUMENTS

- A. The Contractor shall provide Project Record Documents, O&M, "As-Builts" Drawings, and Warranties as indicated in Division 1, of the Technical Specifications Section Project Record Documents. Use Division 1, of the Technical Specifications Section "Project Record Documents".

1.7 OPERATION AND MAINTENANCE MANUALS

- A. See Section "Operation and Maintenance Manuals" for additional information.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Consultant for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

- D. Provide copies of each warranty to include in operation and maintenance manuals.

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. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION:

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 10
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. As-Built Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications, Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 1, of the Technical Specifications, Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 2 through 16, of the Technical Specifications, Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

- A. As-Built Drawings: Comply with the following:
 - 1. Number of Copies: Submit two sets of marked-up As-Built Drawings to the Consultant for the Consultant to prepare the Record Drawings.
- B. Record Specifications: Submit two copies of Project's marked up Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit two copies of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

- A. As-Built Drawings: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark As-Built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up As-Built Drawings.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Consultant's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - o. Clarification Drawings.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

7. Identify and date each As-Builts Drawing; include the designation "PROJECT AS-BUILTS DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- B. Newly Prepared As-Built Drawings: Prepare new Drawings instead of preparing As-Built Drawings where Consultant determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting a substitution or other modification.
 2. Consult with Consultant for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared As-Built Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other sections of the Technical Specifications for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION:

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Consultant's reference during normal working hours.

END OF SECTION 01 78 10

SECTION 01 78 20
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation and Maintenance manuals for the care and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.
 - 3. Division 1, of the Technical Specifications Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 4. Divisions 2 through 50, of the Technical Specifications Sections for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Final Submittal: Submit four copies of each manual in final form at least 15 days before final inspection. Consultant will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Consultant's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Consultant's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Operations and Maintenance Manuals shall be organized in CSI format.
- B. Organization: Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- C. List of Systems and Subsystems: List systems alphabetically.
- D. List of Equipment: List equipment for each system, organized alphabetically by system.
- E. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- F. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.

- B. Title Page: Enclose title page to include the following information:
1. Name and address of Project.
 2. Name and address of Owner.
 3. Date of submittal.
 4. Name, address, and telephone number of Contractor and Subcontractors.
 5. Name and address of Consultant.
 6. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, model number, and serial number indexed to the content of the volume, and cross-referenced to of the Technical Specifications Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with reinforced tabs for each section. Mark each tab to indicate contents.
 3. If provided with the equipment, provide a Protective Plastic Sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch, white bond paper.
 5. Drawings: Attach reinforced, punched on drawings and bind in manual with associated text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION AND MAINTENANCE MANUALS

- A. Content: In addition to requirements in this section, include operation and maintenance data required in individual specification sections including source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list & source information, maintenance service contracts, warranty and bond information, and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. Re-ordering information for parts.
 11. Standard printed maintenance instructions and bulletins.
 12. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 13. Identification and nomenclature of parts and components.
 14. List of items recommended to be stocked as spare parts.
- B. Descriptions: Include the following:
1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Routine and normal operating instructions.
 3. Regulation and control procedures.
 4. Instructions on stopping.
 5. Normal shutdown instructions.
 6. Seasonal and weekend operating instructions.

7. Required sequences for electric or electronic systems.
 8. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
- F. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- G. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 4. Aligning, adjusting, and checking instructions.
 5. Demonstration and training videotape, and training manual if available.
 6. Inspection procedures.
 7. Types of cleaning agents to be used and methods of cleaning.
 8. List of cleaning agents and methods of cleaning detrimental to product.
 9. Schedule for routine cleaning and maintenance.
 10. Repair instructions.
- H. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- I. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- J. If “Maintenance Service Contracts” are required by Contract Documents, provide copies of maintenance agreements with name and telephone number of service agent.
- K. Warranties and Bonds: Include copies of warranties and bonds for each piece of equipment and lists of circumstances and conditions that would affect validity of warranties or bonds. Also, include the Contractor’s Warranty for the project.
 - 1. Include procedures required for notifications for warranty claims.

PART 3 - EXECUTION:

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

END OF SECTION 01 78 20

SECTION 01 82 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Division 1, of the Technical Specifications Section "Photographic Documentation" for preparing and submitting demonstration and training videotapes.

1.3 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Consultant.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment.
 - 1. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 2. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.

- h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
3. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
4. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
5. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

PART 3 - EXECUTION:

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times.
 1. Schedule training with Owner, through Consultant, with at least seven days' advance notice.
- C. Demonstration and Training Videotape: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 1. Comply with requirements in Division 1, of the Technical Specifications Section "Photographic Documentation."
 2. At beginning of each training module, record each chart containing learning objective and lesson outline.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 82 00

**SECTION 03-30-00
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete foundations for PV parking canopies.
- C. Concrete reinforcement.
- D. Concrete curing.

1.02 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- C. ACI PRC-223 - Shrinkage-Compensating Concrete - Guide; 2021.
- D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.
- F. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.
- G. ACI PRC-308 - Guide to External Curing of Concrete; 2016.
- H. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.
- N. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2023.
- O. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- P. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- Q. ASTM C157/C157M - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete; 2017.
- R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2023.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- T. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- U. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.
- V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- W. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2023, with Editorial Revision.
- X. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2023.
- Y. ASTM C845/C845M - Standard Specification for Expansive Hydraulic Cement; 2018.

- Z. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- AA. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2023.
- BB. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method); 2021.
- CC. ASTM C1582/C1582M - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete; 2011, with Editorial Revision (2017).
- DD. ASTM D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter; 2016a.
- EE. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete; 1992.

1.03 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 - Concrete Quality, Mixing and Placing.
 - 3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
 - 4. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
 - 5. Indicate proposed mix design complies with expansive component manufacturer's written recommendations.
- D. Test Reports: Submit report for each test or series of tests specified.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- B. Follow recommendations of ACI PRC-305 when concreting during hot weather.
- C. Follow recommendations of ACI PRC-306 when concreting during cold weather.
- D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.

1.05 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals for additional warranty requirements.
- B. Moisture Emission-Reducing Curing and Sealing Compound, Membrane-Forming: Provide warranty to cover cost of flooring delamination failures for 10 years.
 - 1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.
- C. Moisture Emission-Reducing Curing and Sealing Compound, Penetrating: Provide non-prorated warranty to cover cost of flooring delamination failures for 20 years.
 - 1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
 - 1. Form: Coiled Rolls.
 - 2. WWR Style: 4 x 8-W6 x W10.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.
 - 4. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- F. Structural Fiber Reinforcement: ASTM C1116/C1116M.
 - 1. Fiber Length: 2.5 inch, nominal.
 - 2. Fiber Type: Alkali-resistant synthetic.
- G. Expansive Component for Shrinkage-Compensating Concrete: Dry material for batch-plant or on-site production of shrinkage-compensating concrete; comply with ACI PRC-223, Type G.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.
- J. Shrinkage Reducing Admixture:
 - 1. ASTM C494/C494M, Type S.

- K. Shrinkage Compensating Admixture: For on site production of concrete with ASTM C845/C845M, Type K cement.
- L. Shrinkage Compensating Admixture with Fiber Reinforcement: For on site production of concrete with ASTM C845/C845M, Type K cement with integral fiber reinforcement.
- M. Corrosion Inhibiting Admixture:
 - 1. ASTM C494/C494M, Type C.
 - 2. ASTM C1582/C1582M.
- N. Porosity Inhibiting Admixture (PIA): Liquid, inorganic admixture free of volatile organic compounds (VOCs) and reactive silicates. Closes capillary systems formed during concrete curing to reduce moisture vapor emission and transmission. Reduces alkali silicate reaction (ASR) and concrete shrinkage with no adverse effect on concrete properties or applied flooring.
 - 1. Hydraulic Conductivity: $6 \times 10 \exp(-8)$ fps, minimum, when tested according to ASTM D5084.
 - 2. Concrete Shrinkage Reduction at 28 Days: 75 percent, minimum, when compared to mix design without PIA and both tested according to ASTM C157/C157M.
 - 3. ASR Reduction at 28 Days: 78 percent, minimum, when compared to mix design without PIA and both tested according to ASTM C1260.
- O. Moisture Vapor Reducing Admixture (MVRA): Liquid, inorganic admixture free of volatile organic compounds (VOCs). Closes capillary systems formed during concrete curing to reduce moisture vapor emission and transmission. Reduces concrete shrinkage with no adverse effect on concrete properties or applied flooring.
 - 1. Provide admixture in concrete for underground structures.
- P. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
 - 1. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.
 - 2. Permeability of Cured Concrete: No measurable leakage when tested in accordance with COE CRD-C 48 at 200 psi; provide test reports.
- Q. Integral Hardening Admixture: Dry powder added to concrete during batching.

2.05 ACCESSORY MATERIALS

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Height Change, Plastic State; when tested in accordance with ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.
 - 3. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 - 4. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
 - 5. Products containing aluminum powder are not permitted.

2.06 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
 - 1. Product dissipates within 4 to 6 weeks.
 - 2. Provide product containing fugitive red dye.
- C. Curing Agent, Water-Cure Equivalent Type: Clear, water-based, non-film-forming, liquid-water cure replacement agent.
 - 1. Comply with ASTM C309 standards for water retention.
 - 2. Compressive Strength of Treated Concrete: Equal to or greater than strength after 14-day water cure when tested in accordance with ASTM C39/C39M.
 - 3. VOC Content: Zero.

2.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.
- D. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.
- E. Normal Weight Concrete:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 3. Water-Cement Ratio: Maximum 40 percent by weight.
 4. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
 5. Maximum Slump: 3 inches.
 6. Maximum Aggregate Size: 5/8 inch.

2.08 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.
- C. Do not use shrinkage-reducing admixture (SRA) in same concrete batch with MVRA or PIA.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete with shrinkage-compensating expansive component in accordance with ACI PRC-223.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, and embedded parts will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.06 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

3.07 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than seven days.
 - 2. High early strength concrete: Not less than four days.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - a. Spraying: Spray water over floor slab areas and maintain wet.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01-40-00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- H. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.
- I. Permeability Test: Test concrete with waterproofing admixture according to COE CRD-C 48.

3.09 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 03-30-00

SECTION 05-43-00
SLOTTED CHANNEL FRAMING

PART I – GENERAL

1.01 SUMMARY

- A. Framing shall be a strut type metal framing system (Strut System)
- B. Strut System shall be used:
 - 1. To support mechanical and electrical equipment and devices.
 - 2. For structural applications as applicable.
- C. Strut System and components must be supplied from a single approved Manufacturer.

1.02 QUALITY ASSURANCE

- A. Manufacturer's qualifications:
 - 1. The manufacturer shall have at least 10 years experience in manufacturing Strut Systems.
 - 2. The manufacturer must certify in writing all components supplied have been produced in accordance with an established quality assurance program.
- B. Work shall meet the requirements of the following standards:
 - 1. Federal, State and Local codes
 - 2. American Iron and Steel Institute (AISI) Specification for the Design of ColdFormed Steel Structural Members 2001 Edition
 - 3. American Society for Testing And Materials (ASTM)
 - 4. Metal Framing Manufacturer's Association (MFMA)

1.03 SUBMITTALS

- A. Structural calculations by a Registered Professional or Structural Engineer in the State of the Project's location for approval by the Professional of Record. Calculations may include, but are not limited to:
 - 1. Description of design criteria
 - 2. Stress and deflection analysis
 - 3. Selection of framing members, fittings, and accessories
- B. Assembly drawings necessary to install the Strut System in compliance with the Contract Drawings
- C. Pertinent manufacturers published data

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All material is to be delivered to the work site in original factory packaging to avoid damage to the finish.
- B. Upon delivery to the work site, all components shall be protected from the elements by a shelter or other covering.

1.05 WARRANTY

- A. Manufacturer shall warrant for 1 year from the shipment date that products will be free from defects in material or manufacture. In the event of any such defect in violation of the warranty, Manufacturer shall have the option to repair or replace any such defective product.
- B. Installer shall warrant for 1 year from the date of completion of work that the work will be free of defects in installation. In the event of any such defect in violation of the warranty, Installer shall have the option to repair or replace any such defective product.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Basis of Design: UNISTRUT; Unistrut International 16100 S. Lathrop Ave. Harvey, IL 60426 Phone: 708-339-1610 800-882-5543 Fax: 708-339-7814; www.unistrut.com

B. Substitutions: See Section 01-60-00-Product Requirements

2.02 MATERIALS

A. All channel members shall be fabricated conforming to one of the following ASTM specifications:

1. Plain Carbon Steel: A 1011 SS Grade 33
2. Pre-Galvanized Carbon Steel: A 653 Grade 33
3. UNISTRUT DEFENDER™: A 1046 SS Grade 33
4. Stainless Steel: A 240 (Type 304)
5. Aluminum: B 221 (Type 6063-T6)

B. All fittings shall be fabricated conforming to one of the following ASTM specifications:

1. Carbon Steel: All carbon steel fittings shall be fabricated from steel that meets/exceeds the physical requirements of ASTM A1011 SS Grade 33 and conforms to one of the following ASTM specifications:
 - a. A 575
 - b. A 576
 - c. A 36
 - d. A 635
 - e. A 1059
 - f. A 1046
2. Stainless Steel:
 - a. A 240 (Type 304 or Type 316)
 - b. A 276 (Type 304 or Type 316)

C. Any substitutions of product or manufacturer must be approved in writing ten days prior to bid date by the Professional of Record.

2.03 FINISHES

A. FACTORY PAINTED

1. Channel
 - a. Rust inhibiting thermoset acrylic enamel paint applied by electrodeposition after cleaning and phosphating, and thoroughly baked.
2. Fittings
 - a. Polyester powder coat after cleaning and phosphating, and thoroughly baked.
3. Color shall be FHWA Highway Green, Color Tolerance Chart, PR Color No. 4
4. Hardness = 2H
5. Performance
 - a. Salt Spray per ASTM B117
 - (1) Scribed: Exceed 400 hours
 - (2) Unscribed: Exceed 600 hours
 - b. Nominal chalking at 1,000 hours per weatherometer G-23 test
 - c. No checking at 1,000 hours per weatherometer G-23 test

B. ELECTRO-GALVANIZED per ASTM B 633 Type III SC 1

C. PRE-GALVANIZED per ASTM A653

- 1. Zinc coated by hot-dipped process prior to roll forming at the steel mill
- 2. Zinc coating thickness shall be G90 (0.75 mil = 0.45 oz./ sq. ft. surface area)

D. HOT-DIPPED GALVANIZED per ASTM A123 or A153

- 1. Zinc coated after all manufacturing operations are complete
- 2. Zinc coating thickness shall be G65 (2.6 mils = 1.50 oz./ sq. ft. surface area)

E. UNISTRUT DEFENDER™ per ASTM A1046 and A1059

- 1. Strut coated per A1046 to a mass of 0.45 oz./ sq. ft. surface area
- 2. Fittings coated per A1059 to a thickness of 30 microns and/or A1046 to a mass of 0.45 oz./sq. ft. surface area

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The installer shall inspect the work area prior to installation. If work area conditions are unsatisfactory, installation shall not proceed until satisfactory corrections are completed.

3.02 INSTALLATION

- A. Installation shall be accomplished by a fully trained manufacturer authorized installer.
- B. Set Strut System components into final position true to line, level and plumb, in accordance with approved drawings.
- C. Anchor material firmly in place, and tighten all connections to their recommended torques.

3.03 CLEANUP

- A. Upon completion of this section of work, remove all protective wraps and debris. Repair any damage due to installation of this section of work.

3.04 PROTECTION

- A. During installation, it shall be the responsibility of the installer to protect this work from damage.
- B. Upon completion of this scope of work, it shall become the responsibility of the general contractor to protect this work from damage during the remainder of construction on the project and until substantial completion.

END OF SECTION 05-43-00

SECTION 07-54-00
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic roofing membrane.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing; 2021.
- C. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).
- D. NRCA (RM) - The NRCA Roofing Manual; 2024.
- E. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.03 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C. Shop Drawings: Submit drawings that indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Warranty Documentation:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's written verification that installation complies with warranty conditions for waterproof membrane.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact, unless otherwise indicated.
- B. Store materials in weather protected environment, clear of ground and moisture.
- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.06 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above ____ degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.07 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within five years after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 20 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.
 - 3. Exceptions are not Permitted:

1.08 EXISTING ROOF WARRANTY

- A. Existing roof warranty; GAF Guarantee No. G2014-00004758 and dated July 28, 2014 is attached at the end of this section.
- B. GAF Technical Advisory Bulletin "Solar Installations and GAR Guaranteed Roofing Systems Guidelines" is attached behind the existing warranty. Contracto shall follow all provisions for adding a PV system to an existing GAF EverGuard roof.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials:
 - 1. GAF; EverGuard Extreme TPO 80 mil: www.gaf.com/#sle.
 - 2. Substitutions: Not permitted.

2.02 ROOFING

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered.
- B. Roofing Assembly Requirements:
 - 1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980.
 - a. Field applied coating may not be used to achieve specified SRI.

2.03 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

- A. Membrane Roofing Materials:
 - 1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrims.
 - a. Thickness: 80 mil, 0.080 inch, minimum.
 - 2. Sheet Width:
 - a. Adhered Application: Limit width to 120 inches, maximum, when ambient temperatures are less than 40 degrees F for extended period of time during installation.
 - 3. Color: White.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Membrane Fasteners: As recommended and approved by membrane manufacturer.
- D. Flexible Flashing Material: Same material as membrane.

2.04 ACCESSORIES

- A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- B. Membrane Adhesive: As recommended by membrane manufacturer.
- C. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
 - 1. Composition: Roofing membrane manufacturer's standard.
 - 2. Size: 18 by 18 inches.
 - 3. Surface Color: White.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 INSTALLATION, GENERAL

- A. Perform work in accordance with manufacturer's instructions, NRCA (RM), and NRCA (WM) applicable requirements.
- B. Do not apply roofing membrane during cold or wet weather conditions.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.03 INSTALLATION - MEMBRANE

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate of ___ gallons per square foot. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Coordinate installation of roof drains and sumps and related flashings.

3.04 FIELD QUALITY CONTROL

- A. See Section 01-40-00 - Quality Requirements for additional requirements.
- B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing in accordance with requirements.
- C. Provide daily on-site attendance of roofing manufacturer's representative during installation of this work.

3.05 CLEANING

- A. See Section 01-70-00 - Execution and Closeout Requirements for additional requirements.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.06 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07-54-00



EverGuard® DIAMOND PLEDGE™ NDL ROOF GUARANTEE

No. G2014-00004758OWNER: CHARLOTTE MECKLENBURG SENIOR CENTERS INC., PERIOD OF COVERAGE: 20 YEARSNAME AND TYPE OF BUILDING: CHARLOTTE MECKLENBURG SENIOR CENTERSADDRESS OF BUILDING: 2225 TYVOLA ROAD, CHARLOTTE, NC 28210ROOF SPECIFICATION: TFATI60 AREA OF ROOF: 120.00 SQUARESAPPLIED BY: RADCO CONSTRUCTION SERVICES INC / MOUNT HOLLY, NCDATE OF COMPLETION: 07/28/2014 GUARANTEE EXPIRATION DATE: 07/28/2034

THE GUARANTEE/SOLE AND EXCLUSIVE REMEDY

GAF guarantees to you, the original owner of the building described above, that GAF will provide "Edge To Edge" protection by repairing leaks through the GAF roofing membrane, liquid-applied membrane or coating, base flashing, high wall waterproofing flashing, insulation, expansion joint covers, prefashed accessories, and metal flashings used by the contractor of record that meet SMACNA standards (the "GAF Roofing Materials") resulting from a manufacturing defect, ordinary wear and tear, or workmanship in applying the GAF Roofing Materials.

There is no dollar limit on covered repairs. Leaks caused by any materials other than those listed above, such as the roof deck, non-GAF insulation, or any other materials used in the construction of the roof system, are not covered.

GUARANTEE PERIOD

This guarantee ends on the expiration date listed above. **NOTE:** Lexsuco® flashings are covered by this guarantee **ONLY** for the first ten years.

OWNER RESPONSIBILITIES

Notification of Leaks

In the event of a leak through the GAF Roofing Materials, you **MUST** make sure that GAF is notified directly about the leak, in writing, within **30 days** by email (preferred) at guaranteeleak@gaf.com or by postal mail to GAF Guarantee Services, 1361 Alps Road, Bldg. 11-1, Wayne, New Jersey 07470, or GAF will have no responsibility for making repairs. **NOTE:** The roofing contractor is **NOT** an agent of GAF; notice to the roofing contractor is **NOT** notice to GAF.

By notifying GAF, you authorize GAF to investigate the cause of the leak. If the investigation reveals that the leak is not covered by this guarantee, you agree to pay an investigation cost of \$500. This guarantee will be cancelled if you fail to pay this cost within 30 days of receipt of an invoice for it.

Preventative Maintenance and Repairs

- You must perform regular inspections and maintenance and keep records of this work.
- To keep this guarantee in effect, you must repair any conditions in the building structure or roofing system that are not covered by this guarantee but that GAF concludes may be threatening the integrity of the GAF Roofing Materials (e.g., porous walls allowing water entry into the roofing system).
- You may make temporary repairs to minimize damage to the building or its contents in an emergency, at your sole expense. These repairs will not result in cancellation of the guarantee as long as they are reasonable and customary and do not result in permanent damage to the GAF Roofing Materials.
- Any equipment or material that impedes any inspection or repair must be removed at your expense so that GAF can perform inspections or repairs.

EXCLUSIONS FROM COVERAGE

(e.g., items that are not "ordinary wear and tear" or are beyond GAF's control)

This guarantee does **NOT** cover conditions other than leaks. This guarantee also does **NOT** cover leaks caused by any of the following:

- Inadequate roof maintenance, that is, the failure to follow the Scheduled Maintenance Checklists provided with this guarantee (extra copies available by calling Guarantee Services at 1-800-ROOF-411).
- Unusual weather conditions or natural disasters including, but not limited to, windstorms, hail, floods, hurricanes, lightning, tornadoes, and earthquakes, unless specifically covered under this guarantee.
- Damage to the roof constructed of the GAF Roofing Materials due to: (a) movement or cracking of the roof deck or building; (b) improper installation or failure of any non-GAF insulation or materials; (c) infiltration or condensation of moisture through or around the walls, copings, building structure, or surrounding materials except where high wall GAF waterproofing flashings are installed; (d) chemical attack on the membrane, including, but not limited to, exposure to grease or oil; (e) the failure of wood nailers to remain attached to the structure; or (f) use of materials that are incompatible with the GAF Roofing Materials.
- Traffic of any nature on the roof unless using GAF walkways applied in accordance with GAF's published application instructions.
- Blisters in the GAF Roofing Materials that have not resulted in leaks.
- Changes in the use of the building or any repairs, modifications, or additions to the GAF Roofing Materials after the roof is completed, unless approved in writing by GAF.
- Exposure to sustained high-temperature conditions; however, for systems utilizing EverGuard Extreme® TPO membrane, exposure in excess of 195°F.
- Any condition (e.g., base flashing height or lack of counter flashing) that is not in accordance with GAF's published application instructions, or any deviation or modification from any published specification, unless specifically authorized by a GAF Field Services Manager or Director in writing.

No representative, employee, or agent of GAF, or any other person, has the authority to assume any additional or other liability or responsibility for GAF, unless it is in writing and signed by an authorized GAF Field Services Manager or Director. **NOTE:** Any inspections made by GAF are limited to a surface inspection only, are for GAF's sole benefit, and do not constitute a waiver of any of the terms and conditions of this guarantee.

This guarantee **MAY BE SUSPENDED OR CANCELLED IF THE ROOF IS DAMAGED BY any cause listed above as AN EXCLUSION FROM COVERAGE** that may affect the integrity or watertightness of the roof.

TRANSFERABILITY

You may transfer or assign this guarantee to a subsequent owner of this building for the remaining term only if: 1) the request is in writing to GAF at the address listed below within 60 days after ownership transfer; 2) you make any repairs to the GAF Roofing Materials or other roofing or building components that are identified by GAF after an inspection as necessary to preserve the integrity of the GAF Roofing Materials; and 3) you pay an assignment fee of \$500. This guarantee is **NOT** otherwise transferable or assignable by contract or operation of law, either directly

or indirectly.

LIMITATION OF DAMAGES; MEDIATION; JURISDICTION; CHOICE OF LAW

THIS GUARANTEE IS EXPRESSLY IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, and of any other obligations or liability of GAF, whether any claim against it is based upon negligence, breach of warranty, or any other theory. In NO event shall GAF be liable for any CONSEQUENTIAL OR INCIDENTAL DAMAGES of any kind, including, but not limited to, interior or exterior damages and/or mold growth.

The parties agree that, as a condition precedent to litigation, any controversy or claim relating to this guarantee shall be first submitted to mediation before a mutually acceptable mediator. In the event that mediation is unsuccessful, the parties agree that neither one will commence or prosecute any lawsuit or proceeding other than before the appropriate state or federal court in the State of New Jersey. This guarantee shall be governed by the laws of the State of New Jersey, without regard to principles of conflicts of laws. Each party irrevocably consents to the jurisdiction and venue of the above identified courts.

NOTE: This guarantee becomes effective only when all bills for installation and supplies have been paid in full to the roofing contractor and materials suppliers, and the guarantee charge has been paid to GAF.

This guarantee must have a raised seal to be valid.

GAF
1361 ALPS ROAD
WAYNE, NJ 07470

By: 
Authorized Signature

09/18/2014

Date

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COMTS700A



We
protect
what
matters
most™

Technical Advisory Bulletin

To: GAF Commercial Sales, GAF Contractors, Field Services, AIS, CARE

From: Technical Services Department

No: TAB-C-01

Solar Installations & GAF Guaranteed Roofing Systems Guidelines

*Can Solar
Systems Be
Installed On GAF
Guaranteed
Roofing
Systems?*

Yes! We recognize that many property owners are investing in photovoltaic systems as an alternative energy source and most often these systems are installed on the rooftop.

- The requirements to maintain or obtain guarantee coverage vary; depending on whether the photovoltaic (PV) system is being installed on an existing GAF guaranteed system or is included in a new roofing project.

*For PV System
Installations On
An Existing GAF
Guaranteed
Roofing
System...*

For PV system installations on an existing GAF guaranteed roofing system, these steps must be followed:

1. **An initial inspection** of the existing roofing system must be performed by GAF Field Services to assess the condition of the roof. The fee for this inspection is \$600.
2. **Shop drawings** of the PV system layout and installation specifics must be provided to GAF for our guarantee records, including **all flashing details** that will be used to install the PV system. **NOTE: GAF does not approve mounting systems; GAF only reviews the flashings to be incorporated into the GAF Guaranteed roofing system. GAF reserves the right to decline coverage** where it believes that the installation may be deleterious to the long-term performance of the GAF roofing system.
3. **Any repairs/modifications to the existing roof system** identified by GAF Field Services must be done at the owner's cost prior to the installation of the PV system.
4. **An inspection of the roofing system must be completed by GAF Field Services after the installation of the PV system** and any deficiencies/damage caused by the installation must be repaired. *The fee for this inspection is \$600.*
5. GAF reserves the right to require additional inspections as necessary to ensure that our requirements are met. *The fee for any re-inspection is \$600.*
6. After all requirements are met and fees paid, GAF will issue an addendum to the guarantee confirming coverage of the GAF products installed on the roof, subject to all terms and conditions set forth in the guarantee.

*For PV System
Installations On
A New GAF
Guaranteed
Roofing
System...*

For PV system installations as a part of a new GAF guaranteed roofing system, use the following steps:

1. **Shop drawings** of the PV system layout and installation specifics must be provided to GAF for our guarantee records, including **all flashing details** that will be used to install the PV system. **NOTE: GAF does not approve mounting systems; GAF only reviews the flashings to be incorporated into the proposed GAF Guaranteed roofing system. GAF reserves the right to decline coverage** where it believes that the installation may be deleterious to the long-term performance of the GAF roofing system.

2. **GAF must conduct its final inspection of the GAF roofing system PRIOR TO the installation of the PV system...** if this inspection is not completed; guarantee issuance may not be possible.
3. An additional inspection of the roofing system must be completed by GAF Field Services after the installation of the PV system and any deficiencies/damage caused by the installation must be repaired. *The fee for this inspection is \$600.*
4. GAF reserves the right to require additional inspections as necessary to ensure that our requirements are met. *The fee for any re- inspection is \$600.*
5. After all requirements are met and fees paid, GAF will issue an addendum with the guarantee confirming coverage of the GAF products installed on the roof, subject to all terms and conditions set forth in the guarantee.

Note: Recover applications are not allowed on Extended-length Guarantees (greater than 20 years).

What About "Thin Film" PV Installations?

Because temperatures directly under the PV film will far exceed the in-service temperature of a TPO membrane, **do not install these films directly to a thermoplastic membrane that has not been specifically formulated for such elevated temperatures (EverGuard Extreme® TPO has been specifically formulated for these temperatures).**

- GAF will not issue any type of product or system guarantee for this type of installation unless EverGuard Extreme® TPO membrane is used and GAF has approved the adhesive for the PV panel/film prior to the installation. If there are areas of the roof that are separated from the PV installation, GAF may, in its discretion, provide warranty or guarantee coverage for the GAF products installed in those separated areas.

Questions?

GAF Technical Services Can Assist You... with these and other questions you may have regarding your new roof installation. Technical Support Services can be contacted at 800-766-3411. The GAF website is a great resource for just about any question you may have or for additional information you may require. Please visit www.gaf.com to find the latest information on our products and their installation.

Important: This document supersedes any prior GAF Technical Advisory Bulletins on this topic. Please always check www.gaf.com to make sure you have the most up to date information.

**SECTION 07-62-00
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including exterior penetrations.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- F. CDA A4050 - Copper in Architecture - Handbook; current edition.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with PVDF coating.
 - 1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
- C. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with silicone modified polyester coating.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

2.03 FLASHING

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be

installed.

2.04 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.04 FIELD QUALITY CONTROL

- A. See Section 01-40-00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07-62-00

**SECTION 07-72-00
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-penetrating pedestals.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

1.03 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
 - 1. Non-penetrating Rooftop Supports: Submit design calculations for loadings and spacings.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01-74-19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store products under cover and elevated above grade.

1.05 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for non-penetrating roof supports. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within 5-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 NON-PENETRATING ROOFTOP SUPPORTS/ASSEMBLIES

- A. Non-Penetrating Rooftop Support/Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, and not requiring any attachment to roof structure and not penetrating roofing assembly.
 - 1. Design Loadings and Configurations: As required by applicable codes.
 - 2. Height: Provide minimum clearance of 6 inches under supported items to top of roofing.
 - 3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - 5. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
 - 6. Products:
 - a. Garlock Safety Systems: www.garlocksafety.com/#sle.

- b. Green Link, Inc: www.greenlinkengineering.com/#sle.
- c. PHP Systems/Design: www.phpsd.com/#sle.
- d. Dura-Blok; www.eaton.com.
- e. Substitutions: See Section 01-60-00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. See Section 01-70-00 - Execution and Closeout Requirements for additional requirements.
- B. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07-72-00

SECTION 07-92-00 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01-61-16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.

1.04 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Executed warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.06 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
- B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.
 - 1. Lap Joints between Manufactured Metal Panels: Butyl rubber, noncuring.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01-61-16.

2.03 NONSAG JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus 100 percent and minus 50 percent, minimum.
 - 2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Color: Match adjacent finished surfaces.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: Match adjacent finished surfaces.
- C. Type ___ - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
- D. Type ___ - Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.

2.04 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION 07-92-00

SECTION 10-73-16.13
METAL CANOPIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Freestanding metal canopies.

1.02 RELATED REQUIREMENTS

- A. Section 03-30-00 - Cast-in-Place Concrete: Concrete footings.

1.03 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2022.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- F. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- G. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- H. ASTM E2950 - Standard Specification for Metal Canopy Systems; 2014 (Reapproved 2020).
- I. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.
- J. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.
- K. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- M. ITS (DIR) - Directory of Listed Products; Current Edition.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit product data sheets, including material descriptions and finishes, and preparation instructions and recommendations.
- C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing profiles, sections of components, finishes, and fastening details.
- D. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Erector's Qualification Statement.
- H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in North Carolina.
 - 1. Comply with applicable code for submission of design calculations as required for acquiring permits.
 - 2. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.
- B. Perform steel work in accordance with AISC 303.
- C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
 - 1. Not less than three years of documented experience.
- D. Erector Qualifications: Company specializing in performing the work of this section.
 - 1. Not less than three years of documented experience and approved by canopy manufacturer.
- E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.
- B. Package using methods that prevent damage during shipping and storage on site.
- C. Store materials under cover and elevated above grade.

1.07 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals for additional warranty requirements.
- B. Metal Canopies: Correct defective work within a two year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's one year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 METAL CANOPIES

- A. Shop Fabricated Steel Canopy
 - 1. Pre-engineered steel system complying with ASTM E2950.
- B. Configuration: Layout and dimensions, column layout, canopy clearance, and roof covering design as indicated on drawings.
 - 1. Installation: Freestanding.
 - 2. Column Anchorage: Column baseplates installed with anchor bolts or expansion anchors into concrete footing, slab, or pier.
 - 3. Structural Framing System: Steel.
- C. Performance Requirements:
 - 1. Design and fabricate metal canopy system to resist wind, snow, and live loads without failure, damage, or permanent deflection in accordance with ASCE 7:
 - a. Wind: 24.5 psf positive, -25.9 psf negative; minimum.
 - b. Snow: 12 psf; minimum.
 - c. Live: 20 psf; minimum.
 - 2. Thermal Movement: Design canopy system to accommodate thermal movement caused by ambient temperature range of 120 degrees F and surface temperature range of 180 degrees F without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects on assembly components.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction and installed in compliance with NFPA 70, and marked for intended application.

2.02 COMPONENTS

- A. Structural Steel Framing:
 - 1. Columns: ASTM A500/A500M, Grade B, round or rectangular tubing, sized to suit project design load requirements.
 - 2. Base and Top Plates: ASTM A36/A36M, with pre-drilled bolt holes.
 - 3. Beams: Wide flange, ASTM A572/A572M Grade 50.

- 4. Other Structural Steel Members: ASTM A36/A36M.
- B. Covering:
 - 1. Photovoltaic panels. See Section 26-31-00.
- C. Anchor Bolts: ASTM A307 or ASTM A572/A572M, formed with bent shank, assembled with template for casting into concrete.
 - 1. Minimum exposed thread of 7 inches above footing and 23 inch minimum embedment.
 - 2. Provide nuts and washers as required for column leveling and plumbing.
- D. Concrete Footings: Refer to Section 03-30-00 for additional requirements.

2.03 SHOP FABRICATION

- A. Provide a complete system ready for erection at project site.
- B. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.
- C. Weld steel members in accordance with AWS D1.1/D1.1M.
- D. Fabricate connections for bolt, nut, and washer connectors.

2.04 FINISHES

- A. Structural Steel Framing:
 - 1. Shop Primer: Rust-inhibitive red oxide.

2.05 ACCESSORIES

- A. Structural Bolts: ASTM F3125/F3125M, Grade A325, minimum 3/4 inch diameter.
- B. Trim, Closure Pieces, and Flashings: Same material, thickness and finish as sheet metal decking; factory-fabricated to required profiles.
 - 1. Exposed Fasteners: Same finish as panel system.
- C. Grout: ASTM C1107/C1107M; non-shrinking; premixed compound consisting of non-metallic aggregate, cement, water-reducing and plasticizing agents.
- D. Fasteners, Non-Structural: ASTM F593 stainless steel or ASTM A307 carbon steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Verify that foundation, electrical utilities, and placed anchors are in correct position.
- C. Verify that bearing surfaces are ready to receive this work.
- D. Do not proceed with installation until all conditions are satisfactory.

3.02 INSTALLATION - FRAMING

- A. Erect framing in accordance with AISC 303.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Fasten columns to anchor bolts.
- E. Do not field cut or alter structural members without approval.
- F. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 INSTALLATION - CANOPY COVERING

- A. Install in accordance with manufacturer's instructions.
- B. Fasten metal decking to metal support members, aligned level and plumb.
- C. Install trim and flashing.
- D. Separate dissimilar metals using concealed bituminous paint.
- E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 TOLERANCES

- A. Maximum Variation from Level: Plus/Minus 1/8 inch.

3.05 CLEANING

- A. Clean surfaces of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.06 PROTECTION

- A. Protect canopy after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION 10-73-16.13

SECTION 26-00-10
SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Supplemental requirements generally applicable to the Work specified in Division 26.
- This Section is also referenced by related Work specified in other Divisions.

1.02 REFERENCES

1.03 COORDINATION

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.
 - 3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:
 - a. Exercising generators.
 - b. Emergency lighting.
 - c. Fire-alarm systems.
- B. Arrange to provide temporary electrical service or power in accordance with requirements specified in Division 01.

1.04 ACTION SUBMITTALS

- A. Coordination Drawings for Conduit Routing: 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.
- B. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- C. Coordination Drawings for Large Equipment Outdoor Installations:
 - 1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:
 - a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
 - b. Indicate clear dimensions for fence gates and wall openings.
 - c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
 - d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
 - e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways.
 - f. Dimensioned working clearances and dedicated areas around electrical equipment.
- D. Coordination Drawings for Duct Banks:
 - 1. Show duct profiles and coordination with other utilities and underground structures.
 - 2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

1.05 FIELD CONDITIONS

- A. Seismic Hazard Design Loads:
 - 1. Unless otherwise indicated on Contract Documents, specified Work must withstand seismic hazard design loads determined in accordance with requirements specified in this Section, adjusted for installed elevation above or below grade.
 - a. The term "withstand" means "unit must remain in place without separation of parts from unit when subjected to specified seismic hazard design loads and unit must be fully operational after seismic event."

2. Calculation Factors, ASCE/SEI 7-05, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-05 unless otherwise indicated.

B. Altitude:

1. Sea level to 1000 ft. (300 m).

C. Ambient Temperature:

1. Outdoor: 0° F -110° F Insert requirements.

D.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

3.01 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

3.02 CLOSEOUT ACTIVITIES

A. Demonstration:

1. Demonstrate to Owner's maintenance and clerical personnel and building occupants how to operate the following systems and equipment:

- a. INVERTERS
- b. BAS

END OF SECTION 26-00-10

SECTION 26-05-19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Copper building wire.
 - 2. Aluminum building wire.
 - 3. Metal-clad cable, Type MC.
 - 4. Armored cable, Type AC.
 - 5. Photovoltaic cable, Type PV, rated 2000 V or less.
 - 6. Connectors and splices.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.03 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE

- A. Retain this article to specify allowable types of copper building wire. Separate articles are included in the Specification for aluminum building wire, Type AC cable (copper and aluminum), Type MC cable (copper and aluminum), and Type PV cable.
- B. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Alpha Wire Company.
 - 2. American Bare Conductor.
 - 3. Belden Inc.
 - 4. Cerro Wire LLC.
 - 5. Encore Wire Corporation.
 - 6. General Cable; Prysmian Group North America.
 - 7. Okonite Company (The).
 - 8. Service Wire Co.
 - 9. Southwire Company, LLC.
 - 10. WESCO.
 - 11. Approved Equal.
- D. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. See the Evaluations for discussion of UL's "Wire and Cable Marking and Application Guide."
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- E. First option in "Conductors" Paragraph below is standard for most conductors. Second option is specific to Type TC-ER cables or larger conductors requiring compact stranding.
- F. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- G. Common insulation types are described below; however, numerous other insulation types and flame-resistance options are available. Coordinate with Drawings.
- H. Conductor Insulation:
 - 1. Type THHN and Type THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.
- I. Shield:

2.02 ALUMINUM BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn aluminum current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

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

1. Alpha Wire Company.
2. American Bare Conductor.
3. Belden Inc.
4. Cerro Wire LLC.
5. Encore Wire Corporation.
6. General Cable; Prysmian Group North America.
7. Okonite Company (The).
8. Southwire Company, LLC.
9. WESCO.
10. Approved equal

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Aluminum, complying with ASTM B800 and ASTM B801.

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

2.03 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit and multicircuit with color-coded conductors.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

G. Armor: Steel Aluminum, interlocked.

2.04 ARMORED CABLE, TYPE AC

A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 4.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit and multicircuit with color-coded conductors.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation: Type THHN/THWN-2. Comply with UL 83.

G. Armor: Steel Aluminum, interlocked.

2.05 TRAY CABLE, TYPE TC

A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in a nonmetallic jacket.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. Comply with UL 1277.
 3. Comply with ICEA S-73-532/NEMA WC 57 for Type TC cables used for control, thermocouple extension, and instrumentation.
 4. Comply with ICEA S-95-658/NEMA WC 70 for Type TC cables used for power distribution.
 5. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors and Aluminum, complying with ASTM B800 and ASTM B801.
- D. Ground Conductor: Insulated.
- E. Conductor Insulation: Type XHHW-2. Comply with UL 44.
- F. Shield: None.

2.06 PHOTOVOLTAIC CABLE, TYPE PV

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V.
- B. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. RoHS compliant.
 3. See the Evaluations for discussion of UL's "Wire and Cable Marking and Application Guide."
- C. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation: Comply with UL 44 and UL 4703.

2.07 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. 3M Electrical Products.
 2. ABB, Electrification Business.
 3. AFC Cable Systems; Atkore International.
 4. Gardner Bender.
 5. Hubbell Utility Solutions; Hubbell Incorporated.
 6. Ideal Industries, Inc.
 7. ILSCO.
 8. NSi Industries LLC.
 9. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
 10. Service Wire Co.
 11. TE Connectivity Ltd.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
1. Material: Copper Aluminum.
 2. Type: One hole with standard barrels.
 3. Termination: Crimp.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders:
1. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:
1. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway.

- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Coordinate "Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground" Paragraph below with Section 260543 "Underground Ducts and Raceways for Electrical Systems."
- E. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway.
- F. Feeders in Cable Tray: Type THHN-THWN, single conductors in accordance with NFPA 70, Type TC cable.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway Armored cable, Type AC Metal-clad cable, Type MC.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway.
- J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.
- K. PV Circuits: Type USE-2 for PV source circuits rated at 600 V or less.
- L. PV Circuits: Type PV for PV source circuits rated at 600 V.

3.03 INSTALLATION, GENERAL

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Install plenum cable in environmental airspaces, including plenum ceilings.
- C. 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.
- D. 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.
- E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- F. Install conduits and cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- G. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.04 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 inch (150 mm) of slack.

3.05 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.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.07 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.08 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.

- 2) Calibrated torque wrench.
- 3) Thermographic survey.
- c. Inspect compression-applied connectors for correct cable match and indentation.
- d. Inspect for correct identification.
- e. Inspect cable jacket and condition.
- f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
- g. Continuity test on each conductor and cable.
- h. Uniform resistance of parallel conductors.
3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports 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.

END OF SECTION 26-05-19

SECTION 26-05-26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Ground bonding common with lightning protection system.
 - 3. Foundation steel electrodes.
- C. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.03 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
- B. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:
 - a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
 - 1) Test wells.
 - 2) Ground rods.
 - 3) Ground rings.

PART 2 - PRODUCTS

2.01 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.

2.02 MANUFACTURERS

- A. Erico Inc; Cadweld Electrical Products group
- B. Burndy Electrical
- C. Harger Lightning and Grounding
- D. ILSCO
- E. Kearney/ Cooper Power Systems
- F. Thomas & Betts Electrical
- G. Owner- approved equivalent

2.03 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:
 - 1. Solid Conductors: ASTM B3.
 - 2. Stranded Conductors: ASTM B8.
 - 3. Tinned Conductors: ASTM B33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inch (6.3 by 100 mm) in cross section, with 9/32 inch (7.14 mm) holes spaced 1-1/8 inch (28 mm) apart. Stand-off insulators for

mounting must comply with UL 891 for use in switchboards, 600 V and must be Lexan or PVC, impulse tested at 5000 V.

2.04 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. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- J. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- K. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- L. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.
- M. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal one-piece clamp.
- N. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- O. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with zinc-plated bolts.
 - a. Material: Tin-plated aluminum.
 - b. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and copper ground connector.

2.05 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 ft. (19 mm by 3 m).

PART 3 - EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install barecopper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 30 inch (750 mm) below grade.
 - 2. Duct-Bank Grounding Conductor: Bury 12 inch (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Grounding Conductors: Green-colored insulation with continuous yellow stripe.
- D. Isolated Grounding Conductors: Green-colored insulation with more than one continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- E. 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.
 - 4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors must be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.03 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inch (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inch (50 mm) above to 6 inch (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding

conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring 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 No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inch (150 mm) from the foundation.

3.04

EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

G. Metallic Fences: Comply with requirements of IEEE C2.

1. Grounding Conductor: Bare copper, not less than No. 8 AWG.

2. Gates: Must be bonded to the grounding conductor with a flexible bonding jumper.

3. Barbed Wire: Strands must be bonded to the grounding conductor.

3.05

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 Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inch (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. Use exothermic welds for all below-grade connections.

3. 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.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and must be at least 12 inch (300 mm) deep, with cover.

1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- F. 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.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft. (18 m) apart.
- H. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 ft. (6.0 m) long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.
- I. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 2. Make connections with clean, bare metal at points of contact.
 3. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.06 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 5ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26-05-26

SECTION 26-05-29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Support, anchorage, and attachment components.
 - 2. Fabricated metal equipment support assemblies.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
 - 1. Hangers. Include product data for components.
 - 2. Slotted support systems.
 - 3. Equipment supports.
 - 4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated Design Submittal: For hangers and supports for electrical systems.
 - 1. Include design calculations and details of hangers.
 - 2. Include design calculations for seismic restraints.

1.03 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame Rating: Class 1.
 - 2. Self-extinguishing according to ASTM D635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch (10 mm) diameter holes at a maximum of 8 inch (200 mm) on center in at least one surface.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. G-Strut.
 - d. Thomas & Betts Corporation; A Member of the ABB Group.
 - e. Unistrut; Part of Atkore International.
 - 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 3. Material for Channel, Fittings, and Accessories: Plain steel.
- 4. Channel Width: Selected for applicable load criteria.

5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 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 must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.
 - D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M 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. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - b. B-line, an Eaton business.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - e. MKT Fastening, LLC.
 2. 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.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325 (Grade A325M).
 5. Toggle Bolts: All steel springhead type.
 6. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.01 SELECTION

- A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA NEIS 101
 2. NECA NEIS 102.
 3. NECA NEIS 105.
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."
- D. Provide seismic controls with hangers and supports in accordance with requirements specified in "Section 260548.16 "Seismic Controls for Electrical Systems."
- E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch (6 mm) in diameter.
- F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.02 INSTALLATION OF SUPPORTS

- A. Comply with NECA NEIS 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 must 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 by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 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. Submit welding certificates.

3.04 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inch (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000 psi (20.7 MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 26-05-29

**SECTION 26-05-33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Type EMT-A and Type EMT-SS raceways and elbows.
 2. Type EMT-S raceways and elbows.
 3. Type ENT raceways and fittings.
 4. Type ERMC-S raceways, elbows, couplings, and nipples.
 5. Type FMC-S and Type FMC-A raceways.
 6. Type IMC raceways.
 7. Type LFMC raceways.
 8. Fittings for conduit, tubing, and cable.
 9. Surface metal raceways and fittings.
 10. Wireways and auxiliary gutters.
 11. Metallic outlet boxes, device boxes, rings, and covers.
 12. Cabinets, cutout boxes, junction boxes, pull boxes, and miscellaneous enclosures.
 13. Cover plates for device boxes.
- B. Related Requirements:
1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
 2. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.

1.02 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Wireways and auxiliary gutters.
 2. Surface metal raceways.
 3. Surface nonmetallic raceways.
 4. Floor boxes.
 5. Cabinets, cutout boxes, and miscellaneous enclosures.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - a. AFC Cable Systems, Inc.
 - b. Alflec Inc. A Southwire Company.
 - c. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - d. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - e. Electri-Flex Co.
 - f. Prime Conduit
 - g. Wheatland Tube Company.
 - h. Owner- approved equivalent.

2.02 TYPE EMT-A AND TYPE EMT-SS RACEWAYS AND ELBOWS

- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 2. General Characteristics: UL 797A and UL Category Control Number FJMX.
- B. Aluminum Electrical Metal Tubing (EMT-A) and Elbows:
1. Material: Aluminum.
 2. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - b. Colors: As indicated on Drawings.

2.03 TYPE EMT-S RACEWAYS AND ELBOWS

- A. Performance Criteria:
1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 2. General Characteristics: UL 797 and UL Category Control Number FJMX.

- B. Steel Electrical Metal Tubing (EMT-S) and Elbows:
 - 1. Material: Steel.
 - 2. Options:
 - a. Exterior Coating: Zinc.
 - b. Interior Coating: Zinc with organic top coating.
 - c. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - d. Colors: As indicated on Drawings.

2.04 TYPE ENT RACEWAYS AND FITTINGS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 1653 and UL Category Control Number FKHU.
- B. Electrical Nonmetallic Tubing (ENT) and Fittings:
 - 1. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - b. Fittings:
 - 1) Mechanically Attached Fittings: UL 1653.
 - 2) Solvent-Attached Fittings: UL 651.

2.05 TYPE ERMCS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 6 and UL Category Control Number DYIX.
- B. Galvanized-Steel Electrical Rigid Metal Conduit (ERMCS-G), Elbows, Couplings, and Nipples:
 - 1. Exterior Coating: Zinc.
 - 2. Options:
 - a. Interior Coating: Zinc with organic top coating.
 - b. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - c. Colors: As indicated on Drawings.

2.06 TYPE FMC-S AND TYPE FMC-A RACEWAYS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 1 and UL Category Control Number DXUZ.
- B. Steel Flexible Metal Conduit (FMC-S):
 - 1. Material: Steel.
 - 2. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - b. Colors: As indicated on Drawings.

2.07 TYPE IMC RACEWAYS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 1242 and UL Category Control Number DYBY.
- B. Steel Electrical Intermediate Metal Conduit (IMC):
 - 1. Options:
 - a. Exterior Coating: [Zinc] [Alternative corrosion-resistant coating].
 - b. Interior Coating: [Zinc with organic top coating] [Zinc] [Organic coating].
 - c. Minimum Trade Size: [Metric designator 16 (trade size 1/2)] [Metric designator 21 (trade size 3/4)].
 - d. Colors: As indicated on Drawings.

2.08 TYPE LFMC RACEWAYS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 360 and UL Category Control Number DXHR.
- B. Steel Liquidtight Flexible Metal Conduit (LFMC-S):
 - 1. Material: Steel.
 - 2. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).

- b. Colors: As indicated on Drawings.

2.09 FITTINGS FOR CONDUIT, TUBING, AND CABLE

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
- B. Fittings for Type ERM, Type IMC, Type PVC, Type EPEC, and Type RTRC Raceways:
 - 1. General Characteristics: UL 514B and UL Category Control Number DWTT.
 - 2. Options:
 - a. Material: Steel.
 - b. Coupling Method: Compression coupling Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
 - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
 - d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
- C. Fittings for Type EMT Raceways:
 - 1. General Characteristics: UL 514B and UL Category Control Number FKA.
 - 2. Options:
 - a. Material: Steel.
 - b. Coupling Method: Compression coupling Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
 - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
 - d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
- D. Fittings for Type FMC Raceways:
 - 1. General Characteristics: UL 514B and UL Category Control Number ILNR.
- E. Fittings for Type LFMC and Type LFNC Raceways:
 - 1. General Characteristics: UL 514B and UL Category Control Number DXAS.

2.10 SURFACE METAL RACEWAYS AND FITTINGS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 5 and UL Category Control Number RJBT.
- B. Surface Metal Raceways and Fittings with Metal Covers:
 - 1.
 - 2. Options:
 - a. Galvanized steel or Aluminum base with snap-on covers.
 - b. Manufacturer's standard enamel finish in color selected by Architect.
 - c. Wiring Channels: Single. Multiple channels must be capable of housing a standard 20 to 30 A NEMA device flush within the raceway.

2.11 WIREWAYS AND AUXILIARY GUTTERS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 870 and UL Category Control Number ZOYX.
- B. Metal Wireways and Auxiliary Gutters:
 - 1.
 - 2. Additional Characteristics:
 - a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
 - b. Finish: Manufacturer's standard enamel finish.
 - 3. Options:
 - a. Degree of Protection: Type 1 unless otherwise indicated.
 - b. Wireway Covers: Screw-cover type unless otherwise indicated.

2.12 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: UL 514A and UL Category Control Number QCIT.
- B. Metallic Outlet Boxes:
 - 1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with

provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.

2. Options:

- a. Material: Sheet steel.
- b. Sheet Metal Depth: Minimum 2.5 inch (65 mm).
- c. Cast-Metal Depth: Minimum 2.4 inch (60.3 mm).
 - d. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb (23 kg).
 - e. Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb (32 kg).

C. Metallic Device Boxes:

- 1. Description: Box with provisions for mounting wiring device directly to box.

2.

3. Options:

- a. Material: Sheet steel.
- b. Sheet Metal Depth: minimum 2.5 inch (65 mm).
- c. Cast-Metal Depth: minimum 2.4 inch (60.3 mm).

D. Metallic Extension Rings:

- 1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

E. Metallic Floor Boxes and Floor Box Covers:

- 1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.

F. Metallic Concrete Boxes and Covers:

- 1. Description: Box intended for use in poured concrete.

2.13 CABINETS, CUTOUT BOXES, JUNCTION BOXES, PULL BOXES, AND MISCELLANEOUS ENCLOSURES

A. Performance Criteria:

- 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
- 2. General Characteristics:
 - a. Non-Environmental Characteristics: UL 50.
 - b. Environmental Characteristics: UL 50E.

B. Indoor Sheet Metal Cabinets:

- 1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
- 2. Additional Characteristics: UL Category Control Number CYIV.

C. Indoor Sheet Metal Cutout Boxes:

- 1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
- 2. Additional Characteristics: UL Category Control Number CYIV.

D. Indoor Sheet Metal Junction and Pull Boxes:

- 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
- 2. Additional Characteristics: UL Category Control Number BGUI.

E. Indoor Cast-Metal Junction and Pull Boxes:

- 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
- 2. Additional Characteristics: UL Category Control Number BGUI.

F. Outdoor Sheet Metal Cabinets:

- 1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
- 2. Additional Characteristics: UL Category Control Number CYIV.

3. Options:

- a. Degree of Protection: Type 3.

G. Outdoor Sheet Metal Cutout Boxes:

- 1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
- 2. Additional Characteristics: UL Category Control Number CYIV.
- 3. Options:

- a. Degree of Protection: Type 3.
- H. Outdoor Sheet Metal Junction and Pull Boxes:
 - 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
 - 2. Additional Characteristics: UL Category Control Number BGUZ.
 - 3. Options:
 - a. Degree of Protection: Type 3.
- I. Outdoor Cast-Metal Junction and Pull Boxes:
 - 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
 - 2. Additional Characteristics: UL Category Control Number BGUZ.
 - 3. Options:
 - a. Degree of Protection: Type 3.

2.14 COVER PLATES FOR DEVICES BOXES

- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics:
 - a. Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
 - b. Wallplate-Securing Screws: Metal with head color to match wallplate finish.
- B. Metallic Cover Plates for Device Boxes:
 - 1. Options:
 - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
 - b. Wallplate Material: Steel with white baked enamel, suitable for field painting As indicated on architectural Drawings.
- C. Nonmetallic Cover Plates for Device Boxes:
 - 1. Options:
 - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
 - b. Wallplate Material: 0.060 inch (1.5 mm) thick high-impact thermoplastic (nylon) with smooth finish and color matching wiring device or As indicated on architectural Drawings.
 - c. Color: Gray or As indicated on architectural Drawings.

PART 3 - EXECUTION

3.01 SELECTION OF RACEWAYS

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.
- B. Outdoors:
 - 1. Exposed and Subject to Severe Physical Damage: ERM or IMC.
 - 2. Exposed and Subject to Physical Damage: ERM IMC.
 - a. Locations less than 2.5 m (8 ft) above finished floor.
 - 3. Exposed and Not Subject to Physical Damage: ERM, IMC, Corrosion-resistant EMT.
 - 4. Concealed Aboveground: ERM ,IMC ,EMT.
 - 5. Direct Buried: PVC-80.
 - 6. Concrete Encased Not in Trench: PVC-40.
 - 7. Concrete Encased in Trench: PVC-40.
 - 8. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
- C. Indoors:
 - 1. Hazardous Classified Locations: ERM ,IMC.
 - 2. Exposed and Subject to Severe Physical Damage: ERM, IMC. Subject to severe physical damage includes the following locations:
 - a. Loading docks.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Vehicle bays.
 - 3. Exposed and Subject to Physical Damage: ERM IMC. Subject to physical damage includes the following locations:
 - a. Locations less than 2.5 m (8 ft) above finished floor.

- b. Stub-ups to above suspended ceilings.
 - 4. Exposed and Not Subject to Physical Damage: EMT.
 - 5. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 6. Damp or Wet Locations: ERMC, IMC.
 - 7. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC ,FMC.
- D. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
- 1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.02 INSTALLATION OF RACEWAYS

- A. Installation Standards:
- 1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
 - 2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
 - 3. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
 - 4. Comply with NECA NEIS 101 for installation of steel raceways.
 - 5. Comply with NECA NEIS 102 for installation of aluminum raceways.
 - 6. Comply with NECA NEIS 111 for installation of nonmetallic raceways.
 - 7. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
 - 8. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
 - 9. Raceway Terminations at Locations Subject to Moisture or Vibration:
 - a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG. Install insulated throat metal grounding bushings on service conduits.
- B. General Requirements for Installation of Raceways:
- 1. Complete raceway installation before starting conductor installation.
 - 2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft (0.6 m) above finished floor.
 - 3. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
 - 4. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
 - 5. Support conduit within 12 inch (300 mm) of enclosures to which attached.
 - 6. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
 - 7. 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 interior of raceways at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - b. Where an underground service raceway enters a building or structure.
 - c. Conduit extending from interior to exterior of building.
 - d. Conduit extending into pressurized duct and equipment.
 - e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - f. Where otherwise required by NFPA 70.
 - 8. Do not install conduits within 2 inch (50 mm) of the bottom side of a metal deck roof.
 - 9. Keep raceways at least 6 inch (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

10. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.

11. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb (90 kg) tensile strength. Leave at least 12 inch (300 mm) of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Raceways Embedded in Slabs:

1. Run raceways larger than metric designator 27 (trade size 1) below concrete slab..
2. Arrange raceways to cross building expansion joints with expansion fittings at right angles to the joint.
3. Arrange raceways to ensure that each is surrounded by a minimum of 1 inch (25 mm) of concrete without voids.
4. Do not embed threadless fittings in concrete unless locations have been specifically approved by Architect.
5. Change from ENT to ERM or IMC before rising above floor.

D. Stub-ups to Above Recessed Ceilings:

1. Provide EMT, IMC, or ERM for raceways.
2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

E. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. ERM-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
2. EMT: Provide setscrew, fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

F. Expansion-Joint Fittings:

1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F (17 deg C) and that have straight-run length that exceeds 25 ft (7.6 m). Install in runs of aboveground ERM and EMT conduit that are located where environmental temperature change may exceed 100 deg F (55 deg C) and that have straight-run length that exceeds 100 ft (30 m).
2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
3. Install expansion fittings at locations where conduits cross building or structure expansion joints.
4. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

G. Raceways Penetrating Rooms or Walls with Acoustical Requirements:

1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

3.03 INSTALLATION OF SURFACE RACEWAYS

- A. Install surface raceways only where indicated on Drawings.
- B. Install surface raceway with a minimum 2 inch (50 mm) radius control at bend points.
- C. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch (1200) mm) and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's written instructions. Tape and glue are unacceptable support methods.

3.04 INSTALLATION OF BOXES AND ENCLOSURES

- A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
- B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

- C. 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 box and cover plate or supported equipment and box, whether installed indoors or outdoors.
- D. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- E. Locate boxes so that cover or plate will not span different building finishes.
- F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
- G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
- H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
- I. Set metal floor boxes level and flush with finished floor surface.
- J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
- M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
 - 1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
 - 2. Provide gaskets for wallplates and covers.

3.05 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.06 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.

3.07 CLEANING

- A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

END OF SECTION 26-05-33

SECTION 26-05-43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 2 - GENERAL

2.01 SUMMARY

- A. Section Includes:
 - 1. Type EPEC raceways and fittings.
 - 2. Type ERMC-S raceways, elbows, couplings, and nipples.
 - 3. Type PVC raceways and fittings.
 - 4. Fittings for conduit, tubing, and cable.
 - 5. Threaded metal joint compound.
 - 6. Solvent cements.
 - 7. Duct accessories.
 - 8. Handholes and boxes for exterior underground wiring.
 - 9. Duct sealing.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

2.02 DEFINITIONS

- A. Duct: A single raceway or multiple raceways, installed singly or as components of a duct bank.
- B. Duct Bank: Two or more ducts installed in parallel, direct buried or with additional casing materials such as concrete.
- C. Handhole: An underground chamber containing electrical cables, sized such that personnel are not required to enter in order to access the cables.
- D. Manhole: An underground chamber containing electrical cables and equipment, sized to provide access with working space clearances.
- E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

2.03 ACTION SUBMITTALS

- A. Product Data:
 - 1. Duct-bank materials, including spacers and miscellaneous components.
 - 2. Ducts, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Accessories for handholes, boxes.
 - 4. Underground-line warning tape.
- B. Shop Drawings:
 - 1. Precast or Factory-Fabricated Concrete Structures:
 - a. Include plans, elevations, sections, and details, including attachments to other Work.
 - b. Include duct entry provisions, including locations and duct sizes, and methods and materials for waterproofing duct entry locations.
 - c. Include reinforcement details.
 - d. Include frame and cover design and manhole chimneys.
 - e. Include ladder step details.
 - f. Include grounding details.
 - g. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, sumps, and other accessories.
 - h. Include joint details.
 - 2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:
 - a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.
 - b. Include duct entry provisions, including locations and duct sizes, and methods and materials for waterproofing duct entry locations.
 - c. Include cover design.
 - d. Include grounding details.

- e. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and other accessories.
 - C. Field Quality-Control Submittals:
 - 1. Field quality-control reports.
- 2.04 INFORMATIONAL SUBMITTALS**
- A. Certificates:
 - 1. For concrete and steel used in precast concrete handholes, as required by ASTM C858.
 - B. Source Quality-Control Submittals:
 - 1. Source quality-control reports.
- PART 3 - PRODUCTS**
- 3.01 RACEWAYS AND FITTINGS**
- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 2. CANTEX Inc.
 - 3. Wheatland Tube Company.
 - 4. Owner- approved equivalent.
 - B. TYPE EPEC RACEWAYS AND FITTINGS
 - 1. Performance Criteria:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics: UL 651A and UL CCN EAZX.
 - 2. Schedule 40 Electrical HDPE Underground Conduit (EPEC-40)
 - 3. Schedule 80 Electrical HDPE Underground Conduit (EPEC-80)
 - C. TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES
 - 1. Performance Criteria:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics: UL 6 and UL CCN DYIX.
 - 2. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:
 - a. Exterior Coating: Zinc.
 - D. TYPE PVC RACEWAYS AND FITTINGS
 - 1. Performance Criteria:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics: UL 651 and UL CCN DZYR.
 - 2. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings
 - 3. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings
- 3.02 SOLVENT CEMENTS**
- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - 2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL CCN DWTT.
- 3.03 DUCT ACCESSORIES**
- A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
 - B. Underground-Line Warning Tape: In accordance with Section 260553 "Identification for Electrical Systems."
- 3.04 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING**
- A. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics:
 - a. ASTM C858 for design and manufacturing processes.
 - b. SCTE 77.
- B. Source Quality Control:
 1. Precast Concrete Utility Structures: Test and inspect in accordance with ASTM C1037.
 2. Polymer Concrete and Nonconcrete Handhole and Pull-Box Prototypes: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests must be for specified tier ratings of products supplied. Testing machine pressure gages must have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.
- C. Precast Concrete Handholes and Boxes:
 1. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover must form top of enclosure and must have load rating consistent with that of handhole or box.
 2. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - a. Rinker Materials.
 - b. Christy Concrete Products. a division of Oldcastle Precast.
 - c. Elmhurst-Chicago Stone Co.
 - d. Oldcastle Precast Group.
 - e. Riverton Concrete Products; a division of Cretex Companies, Inc.
 - f. Utility Concrete Products, LLC.
 - g. Utility Vault Co.
 - h. Wausau Tile, Inc.
 - i. Owner- approved equivalent.
 3. Configuration: Units must be designed for flush burial and have open bottom unless otherwise indicated.
 4. Frame and Cover:
 - a. Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
 - b. Cover Finish: Nonskid finish must have minimum coefficient of friction of 0.50.
 - c. Cover Legend: Molded lettering, "ELECTRIC".
 5. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - a. Extension must provide increased depth of 12 inch (300 mm).
 - b. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
 6. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at installation location with ground-water level at grade.
 7. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct, plus additional 12 inch (300 mm) vertically and horizontally to accommodate alignment variations.
 - a. Center window location.
 - b. Knockout panels must be located no less than 6 inch (150 mm) from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
 - c. Knockout panel opening must have cast-in-place, welded-wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct.
 - d. Knockout panels must be framed with at least two additional No. 3 steel reinforcing bars in concrete around each opening.
 - e. Knockout panels must be 1-1/2 to 2 inch (38 to 50 mm) thick.
 8. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - a. Type and size: Match fittings to duct to be terminated.

- b. Fittings must align with elevations of approaching duct and be located near interior corners of handholes to facilitate racking of cable.
 - c. Provide minimum of one cast end-bell or duct-terminating fitting of each size provided in each wall.
 - 9. Handholes 12 inch wide by 24 inch long (300 mm wide by 600 mm long) and larger must have inserts for cable racks and pulling-in irons installed before concrete is poured.
- D. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover:
 - 1. Description: Molded of sand, concrete, and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or combination.
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC. a division of Oldcastle Precast
 - c. NewBasis.
 - d. Owner- approved equivalent.
 - 3. Configuration: Units must be designed for flush burial and have closed bottom unless otherwise indicated.
 - 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and installed location.
 - a. Cover Finish: Nonskid finish must have minimum coefficient of friction of 0.50.
 - b. Cover Legend: Molded lettering, "ELECTRIC".
 - 5. Conduit Entrance Provisions: Conduit-terminating fittings must mate with entering ducts for secure, fixed installation in enclosure wall.
 - 6. Duct Entrance Provisions: Duct-terminating fittings must mate with entering duct for secure, fixed installation in enclosure wall.
 - 7. Handholes 12 inch wide by 24 inch long (300 mm wide by 600 mm long) and larger must have factory-installed inserts for cable racks and pulling-in irons.
 - 8. Options:
 - a. Color: Gray.
- E. Fiberglass Handholes and Boxes:
 - 1. Description: Molded of fiberglass-reinforced polyester resin, with covers made of reinforced fiberglass.
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC. a division of Oldcastle Precast.
 - c. Christy Concrete Products. a division of Oldcastle Precast.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.
 - e. Owner- approved equivalent.
 - 3. Configuration: Units must be designed for flush burial and have open bottom unless otherwise indicated.
 - 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - a. Cover Finish: Nonskid finish must have minimum coefficient of friction of 0.50.
 - b. Cover Legend: Molded lettering, "ELECTRIC".
 - 5. Duct Entrance Provisions: Duct-terminating fittings must mate with entering duct for secure, fixed installation in enclosure wall.
 - 6. Handholes 12 inch wide by 24 inch long (300 mm wide by 600 mm long) and larger must have factory-installed inserts for cable racks and pulling-in irons.
 - 7. Options:
 - a. Color: Gray.

3.05 DUCT SEALING

- A. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Compound must be capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduit, conduit and duct

coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals. Duct sealing compound must be removable without damaging ducts or cables.

B. Inflatable Duct-Sealing System: Wraparound inflatable bladder that seals ducts that are empty or containing conductors against air and water infiltration. System is suitable for use in steel, plastic, or concrete ducts and penetrations.

PART 4 - EXECUTION

4.01 SELECTION OF UNDERGROUND DUCTS

- A. Duct for Electrical Feeders 600 V and Less: PVC-80, direct buried unless otherwise indicated, PVC-40, concrete encased unless otherwise indicated.
- B. Duct for Electrical Branch Circuits: PVC-40, direct buried unless otherwise indicated.
- C. Underground Ducts Crossing Driveways: PVC-40 encased in reinforced concrete.
- D. Underground Ducts Crossing Roadways: PVC-40, encased in reinforced concrete.
- E. Stub-ups: Concrete encased, ERM-C-S.

4.02 SELECTION OF UNDERGROUND ENCLOSURES

- A. Handholes and Boxes:
 - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, H-20 structural load rating.
 - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
 - 3. Units in Sidewalk and Similar Applications with Safety Factor for Nondeliberate Loading by Vehicles: Polymer concrete units, SCTE 77, Tier 8 structural load rating.
 - 4. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested in accordance with SCTE 77 with 3000 lbf (13 345 N) vertical loading.
 - 5. Cover design load must not exceed load rating of handhole or box.

4.03 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

4.04 INSTALLATION OF DUCTS AND DUCT BANKS

- A. Special Techniques:
 - 1. Where indicated on Drawings, install duct, spacers, and accessories into duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
 - 2. Steel raceway, bends, and fittings in single duct run or duct bank must be of same type.
 - 3. Slope: Pitch duct minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
 - 4. Expansion and Deflection Fittings: Install expansion and deflection fitting in each duct in area of disturbed earth adjacent to manhole or handhole.
 - 5. Install expansion fitting near center of straight line duct with calculated expansion of more than 3/4 inch (19 mm).
 - 6. Curves and Bends:
 - a. Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with minimum radius of 48 inch (1200 mm), both horizontally and vertically, at other locations unless otherwise indicated.
 - b. Field bending must be in accordance with NFPA 70 minimum radii requirements, except bends over 45 degrees must be made with minimum radius of 48 inch (1200 mm). Use only equipment specifically designed for material and size involved. Use PVC heating bender for bending PVC conduit.
 - 7. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch (75 mm) of concrete for minimum of 12 inch (300 mm) on each side of coupling.

- a. Install insulated grounding bushings on steel raceway terminations that are less than 12 inch (300 mm) below grade or floor level and do not terminate in hubs.
- 8. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing duct will not be subject to environmental temperatures above 104 deg F (40 deg C). Where environmental temperatures are calculated to rise above 104 deg F (40 deg C), and anywhere duct crosses above underground steam line, install insulation blankets listed for direct burial to isolate duct bank from steam line to maintain maximum environmental temperature of 104 deg F (40 deg C).
- 9. End Bell Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inch (250 mm) o.c. for 5 inch (125 mm) duct, and vary proportionately for other duct sizes.
 - a. Begin change from regular spacing to end-bell spacing 10 ft (3 m) from end bell, without reducing duct slope and without forming trap in line.
 - b. Grout end bells into structure walls from both sides to provide watertight entrances.
- 10. Duct Terminators for Entrances to Cast-in-Place Manholes and Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inch (150 mm) o.c. for 4 inch (100 mm) duct, and vary proportionately for other duct sizes.
 - a. Begin change from regular spacing to terminator spacing 10 ft (3 m) from terminator, without reducing duct line slope and without forming trap in line.
- 11. Install manufactured steel raceway elbows for stub-ups at poles unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 - a. Couple steel elbows to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch (75 mm) of concrete for minimum of 12 inch (300 mm) on each side of coupling.
- 12. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15 psig (1.03 MPa) hydrostatic pressure.
- 13. Pulling Cord: Install 200 lbf (1000 N) test nylon cord in empty ducts.
- 14. Concrete-Encased Ducts and Duct Bank:
 - a. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes 6 inch (150 mm) or less in nominal diameter.
 - b. Width: Excavate trench 3 inch (75 mm) wider than duct on each side.
 - c. Depth: Install so top of duct envelope is at least 24 inch (600 mm) below finished grade in areas not subject to deliberate traffic, and at least 30 inch (750 mm) below finished grade in deliberate traffic paths for vehicles unless otherwise indicated. Install so top of duct envelope is below local frost line.
 - d. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
 - e. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 ft (6 m) of duct. Place spacers within 24 inch (600 mm) of duct ends. Stagger spacers approximately 6 inch (150 mm) between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
 - f. Minimum Space between Ducts: 3 inch (75 mm) between edge of duct and exterior envelope wall, 2 inch (50 mm) between ducts for like services, and 4 inch (100 mm) between power and communications ducts.
 - g. Elbows:
 - 1) Use manufactured steel elbows for stub-ups, at building entrances, and at changes of direction in duct run.

h. Stub-ups to Outdoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch (1500 mm) from edge of equipment base.

1) Stub-ups must be minimum 4 inch (100 mm) above finished floor and minimum 3 inch (75 mm) from conduit side to edge of slab.

i. Stub-ups to Indoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch (1500 mm) from edge of wall. Install insulated grounding bushings on terminations at equipment.

1) Stub-ups must be minimum 4 inch (100 mm) above finished floor and no less than 3 inch (75 mm) from conduit side to edge of slab.

j. Reinforcement: Reinforce concrete-encased duct where crossing disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

k. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.

l. Concrete Cover: Install minimum of 3 inch (75 mm) of concrete cover between edge of duct to exterior envelope wall, 2 inch (50 mm) between duct of like services, and 4 inch (100 mm) between power and communications ducts.

m. Place minimum 6 inch (150 mm) of engineered fill above concrete encasement of duct.

n. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.

1) Start at one end and finish at other, allowing for expansion and contraction of duct as its temperature changes during and after pour. Use expansion fittings installed in accordance with manufacturer's published instructions, or use other specific measures to prevent expansion-contraction damage.

2) If more than one pour is necessary, terminate each pour in vertical plane and install 3/4 inch (15 mm) reinforcing-rod dowels extending minimum of 18 inch (450 mm) into concrete on both sides of joint near corners of envelope.

o. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 033000 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.

15. Direct-Buried Duct and Duct Bank:

a. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inch (150 mm) in nominal diameter.

b. Width: Excavate trench 3 inch (75 mm) wider than duct on each side.

c. Depth: Install top of duct at least 36 inch (900 mm) below finished grade unless otherwise indicated.

d. Set elevation of top of duct bank below frost line.

e. Place minimum 3 inch (75 mm) of sand as bed for duct. Place sand to minimum of 6 inch (150 mm) above top level of duct.

f. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.

g. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 ft (6 m) of duct. Place spacers within 24 inch (600 mm) of duct ends. Stagger spacers approximately 6 inch (150 mm) between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not

use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

h. Install duct with minimum of 3 inch (75 mm) between ducts for like services and 6 inch (150 mm) between power and communications duct.

i. Install manufactured steel elbows for stub-ups, at building entrances, and at changes of direction in duct.

1) Couple RNC duct to steel raceway with adapters designed for this purpose, and encase coupling with minimum 3 inch (75 mm) of concrete.

2) Stub-ups to Outdoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch (1500 mm) from edge of base. Install insulated grounding bushings on terminations at equipment.

a) Stub-ups must be minimum 4 inch (100 mm) above finished base and minimum 3 inch (75 mm) from conduit side to edge of base.

3) Stub-ups to Indoor Equipment: Extend concrete-encased steel raceway horizontally on exterior of wall minimum of 60 inch (1500 mm) from edge of wall. Install insulated grounding bushings on terminations at equipment.

4) Stub-ups through interior floors must be minimum 4 inch (100 mm) above finished floor and no less than 3 inch (75 mm) from conduit side to edge of equipment pad or floor slab.

j. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inch (100 mm) over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.

16. Underground-Line Warning Tape: Bury nonconducting underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inch (300 mm) above concrete-encased duct and duct banks and approximately 12 inch (300 mm) below grade. Align tape parallel to and within 3 inch (75 mm) of centerline of duct bank. Provide additional warning tape for each 12 inch (300 mm) increment of duct-bank width over nominal 18 inch (450 mm). Space additional tapes 12 inch (300 mm) apart, horizontally across width of ducts.

17. Ground ducts and duct banks in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

4.05 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Reference Standards:

1. Precast Concrete Handholes: Comply with ASTM C891 unless otherwise indicated.
2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

1. Cast-in-Place Manholes:

- a. Finish interior surfaces with smooth-troweled finish.
- b. Knockouts for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inch (38 to 50 mm) thick, arranged as indicated.
- c. Comply with requirements in Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete, formwork, and reinforcement.

2. Precast Concrete Handholes and Manholes:

- a. Install units level and plumb and with orientation and depth coordinated with connecting duct to minimize bends and deflections required for proper entrances.
- b. Unless otherwise indicated, support units on level bed of crushed stone or gravel graded from 1 inch (25 mm) sieve to No. 4 (4.75 mm) sieve and compacted to same density as adjacent undisturbed earth.
- c. Field-cut openings for conduits in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be

cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3. Elevations:

a. Install handholes with bottom below frost line, below grade.

b. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.

c. Where indicated, cast handhole cover frame integrally with handhole structure.

4. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.

5. Manhole Access: Circular opening in manhole roof; sized to match cover size.

a. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.

b. Install chimney, constructed of precast concrete collars and rings, and cast-iron frame to connect cover with manhole roof opening. Provide moisture-tight joints and waterproof grouting for frame and chimney.

6. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.

7. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inch (97 mm) for manholes and 2 inch (50 mm) for handholes, for anchor bolts installed in field. Use minimum of two anchors for each cable stanchion.

8. Ground manholes, handholes, and boxes in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

4.06 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Special Techniques:

1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.

2. Unless otherwise indicated, support units on level bed of crushed stone or gravel, graded from 1/2 inch (12.5 mm) sieve to No. 4 (4.75 mm) sieve and compacted to same density as adjacent undisturbed earth.

3. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.

4. Install handholes and boxes with bottom below frost line, below grade.

5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

6. Field cut openings for duct in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

7. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour concrete ring encircling, and in contact with enclosure entry, and with top surface screeded to top of box cover frame. Bottom of ring must rest on compacted earth.

a. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Section 033000 "Cast-in-Place Concrete," with troweled finish.

b. Dimensions: 10 inch wide by 12 inch deep (250 mm wide by 300 mm deep).

8. Ground handholes and boxes in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

4.07 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Architect.

B. Tests and Inspections:

1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.

2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide minimum 12 inch (300 mm) long mandrel equal to duct size minus 1/4 inch (6 mm). If obstructions are indicated, remove obstructions and retest.
3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."

C. Nonconforming Work:

1. Underground ducts, raceways, and structures will be considered defective if they do not pass tests and inspections.
2. Correct deficiencies and retest as specified above to demonstrate compliance.

D. Assemble and submit test and inspection reports.

4.08 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump, and building interiors affected by Work.
 1. Sweep floor, removing dirt and debris.
 2. Remove foreign material.

END OF SECTION 26-05-43

SECTION 26-05-44
SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.02 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Metraflex Company (The).
 - c. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.03 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. HOLDRITE.

2.04 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.05 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch Insert dimension annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26-05-44

SECTION 26-05-53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 1000 V or Less:

1. Black letters on orange field.
2. Legend: Indicate voltage.

B. Color-Coding for Phase- Identification, 1000 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color must be factory applied.
2. Colors for 208Y/120 V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
3. Colors for 240 V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
4. Color for Neutral: White.
5. Color for Equipment Grounds: Green.
6. Colors for Isolated Grounds: Green with two or more yellow stripes.

C. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

D. Warning labels and signs must include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."
3. Arc Flash Hazard: "WARNING – POTENTIAL ARC FLASH HAZARD – APPROPRIATE PPE AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT." Label shall also indicate the flash protection boundary, flash hazard category, and the minimum arc rating, as well as indicating the PPE required.

E. Equipment Identification Labels:

1. Black letters on white field.

2.03 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3 mil (0.08 mm) thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3 mil (0.08 mm) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
 - a. 1-1/2 by 6 inch (37 by 150 mm) for raceway and conductors.
 - b. 3-1/2 by 5 inch (76 by 127 mm) for equipment.
 - c. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 deg F (93 deg C). Comply with UL 224.

2.05 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. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mil (0.08 mm) thick by 1 to 2 inch (25 to 50 mm) wide; compounded for outdoor use.

C. Tape and Stencil: 4 inch (100 mm) wide black stripes on 10 inch (250 mm) centers placed diagonally over orange background and are 12 inch (300 mm) wide. Stop stripes at legends.

D. Floor Marking Tape: 2 inch (50 mm) wide, 5 mil (0.125 mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:
 - a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape must be permanent and may not be damaged by burial operations.
 - c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
 - a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
 - b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".
 - c. Inscriptions for Orange Tapes: "CAUTION BURIED COMMUNICATION LINE BELOW".

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be 1 inch (25 mm).

2.06 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch (0.38 mm) thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

2.07 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 inch (180 by 250 mm).
- B. Metal-Backed Butyrate Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396 inch (1 mm) galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
 - 2. 1/4 inch (6.4 mm) grommets in corners for mounting.
 - 3. Nominal Size: 10 by 14 inch (250 by 360 mm).
- C. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Engraved legend.
 - 2. Thickness:
 - a. For signs up to 20 sq. inch (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
 - b. For signs larger than 20 sq. inch (129 sq. cm), 1/8 inch (3.2 mm) thick.
 - c. Engraved legend with black letters on white face.
 - d. Self-adhesive.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.08 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) in accordance with ASTM D638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) in accordance with ASTM D638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) in accordance with ASTM D638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. 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

3.01 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of item before installing identification products.

- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Emergency Operating Instruction Signs: Install instruction signs with white legend on red background with minimum 3/8 inch (10 mm) high letters for emergency instructions at equipment used for power transfer.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.
- K. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
 - 1. "POWER."
- L. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.
- M. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.
- N. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.
- O. Self-Adhesive Labels:
 - 1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide single line of text with 1/2 inch (13 mm) high letters on 1-1/2 inch (38 mm) high label; where two lines of text are required, use labels 2 inch (50 mm) high.
- P. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.
- Q. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.
- R. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.
- S. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.
- T. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- U. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.
- V. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inch (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in common trench [or concrete envelope]exceeds 16 inch (400 mm) overall.
 - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- W. Metal Tags:
 - 1. Place in location with high visibility and accessibility.
 - 2. Secure using general-purpose cable ties.
- X. Nonmetallic Preprinted Tags:
 - 1. Place in location with high visibility and accessibility.
 - 2. Secure using general-purpose cable ties.
- Y. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
 - 2. Unless otherwise indicated, provide single line of text with 1/2 inch (13 mm) high letters on minimum 1-1/2 inch (38 mm) high sign; where two lines of text are required, use signs minimum 2 inch (50 mm) high.
- Z. Metal-Backed Butyrate Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

2. Unless otherwise indicated, provide single line of text with 1/2 inch (13 mm) high letters on 1-1/2 inch (38 mm) high sign; where two lines of text are required, use labels 2 inch (50 mm) high.
- AA. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
 2. Unless otherwise indicated, provide single line of text with 1/2 inch (13 mm) high letters on 1-1/2 inch (38 mm) high sign; where two lines of text are required, use labels 2 inch (50 mm) high.
- BB. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.
 2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than A and 120 V to Ground: Identify with self-adhesive raceway labels.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft (15 m) maximum intervals in straight runs, and at 25 ft (7.6 m) maximum intervals in congested areas.
- D. Power-Circuit Conductor Identification, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify phase.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft (15 m) maximum intervals in straight runs, and at 25 ft (7.6 m) maximum intervals in congested areas.
- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.
- F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes self-adhesive labels with conductor designation.
- G. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- H. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- I. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in direction of access to live parts. Workspace must comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
1. Apply to exterior of door, cover, or other access.
 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- L. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.
- M. Emergency Operating Instruction Signs: Laminated acrylic or melamine plastic signs with white legend on red background with minimum 3/8 inch (10 mm) high letters for emergency instructions at equipment used for power transfer.
- N. Equipment Identification Labels:
1. Engraved, Laminated Acrylic or Melamine Label: Attached with permanent adhesive. Provide label with white legend on black background unless otherwise noted. Minimum letter height shall be 3/8 inch. Each equipment will have a unique color based upon the electrical system. Colors will be as followed.
 - a. Orange with white letters: Cell 1, System A
 - b. Blue with white letters: Cell 2, System B
 2. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 3. Outdoor Equipment: Laminated acrylic or melamine sign.
 4. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Inverters
 - c. Combiners
 - d. Disconnect switches.
 - e. Enclosures and electrical cabinets.
 - f. Enclosed switches.
 - g. Enclosed circuit breakers.
 - h. control panels, terminal cabinets, and racks.
- O. Arc Flash Warning Labels: On each piece of electrical equipment, install arc flash hazard warning sign indicating flash protection boundary, flash hazard category, and the minimum arc rating, as well as indicating the PPE required, using arc flash hazard data obtained from the Arc Flash Hazard Assessment Study. Indicate the data specific to each piece of equipment, in accordance with NFPA 70E. Labels for outdoor equipment shall be printed on heavy-duty- UV-resistant and water-resistant vinyl with permanent outdoor grade adhesive. Danger labels shall be provided for any equipment at 40 Cal/cm² or above.

END OF SECTION 26-05-53

**SECTION 260573
POWER SYSTEM STUDIES**

PART 1 - GENERAL

1.01 SUMMARY

- A. The Work of this Section Includes:
 - 1. Short-circuit study.
 - 2. Overcurrent protective device coordination study.
 - 3. Arc-flash hazard study.

- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data: For power system analysis software to be used for studies.
 - 1. Product Certificates: For power system study software applications, include certificate stating compliance with specified requirements, signed by software manufacturer.

- B. Power System Study Reports:
 - 1. Submit reports after approval of system protective devices submittals. Submittals must be in digital form.
 - 2. Submit short-circuit study input data, including completed computer-program input data sheets.
 - 3. Submit arc-flash study input data, including completed computer-program input data sheets.
 - 4. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
 - 5. Submit revised one-line diagram, reflecting field investigation results and results of short-circuit study.

- C. Data files for studies in format compatible with Owner's power system analysis software.

1.03 QUALITY ASSURANCE

- A. Submittals for power system studies must be signed and sealed by qualified electrical professional engineer responsible for their preparation.

- B. Studies must be performed using commercially developed and distributed software designed specifically for power system analysis.

- C. Software algorithms must comply with the requirements of standards and guides specified in this Section.

- D. Manual calculations are unacceptable.

PART 2 - PRODUCTS

2.01 POWER SYSTEM ANALYSIS SOFTWARE

- A. SKM
- B. ETAP
- C. Standard Features:
 - 1. Power System Analysis:
 - a. Power-systems-analysis software applications must have analytical capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 3002 series standards.
 - b. Computer software application must be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program must report device settings and ratings of overcurrent protective devices and must demonstrate selective coordination by computer-generated, time-current coordination plots.
 - c. Computer software application must be designed to perform arc-flash analysis or have function, component, or add-on module designed to perform arc-flash analysis.
 - 2. Analysis Standards:
 - a. Short-Circuit Current Analysis: In accordance with IEEE 3002.3.
 - b. Arc-Flash Hazard Analysis: In accordance with IEEE 1584.
 - 3. Capable of printing arc-flash hazard warnings for equipment on [polyester] [vinyl], weather- and UV-resistant, pressure-sensitive adhesive labels complying with NFPA 70E.
 - a. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard study:
 - 1) Equipment designation.
 - 2) Nominal voltage.
 - 3) Protection boundaries.
 - a) Arc-flash boundary.
 - b) Restricted approach boundary.
 - c) Limited approach boundary.
 - 4) Arc-flash PPE category.
 - 5) Required minimum arc rating of PPE in Cal/cm squared.
 - 6) Available incident energy.
 - 7) Working distance.
 - 8) Engineering report number, revision number, and issue date.
- D. Other Available Features Required by the Project:

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Collect and analyze data for power system studies.

1. Verify completeness of data supplied in one-line diagram on Drawings. Call discrepancies to Architect's attention.
2. For equipment included as Work on the Project, use characteristics submitted under provisions of action submittals and information submittals for the Project.
3. For relocated equipment and equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers in accordance with NFPA 70E.
4. Gather and tabulate required input data to support power system studies. Comply with requirements in Section 017839 "Project Record Documents" for recording circuit protective device characteristics. Record data on Record Document copy of one-line diagram. Comply with recommendations in IEEE 3002 series standards as to amount of detail that is required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer. Data include, but are not limited to, the following:
 - a. Product data for the Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - b. Electrical power utility impedance at service.
 - c. Power sources and ties.
 - d. Short-circuit current at each system bus (three phase and line to ground).
 - e. Full-load current of loads.
 - f. Voltage level at each bus.
 - g. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 - h. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
 - i. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 - j. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
 - k. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
 - l. Maximum demands from service meters.
 - m. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
 - n. Motor horsepower and NEMA MG 1 code letter designation.
 - o. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
 - p. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
 - q. Derating factors.

3.02 PREPARATION

A. Preparation of Data for Short-Circuit Study:

1. Verify completeness of data supplied on one-line diagram. Call discrepancies to Architect's attention.
2. For equipment included as Work on the Project, use characteristics submitted under provisions of action submittals and information submittals for the Project.
3. Prepare one-line diagram of modeled power system, showing the following:
 - a. Protective device designations and ampere ratings.
 - b. Conductor types, sizes, and lengths.
 - c. Transformer kVA and voltage ratings.
 - d. Motor and generator designations and kVA ratings.
 - e. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.

- f. Derating factors and environmental conditions.
 - g. Revisions to electrical equipment required by study.
4. Examine the Project's overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.
 5. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.
- B. Preparation of Data for Arc-Flash Hazard Study:
1. Assemble data from short-circuit study and overcurrent protective device coordination study.
 2. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.03 SHORT-CIRCUIT STUDY

- A. Base study on device characteristics supplied by device manufacturer.
- B. Extent of electrical power system to be studied is indicated on Drawings.
- C. Begin short-circuit current analysis at service, extending down to system overcurrent protective devices as follows:
 1. To normal system low-voltage load buses where fault current is 5 kA or less.
- D. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for the Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- E. Include AC fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase AC systems. Also account for fault-current DC decrement to address asymmetrical requirements of interrupting equipment.
- F. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at equipment indicated on one-line diagram.
 1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.
- G. Include in report identification of protective device applied outside its capacity.

3.04 ARC-FLASH HAZARD STUDY

- A. Comply with NFPA 70E, including Annex D, for arc-flash hazard study.
- B. Preparatory Studies: Obtain short-circuit study and overcurrent protective device coordination study results prior to starting arc-flash hazard study.
- C. Calculate maximum and minimum contributions of fault-current size.
 1. Maximum calculation must assume maximum contribution from utility and must assume motors to be operating under full-load conditions.
 2. Calculate arc-flash energy at 85 percent of maximum short-circuit current in accordance with IEEE 1584 recommendations.

3. Calculate arc-flash energy with utility contribution at minimum and assume no motor contribution.
- D. Calculate arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.
 - E. Include medium- and low-voltage equipment locations, except nominal arc-flash hazard warning data may be provided for equipment fed from transformers rated below 240 V(ac), 2000 A, instead of documenting precise calculations.
 - F. Calculate limited, restricted, and prohibited approach boundaries for each location.
 - G. Incident energy calculations must consider accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations must account for changing current contributions, as sources are interrupted or decremented with time. Fault contribution from motors and generators must be decremented as follows:
 1. Fault contribution from induction motors must not be considered beyond three to five cycles.
 2. Fault contribution from synchronous motors and generators must be decayed to match actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 to 3 p.u. after 10 cycles).
 - H. Arc-flash energy must generally be reported for maximum of line or load side of circuit breaker. However, arc-flash computation must be performed and reported for both line and load side of circuit breaker as follows:
 1. When circuit breaker is in separate enclosure.
 2. When line terminals of circuit breaker are separate from work location.
 - I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.05 POWER SYSTEM STUDY REPORTS

- A. Preparation of Power System Study Reports: Prepare and submit the following:
 1. Short-Circuit Study Report Contents:
 - a. Executive summary of study findings.
 - b. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
 - c. One-line diagram of modeled power system, showing the following:
 - 1) Protective device designations and ampere ratings.
 - 2) Conductor types, sizes, and lengths.
 - 3) Transformer kVA and voltage ratings.
 - 4) Motor and generator designations and kVA ratings.
 - 5) Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
 - 6) Derating factors and environmental conditions.
 - 7) Revisions to electrical equipment required by study.
 - d. Comments and recommendations for system improvements or revisions in written document, separate from one-line diagram.
 - e. Short-Circuit Study Input Data:
 - 1) One-line diagram of system being studied.
 - 2) Power sources available.
 - 3) Manufacturer, model, and interrupting rating of protective devices.

- 4) Conductors.
 - 5) Transformer data.
- f. Short-Circuit Study Output Reports:
- 1) Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a) Voltage.
 - b) Calculated fault-current magnitude and angle.
 - c) Fault-point X/R ratio.
 - d) Equivalent impedance.
 - 2) Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a) Voltage.
 - b) Calculated symmetrical fault-current magnitude and angle.
 - c) Fault-point X/R ratio.
 - d) Calculated asymmetrical fault currents based on fault-point X/R ratio; based on calculated symmetrical value multiplied by 1.6; and based on calculated symmetrical value multiplied by 2.7.
 - 3) Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a) Voltage.
 - b) Calculated symmetrical fault-current magnitude and angle.
 - c) Fault-point X/R ratio.
 - d) No AC Decrement (NACD) ratio.
 - e) Equivalent impedance.
 - f) Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
 - g) Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

2. Arc-Flash Hazard Study Report Contents:

- a. Executive summary of study findings.
- b. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- c. One-line diagram, showing the following:
 - 1) Protective device designations and ampere ratings.
 - 2) Conductor types, sizes, and lengths.
 - 3) Transformer kVA and voltage ratings, including derating factors and environmental conditions.
 - 4) Motor and generator designations and kVA ratings.
 - 5) Switchgear, switchboard, motor-control center, panelboard designations, and ratings.
- d. Short-circuit study output data.
- e. Arc-Flash Study Output Reports:
 - 1) Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in report:
 - a) Voltage.
 - b) Calculated symmetrical fault-current magnitude and angle.
 - c) Fault-point X/R ratio.
 - d) No AC Decrement (NACD) ratio.

- e) Equivalent impedance.
 - f) Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
 - g) Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.
- f. Incident Energy and Flash Protection Boundary Calculations:
- 1) Arcing fault magnitude.
 - 2) Protective device clearing time.
 - 3) Duration of arc.
 - 4) Arc-flash boundary.
 - 5) Restricted approach boundary.
 - 6) Limited approach boundary.
 - 7) Working distance.
 - 8) Incident energy.
 - 9) Hazard risk category.
 - 10) Recommendations for arc-flash energy reduction.
- g. Fault study input data, case descriptions, and fault-current calculations including definition of terms and guide for interpretation of computer printout.

3.06 FIELD ADJUSTMENT FOR DEVICE COORDINATION

- A. Adjust relay and protective device settings in accordance with recommended settings provided by coordination study. Field adjustments must be completed by engineering service division of equipment manufacturer under "Startup and Acceptance Testing" contract portion.
- B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
- C. Testing and adjusting must be by qualified low-voltage electrical testing and inspecting agency.
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for adjustable overcurrent protective devices.

3.07 WARNING LABELING OF ARC-FLASH HAZARDS

- A. Apply one arc-flash label on front cover for each equipment included in study, including each piece of equipment listed below:
 - 1. Low-voltage switchgear.
 - 2. Switchboards.
 - 3. Panelboards.
 - 4. Low voltage transformers.
 - 5. Safety switches.
 - 6. Control panels.
- B. Base arc-flash label data on highest values calculated at each location.
- C. Machine print warning labels with no handwritten or field-applied markings.
- D. Install arc-flash warning labels under direct supervision and control of qualified electrical professional engineer.

END OF SECTION 260573

**SECTION 262416
PANELBOARDS**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
1. Distribution panelboards.
 2. Lighting and appliance branch-circuit panelboards.

1.03 DEFINITIONS

- A. ATS: Acceptance testing specification.
B. GFCI: Ground-fault circuit interrupter.
C. GFEP: Ground-fault equipment protection.
D. HID: High-intensity discharge.
E. MCCB: Molded-case circuit breaker.
F. SPD: Surge protective device.
G. VPR: Voltage protection rating.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
 2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
1. Include dimensioned plans, elevations, sections, and details.
 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 4. Detail bus configuration, current, and voltage ratings.
 5. Short-circuit current rating of panelboards and overcurrent protective devices.
 6. Include evidence of NRTL listing for SPD as installed in panelboard.
 7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
B. Panelboard Schedules: For installation in panelboards.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Keys: One spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.
 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).

1.11 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: 18 months from date of Substantial Completion.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.
 - 1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANELBOARDS COMMON REQUIREMENTS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. 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.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.
- F. Enclosures: Surface-mounted, dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - 2. Height: 84 inches (2.13 m) maximum.
 - 3. 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.
 - 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 - 5. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Same finish as panels and trim.
- G. Incoming Mains:
 - 1. Location: Top.
 - 2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.
- H. Phase, Neutral, and Ground Buses:
 - 1. Material: Tin-plated aluminum.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
 - 2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
 - 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

- 4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
- I. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Tin-plated aluminum.
 - 2. Terminations shall allow use of 75 deg C rated conductors without derating.
 - 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 - 4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 - 5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
 - 6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 7. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 8. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.
 - 9. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- J. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
 - 1. Percentage of Future Space Capacity: 20 percent.
- K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
 - 1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
 - 2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.02 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
- B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Corporation; Cutler-Hammer Products.
 - 2. General Electric Co.; Electrical Distribution & Protection Div.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D.
 - 5. Owner- approved equivalent.
- B. Panelboards: NEMA PB 1, distribution type.
- C. 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.
- D. Mains: Circuit breaker or as noted on drawings.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.04 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - 2. Eaton Corporation; Cutler-Hammer Products.
 - 3. General Electric Co.; Electrical Distribution & Protection Div.
 - 4. Siemens Energy & Automation, Inc.
 - 5. Square D.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.05 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

- a. Inverse time-current element for low-level overloads.
- b. Instantaneous magnetic trip element for short circuits.
- c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic Trip Circuit Breakers:

- a. RMS sensing.
- b. Field-replaceable rating plug or electronic trip.
- c. Digital display of settings, trip targets, and indicated metering displays.
- d. Multi-button keypad to access programmable functions and monitored data.
- e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
- f. Integral test jack for connection to portable test set or laptop computer.
- g. Field-Adjustable Settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long and short time adjustments.
 - 4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).

6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).

7. Subfeed Circuit Breakers: Vertically mounted.

8. MCCB Features and Accessories:

- a. Standard frame sizes, trip ratings, and number of poles.
- b. Breaker handle indicates tripped status.
- c. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
- d. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits. Type HACR for heating, air-conditioning, and refrigerating equipment.
- e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
- f. Rating Plugs: Three-pole breakers with ampere ratings greater than 250 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
- g. Multipole units enclosed in a single housing with a single handle.
- h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
- i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.06 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. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.07 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Comply with NECA 1.
- C. Install panelboards and accessories according to NEMA PB 1.1.
- D. Equipment Mounting:
 - 1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
 - 2. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- E. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.
- F. Mount panelboard cabinet plumb and rigid without distortion of box.
- G. Mount surface-mounted panelboards to steel slotted supports 5/8 inch (16 mm) in depth. Orient steel slotted supports vertically.
- H. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
 - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- I. 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.
- J. Install filler plates in unused spaces.
- K. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- L. Mount spare fuse cabinet in accessible location.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. 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.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. 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.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- D. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and

Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Perform optional tests. 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.

3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

b. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. 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.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated by EOR.

3.06 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26-24-16

**SECTION 262726
WIRING DEVICES**

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Standard-grade receptacles, 125 V, 15 and 20 A.
2. GFCI receptacles, 125 V, 20 A.
3. Toggle switches, 120/277 V, 15 A.
4. Decorator-style devices, 15 A.
5. Occupancy sensors.
6. Digital timer light switches.
7. Wall-box dimmers.
8. Wall plates.

1.02 ACTION SUBMITTALS:

- A. Product Data: For each type of product.

1.03 INFORMATIONAL SUBMITTALS:

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.01 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 use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.
- E. Device Color:
1. Wiring Devices Connected to Normal Power System: Gray, unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Electrical System (NFPA 700 system): Red.
 3. SPD Devices: Blue.
 4. Isolated-Ground Receptacles: Orange.
- F. Wall Plate Color: Stainless steel, unless otherwise noted.
- G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Weather-Resistant Duplex Receptacle, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.03 STANDARD-GRADE RECEPTACLES, 125 V, 15 A

- A. Duplex Receptacles, 125 V, 15 A:
 - 1. Description: Two pole, three wire, and self-grounding.
 - 2. Configuration: NEMA WD 6, Configuration 5-15R.
 - 3. Standards: Comply with UL 498 and FS W-C-596.
- B. Weather-Resistant Duplex Receptacle, 125 V, 15 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-15R.
 - 3. Standards: Comply with UL 498.
 - 4. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.04 GFCI RECEPTACLES, 125 V, 20 A

- A. Duplex GFCI Receptacles, 125 V, 20 A:
 - 1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Type: Feed through.
 - 4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.05 TOGGLE SWITCHES, 120/277 V, 15 A

- A. Single-Pole Switches, 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
 - 2. Standards: Comply with UL 20 and FS W-S-896.
- B. Two-Pole Switches, 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
 - 2. Comply with UL 20 and FS W-S-896.
 - 3. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
 - 4. Standards: Comply with UL 20 and FS W-S-896.
- C. Three-Way Switches, 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
 - 2. Comply with UL 20 and FS W-S-896.
- D. Four-Way Switches, 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
 - 2. Standards: Comply with UL 20 and FS W-S-896.
- E. Pilot-Light, Single-Pole Switches: 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.

- c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
- 2. Description: Illuminated when switch is on.
- 3. Standards: Comply with UL 20 and FS W-S-896.
- F. Lighted Single-Pole Switches, 120/277 V, 15 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Pass & Seymour/Legrand (Pass & Seymour).
 - 2. Description: Handle illuminated when switch is on.
 - 3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.06 TOGGLE SWITCHES, 120/277 V, 20 A

- A. Single-Pole Switches, 120/277 V, 20 A:
 - 1. Standards: Comply with UL 20 and FS W-S-896.
- B. Two-Pole Switches, 120/277 V, 20 A:
 - 1. Comply with UL 20 and FS W-S-896.
- C. Three-Way Switches, 120/277 V, 20 A:
 - 1. Comply with UL 20 and FS W-S-896.
- D. Four-Way Switches, 120/277 V, 20 A:
 - 1. Standards: Comply with UL 20 and FS W-S-896.
- E. Lighted Single-Pole Switches, 120/277 V, 20 A:
 - 1. Description: Handle illuminated when switch is on.
 - 2. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.07 DECORATOR-STYLE DEVICES, 15 A

- A. Decorator Duplex Receptacles, 125 V, 15 A:
 - 1. Description: Two pole, three wire, and self-grounding. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-15R.
 - 3. Standards: Comply with UL 498.
- B. Decorator, Tamper-Resistant, Duplex Receptacles, 125 V, 15 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-15R.
 - 3. Standards: Comply with UL 498.
 - 4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- C. Decorator, Tamper- and Weather-Resistant, Duplex Receptacles, 125 V, 15 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-15R.
 - 3. Standards: Comply with UL 498.
 - 4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.
- D. Decorator Single-Pole Switches, 120/277 V, 15 A:
 - 1. Comply with UL 20.
- E. Decorator Single-Pole Lighted Switches, 120/277 V, 15 A, Insert drawing designation:
 - 1. Description: Square face illuminated when circuit is switched off.
 - 2. Standards: Comply with UL 20.

2.08 DECORATOR-STYLE DEVICES, 20 A

- A. Decorator Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding. Square face.
 - 2. Configuration: NEMA WD 6, Configuration 5-20R.
 - 3. Standards: Comply with UL 498.
- B. Decorator Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
 - 1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.

2. Configuration: NEMA WD 6, Configuration 5-20R.
 3. Standards: Comply with UL 498.
 4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- C. Decorator, Tamper- and Weather-Resistant, Duplex Receptacles, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
 2. Configuration: NEMA WD 6, Configuration 5-20R.
 3. Standards: Comply with UL 498.
 4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.
- D. Decorator Single-Pole Switches, 120/277 V, 20 A, Insert drawing designation:
1. Comply with UL 20.
- E. Decorator Single-Pole Lighted Switches, 120/277 V, 20 A:
1. Description: Square face illuminated when circuit is switched off.
 2. Standards: Comply with UL 20.

2.09 OCCUPANCY SENSORS

- A. Wall Switch Sensor Light Switch, Dual Technology:
1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
 2. Standards: Comply with UL 20.
 3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
 4. Adjustable time delay of five minutes.
 5. Able to be locked to Manual-On mode.
 6. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
 7. Connections: Provisions for connection to BAS.
 8. Connections: RJ-45 communications outlet.
 9. Connections: Integral wireless networking.
- B. Wall Sensor Light Switch, Passive Infrared:
1. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.
 2. Standards: Comply with UL 20.
 3. Connections: Provisions for connection to BAS.
 4. Connections: Hard wired.
 5. Connections: Wireless.
 6. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
 7. Integral relay for connection to BAS.
 8. Adjustable time delay of five minutes.
 9. Able to be locked to Manual-On mode.
 10. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
- C. Wall Sensor Light Switch, Ultrasonic:
1. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using ultrasonic technology.
 2. Standards: Comply with UL 20.
 3. Connections: Provisions for connection to BAS.
 4. Connections: RJ-45 communications outlet.
 5. Connections: Integral wireless networking.
 6. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
 7. Integral relay for connection to BAS.
 8. Adjustable time delay of five minutes.
 9. Able to be locked to Manual-On mode.
 10. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

2.10 TIMER LIGHT SWITCH

- A. Digital Timer Light Switch:

1. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit digital display, with selectable time interval in 10-minute increments.
2. Standards: Comply with UL 20.
3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
4. Integral relay for connection to BAS.

2.11 DIMMERS

A. Wall-Box Dimmers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Lutron Electronics Co., Inc.
 - e. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
3. Control: Continuously adjustable slider; with single-pole or three-way switching.
4. Standards: Comply with UL 1472.
5. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
 - a. 600 W; dimmers shall require no derating when ganged with other devices. Illuminated when "off."
6. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.
7. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.12 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. 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: Stainless steel.
 3. Material for Unfinished Spaces: Stainless steel.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
- B. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
- C. Coordination with Other Trades:
 1. 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.
 2. 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.
 3. Install wiring devices after all wall preparation, including painting, is complete.
 4. Where next to data outlet install both side by side.
- D. Device Installation:
 1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
 2. Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
1. Install dimmers within terms of their listing.
 2. Verify that dimmers used for fan-speed control are listed for that application.
 3. Install unshared neutral conductors online and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical. Group adjacent switches under single, multigang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 FIELD QUALITY CONTROL

- A. Tests for Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 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.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
- B. Wiring device will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 26-27-26

SECTION 26-28-16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
1. Fusible switches.
 2. Nonfusible switches.
 3. Molded-case circuit breakers (MCCBs).
 4. Enclosures.

1.03 DEFINITIONS

- A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.09 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.02 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

C. Comply with NFPA 70.

2.03 FUSIBLE SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.
2. General Electric Co.; Electrical Distribution & Control Division.
3. Siemens Energy & Automation, Inc.
4. Square D/Group Schneider.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240-V ac.
4. 200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. 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. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac.
5. Lugs: Mechanical type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.04 NONFUSIBLE SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.
2. General Electric Co.; Electrical Distribution & Control Division.
3. Siemens Energy & Automation, Inc.
4. Square D/Group Schneider.

B. Type GD, General Duty, Three Pole, Single Throw, 240-V ac, 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, Three Pole, Double Throw, 240-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. 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. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 24-V ac.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.05 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.
2. General Electric Co.; Electrical Distribution & Control Division.
3. Siemens Energy & Automation, Inc.
4. Square D/Group Schneider.

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 167 deg F (75 deg C) rated wire.

G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

J. 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-squared t response.

K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

O. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, 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.

2.06 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) , gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R, 12) , a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be directly operable through the front cover of the enclosure (NEMA 250 Type 1) directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the

locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

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

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.02 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.

2. Outdoor Locations: NEMA 250, Type 3R <Insert type>.

3. Kitchen Wash-Down Areas: NEMA 250, Type 4X,.

4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7.

3.03 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Install fuses in fusible devices.

E. Comply with NFPA 70 and NECA 1.

3.04 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.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.

b. Inspect anchorage, alignment, grounding, and clearances.

c. Verify that the unit is clean.

d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.

e. Verify that fuse sizes and types match the Specifications and Drawings.

f. Verify that each fuse has adequate mechanical support and contact integrity.

g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

- a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
 - i. Verify correct phase barrier installation.
 - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
- D. Tests and Inspections for Molded Case Circuit Breakers:
 - 1. Visual and Mechanical Inspection:
 - a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and clearances.
 - d. Verify that the unit is clean.
 - e. Operate the circuit breaker to ensure smooth operation.
 - f. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.
 - 1. Test procedures used.
 - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - 3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.06 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 26-28-16

**SECTION 26-31-00
PHOTOVOLTAIC SYSTEM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Photovoltaic system requirements.
- B. Photovoltaic modules.
- C. Photovoltaic module mounting system.
- D. Photovoltaic combiner boxes.
- E. Photovoltaic inverters.
- F. Charge controllers.
- G. Monitoring system.

1.02 RELATED REQUIREMENTS

- A. Section 03-30-00 - Cast-in-Place Concrete: Materials and installation requirements for concrete foundations.
- B. Section 25-36-13 - Integrated Automation Power Meters: Smart (AMI and AMR) Meters.
- C. Section 26-05-19 - Low-Voltage Electrical Power Conductors and Cables.
- D. Section 26-05-26 - Grounding and Bonding for Electrical Systems.
- E. Section 26-05-29 - Hangers and Supports for Electrical Systems.
- F. Section 26-05-53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26-21-00 - Low-Voltage Electrical Service Entrance.
- H. Section 26-22-00 - Low-Voltage Transformers: Isolation transformers not integral to inverters.
- I. Section 26-28-13 - Fuses.
- J. Section 26-28-16.16 - Enclosed Switches.
- K. Section 26-43-00 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. IEC 61215-1 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1: Test Requirements; 2021, with Corrigendum.
- C. IEC 61215-1-1 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-1: Special Requirements for Testing of Crystalline Silicon Photovoltaic (PV) Modules; 2021.
- D. IEC 61215-1-2 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-2: Special Requirements for Testing of Thin-Film Cadmium Telluride (CdTe) Based Photovoltaic (PV) Modules; 2021, with Amendment (2022).
- E. IEC 61215-1-3 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-3: Special Requirements for Testing of Thin-Film Amorphous Silicon Based Photovoltaic (PV) Modules; 2021, with Amendment (2022).
- F. IEC 61215-1-4 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 1-4: Special Requirements for Testing of Thin-Film Cu(In,Ga)(S,Se)₂ Based Photovoltaic (PV) Modules; 2021, with Amendment (2022).
- G. IEC 61215-2 - Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval - Part 2: Test Procedures; 2021.
- H. IEEE 1547 - IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces; 2018, with Amendment (2020).
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 412 - Standard for Installing and Maintaining Photovoltaic (PV) Power Systems; 2012.
- K. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 489B - Outline of Investigation for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures for Use with Photovoltaic (PV) Systems; Current Edition, Including All Revisions.
- N. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.
- O. UL 1699B - Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection; Current Edition; Current Edition, Including All Revisions.
- P. UL 1703 - Flat Plate Photovoltaic Modules and Panels; Current Edition, Including All Revisions.
- Q. UL 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources; Current Edition, Including All Revisions.
- R. UL 2579 - Low-Voltage Fuses - Fuses for Photovoltaic Systems; Current Edition, Including All Revisions.
- S. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for photovoltaic system components.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this section; require attendance of all affected installers. Include adequate instruction on the electrical hazards associated with photovoltaic systems and appropriate safety procedures to be followed.
- C. Rebates and Incentives: Assist in preparing and submitting documentation as required for Owner to secure funds from available federal, state, and utility company rebate and incentive programs. Notify Owner of any time constraints affecting program qualification.
- D. Utility Interconnection:
 - 1. See Section 26-21-00 for Utility Company contact information and additional requirements.
 - 2. Assist in preparing and submitting documentation as required for securing utility interconnection agreement between Owner and Utility Company.
 - a. Include copies of documentation with submittals.
 - 3. Preinstallation Meeting: Convene one week prior to commencing work of this section to review interconnection requirements and details with Utility Company representative.
 - 4. Coordinate with Utility Company to provide utility metering suitable for system requirements.
 - 5. Arrange for inspections and secure permits necessary to obtain Utility Company approval of system.

1.05 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, attachment locations and details, and proposed size, type, and routing of conduits and cables. Include system interconnection schematic diagrams showing all factory and field connections.
- D. Design Data:
 - 1. Include structural calculations, certified by structural engineer, for equipment and mounting system.
 - 2. Include electrical calculations for array and associated equipment other than the basis of design products and configuration.
- E. Certify that products of this section meet or exceed specified requirements.
- F. Certify that work of this section does not void roof warranty.

- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- H. Manufacturer's detailed field testing procedures.
- I. Manufacturer's detailed startup procedures.
- J. Utility interconnection documentation.
- K. Source quality control test reports.
- L. Field quality control test reports.
 - 1. Include manufacturer's field reports.
- M. Structural Designer's Qualification Statement.
- N. Electrical Designer's Qualification Statement.
- O. Manufacturer's Qualification Statement.
- P. Installer's Qualification Statement.
- Q. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
 - 1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
- R. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- S. Maintenance contracts.
- T. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- U. Software: One copy of software provided under this section.
- V. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01-60-00 - Product Requirements, for additional provisions.
 - 2. Extra Photovoltaic Modules: Two.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with Utility Company requirements for interconnection.
- C. Structural Designer Qualifications: Registered structural engineer licensed in the State in which the Project is located.
- D. Electrical Designer Qualifications: Registered electrical engineer licensed in the State in which the Project is located experienced in the design of photovoltaic systems.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- F. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience with photovoltaic systems of similar size, type, and complexity.
 - 1. Licensed in the State in which the Project is located to install photovoltaic systems.
 - 2. Manufacturer's authorized installer.
 - 3. Supervisor: North American Board of Certified Energy Practitioners (NABCEP) certified PV Installer.
 - 4. Installer Personnel: At least 2 years of experience installing photovoltaic systems.
- G. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.08 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals, for additional warranty requirements.

- B. Specified warranties indicate minimum requirements. Provide additional warranties or extended warranty periods where required to qualify for rebate and incentive programs.
- C. Photovoltaic Modules:
 - 1. Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.
 - 2. Provide manufacturer warranty guaranteeing minimum 90 percent of rated power output for 10 years and minimum 80 percent of rated power output for 20 years.
- D. Photovoltaic Module Mounting System: Provide minimum 10 year manufacturer warranty covering repair or replacement due to defective materials or workmanship.
- E. Photovoltaic Combiner Boxes: Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.
- F. Photovoltaic Inverters: Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Photovoltaic Modules, Crystalline Silicon:
 - 1. Substitutions: See Section 01-60-00 - Product Requirements.
- B. Photovoltaic Module Mounting System:
 - 1. Unirac, Inc; RM10-EVO: www.unirac.com/#sle.
 - 2. DCE Solar; Eco-Top HD: www.DCEsolar.com.
 - 3. Opsun Commercial Solar Carport; www.opsn.com.
 - 4. Substitutions: See Section 01-60-00 - Product Requirements.
- C. Photovoltaic Combiner Boxes:
 - 1. SMA America, LLC: www.sma-america.com/#sle.
 - 2. SolarBOS, Inc: www.solarbos.com/#sle.
 - 3. Solectria Renewables, LLC: solectria.com/#sle.
 - 4. Substitutions: See Section 01-60-00 - Product Requirements.
- D. Photovoltaic Inverters:
 - 1. Schneider Electric: www.se.com/#sle.
 - 2. SMA America, LLC: www.sma-america.com/#sle.
 - 3. Solectria Renewables, LLC: www.sollectria.com/#sle.
 - 4. Basis of Design: Solar Edge, SE14.4KUS / SE17.3KUS; www.solaredge.com.
 - 5. Substitutions: See Section 01-60-00 - Product Requirements.
- E. Monitoring System:
 - 1. Schneider Electric: www.se.com/#sle.
 - 2. SMA America, LLC: www.sma-america.com/#sle.
 - 3. Solectria Renewables, LLC: www.solren.com/#sle.
 - 4. Substitutions: See Section 01-60-00 - Product Requirements.
- F. Source Limitations: For each type of component, furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 PHOTOVOLTAIC SYSTEM REQUIREMENTS

- A. Provide complete photovoltaic system consisting of photovoltaic modules and associated balance of system components necessary for connection to facility electrical system.
- B. System Description:
 - 1. Photovoltaic array is roof-mounted and canopy-mounted in location indicated on the drawings.
 - 2. Orientation of array is as indicated on the drawings.
 - 3. System includes interconnection with utility grid (grid-tied system).
 - a. Utility metering configuration: Net metering.
 - 4. System does not include battery storage system.
 - 5. System does not include engine generator.
 - 6. System includes DC system surge protection.
 - 7. System includes monitoring system.

8. Owner intends to secure funds from available federal, state, and utility company rebate and incentive programs.
- C. Capacity:
1. Minimum Expected Annual Energy Production: 278.0 MWh, as calculated by National Renewable Energy Laboratory's PVWatts calculator or approved equivalent.
 2. Total Nominal Rated Power Output of Array: Equal to or greater than the rated output of the basis of design array.
 3. Nominal Rated Power Output of Individual Modules: Equal to or greater than the rated output of the basis of design module.
- D. Size:
1. Array: Designed to fit within the area designated on the drawings.
 2. Individual Modules: Size is not critical.
- E. Appearance:
1. Arrange array such that modules are aligned with uniform spacing.
 2. Make no alterations affecting appearance of building exterior or interior without approval of Architect.
 3. Final determination of acceptable appearance is by Architect.
- F. Provide photovoltaic system and associated components suitable for wind loads, snow loads, seismic loads, and other structural design considerations of the installed location.
1. Comply with ASCE 7.
- G. Provide photovoltaic system and associated components suitable for continuous operation under the service conditions at the installed location.
- H. Provide products listed, classified, and labeled as suitable for the purpose intended.
- I. Provide photovoltaic system and associated components that qualify for available federal, state, and utility company rebate and incentive programs.
- J. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system.
- K. DC Arc Fault Circuit Protection: Provide DC photovoltaic arc-fault protection devices listed as complying with UL 1699B as required for compliance with NFPA 70.
- L. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- M. Arrange array to provide adequate access to rear of string(s) for maintenance.
- N. Arrange array to minimize shading during peak production periods.

2.03 PHOTOVOLTAIC MODULES

- A. Acceptable Module Types: Only crystalline silicon modules are acceptable. Thin film modules will not be considered for this project.
- B. General Requirements:
1. Photovoltaic Modules: Factory assembled; consisting of photovoltaic cells, frame, junction box, cables for series connection, and bypass diodes for shade tolerance; rated for 600 V DC; complying with IEC 61215-1 and IEC 61215-2 and listed as complying with UL 1703.
 2. Crystalline Silicon Photovoltaic Modules: Comply with IEC 61215-1-1.
 3. Frame: Anodized aluminum.
 4. Factory-Installed Junction Box: Weatherproof, with factory-installed terminals and bypass diodes.
 5. Factory-Installed Cables: Type USE-2 or listed photovoltaic (PV) wire with polarized locking connectors.
 6. Unless otherwise indicated, specified module performance characteristics are rated under Standard Test Conditions (STC).
 7. Power Rating Tolerance: Plus 10 or minus 5 percent.
 - a. Include flash test data for each module with source quality control reports to demonstrate compliance.
- C. Basis of Design: Q Cells; Q.PEAK DUO XL-G10 Series, 490 Wp; www.qcells.com.

2.04 BALANCE OF SYSTEM COMPONENTS

- A. Photovoltaic Module Mounting System:
 - 1. Provide complete mounting system compatible with modules to be installed and suitable to properly install them in the location indicated, including all necessary hardware and accessories.
 - 2. Support Structure and Associated Hardware Materials: Use aluminum, galvanized steel, or stainless steel.
 - 3. Roof-Mounted Arrays:
 - a. Acceptable System Types: Only non-penetrating systems are acceptable. Penetrating systems will not be considered for this project.
 - b. Provide system compatible with the roof at the installed location.
 - c. Module Tilt Angle: 10 degrees.
 - d. Provide minimum clearance of 3 inches between roof and module for air circulation and drainage.
- B. Photovoltaic Combiner Boxes:
 - 1. Provide combiner box(es) for termination of strings as indicated or as required for the array configuration installed.
 - 2. Combiner Boxes: Rated for 600 V DC; current ratings suitable for connected strings; equipped with fuseholders; listed as complying with UL 1741.
 - 3. Fuseholders: Touch-safe; suitable to accept fuses indicated.
 - 4. Number of Input Circuits: As indicated or as required for termination of strings, with minimum of 25 percent spare capacity for future expansion.
 - 5. Enclosure: NEMA 250, Type 3R, unless otherwise indicated.
 - 6. Provide integral load-break rated disconnect.
 - 7. Provide with capability of current monitoring for individual strings.
- C. Photovoltaic Inverters:
 - 1. Provide inverter(s) as indicated or as required for connection of the photovoltaic array DC system to the AC system indicated.
 - 2. Inverters: Suitable for the requirements of the connected array; output configuration compatible with connected system; listed as complying with UL 1741; furnished with the following features:
 - a. Maximum power point tracking (MPPT).
 - b. LCD display.
 - c. Integral AC disconnect.
 - d. Integral DC disconnect.
 - e. Integral DC ground fault detection and interruption (GFDI).
 - f. Communications Interface: As required for connection to system indicated.
 - 3. Grid-Tied Inverters: Comply with IEEE 1547, including over/under grid voltage and frequency protection, and anti-islanding protection to automatically disconnect upon loss of utility power and to remain disconnected until utility power restoration has been maintained for five minutes.
 - 4. Grounded Photovoltaic DC Systems: Furnish with integral isolation transformer. Transformerless inverters may be used if a separate isolation transformer is provided.
 - 5. Total Harmonic Distortion: Less than five percent.
 - 6. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Outdoor Locations: Type 3R.
- D. Isolation Transformers: Comply with Section 26-22-00 .
- E. Enclosed Switches, in Addition to Requirements of Section 26-28-16.16:
 - 1. Switches for DC System: Rated for 600 V DC.
 - 2. Switches Connected to Supply Side of Service Disconnecting Means: Listed and labeled as suitable for use as service equipment according to UL 869A.
- F. Surge Protective Devices, in Addition to Requirements of Section 26-43-00:
 - 1. Surge Protective Devices for DC System:
 - a. Rated for 600 V DC.
 - b. Listed and labeled as complying with UL 1449, Type 1.
 - c. Surge Current Rating: Not less than 50 kA per mode.
 - d. UL 1449 Nominal Discharge Current (I-n): 20 kA.

- G. Molded-Case Circuit Breakers and Switches for DC System: Rated for 600 V DC; listed as complying with UL 489B.
- H. Monitoring System:
 - 1. Provide a system to monitor photovoltaic system performance including all sensors, dataloggers, connections, software, equipment and accessories necessary for a complete operating system.
 - 2. System communications interfaces to be wired or wireless to the JACE BAS system, with compatible interconnected components. In addition, a cellular card shall be provided for data collection over web interface. The contractor shall provide 1 year subscription, membership, cellular service or any service required that has cost to collect data.
 - a. Provide suitable raceway, minimum 3/4 inch trade size, for all required wired connections.
 - 3. System to monitor and record, in 15 minute intervals:
 - a. Inverter status.
 - b. Instantaneous power (kW).
 - c. Cumulative energy production (kWh).
 - d. Current monitoring for individual strings.
 - 4. Energy Production Meter: Revenue grade, with accuracy of plus or minus two percent.
 - 5. System real-time and historical data to be accessible from the following locations:
 - a. Personal computer(s), via internet connection.
 - b. Remote personal display(s), quantity and location as indicated on the drawings.
 - c. Remote public display(s), quantity and location as indicated on the drawings.
 - 6. System to provide alarm notification via e-mail or instant message.
 - 7. System to be compatible with third party monitoring service to be selected by Owner.

2.05 SOURCE QUALITY CONTROL

- A. Factory test the following products to verify operation and performance characteristics. Include test reports with submittals.
 - 1. Photovoltaic modules.
 - 2. Photovoltaic inverters.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Use open circuiting, short circuiting, or opaque covering to disable modules, array or portions of array prior to installation and service.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install photovoltaic system in accordance with NECA 412.
- D. Provide required support and attachment in accordance with Section 26-05-29.
- E. Mount equipment such that the highest position of any operating handle for circuit breakers or switches does not exceed 24 inches above the floor, ground, or working platform.
- F. Provide cast-in-place concrete foundations for ground-mounted arrays as indicated, constructed in accordance with Section 03-30-00.
- G. Circuiting Requirements. in Addition to Requirements of Section 26-05-19:
 - 1. Wiring Methods:
 - a. Unless otherwise indicated, use exposed module factory-installed cables (not routed inside building) for module interconnections.

- b. Unless otherwise indicated, use exposed type USE-2/RHH/RHW-2 single-conductor cable or listed photovoltaic wire (not routed inside building) for wiring between string(s) and combiner box(es).
 - c. Unless otherwise indicated, use type THHN/THWN-2 single-conductor building wire in suitable raceway for wiring between combiner box(es) and point of interconnection.
 - d. Secure exposed cables in accordance with NFPA 70. Where possible, conceal behind array.
 - e. Install cables in suitable raceway where readily accessible or where required by authority having jurisdiction.
 - f. Use suitable twist-on insulated spring connectors, mechanical connectors, or compression connectors for photovoltaic circuit splices and taps.
2. Photovoltaic DC System Conductor Color Code:
- a. Negative Grounded System:
 - 1) Positive: Red.
 - 2) Negative/Grounded: White.
 - b. Positive Grounded System:
 - 1) Positive/Grounded: White.
 - 2) Negative: Black.
 - c. Ungrounded System:
 - 1) Positive: Red.
 - 2) Negative: Black.
3. Maintain separation of photovoltaic and non-photovoltaic circuits in accordance with NFPA 70.
- H. Grounding and Bonding Requirements, in Addition to Requirements of Section 26-05-26:
- 1. Ensure that there is only one AC System bonding connection between grounding system and grounded/neutral conductor, including external connections and connections internal to equipment.
 - 2. Grounded DC Systems: Ensure that there is only one point of system grounding connection to the grounded conductor, including external connections and connections internal to equipment.
 - 3. Provide auxiliary electrodes for photovoltaic array grounding in accordance with NFPA 70.
- I. Identification Requirements, in Addition to Those Specified in Section 26-05-53:
- 1. Color for Photovoltaic System Identification Nameplates and Labels: White text on red background, unless otherwise required by NFPA 70 or authorities having jurisdiction.
 - 2. Use identification nameplate or means of identification acceptable to authority having jurisdiction to identify the presence of multiple power sources and the location of main service disconnecting means and each photovoltaic system disconnecting means. Locate at main service disconnecting means and at each photovoltaic system disconnecting means. Verify format and descriptions with authorities having jurisdiction.
 - 3. Use identification nameplate to identify each photovoltaic system disconnecting means with text "PV SYSTEM DISCONNECT".
 - 4. Use identification nameplate or identification label to identify systems equipped with rapid shutdown and associated rapid shutdown switch(es). Format, descriptions, and locations to comply with NFPA 70 and requirements of authorities having jurisdiction.
 - 5. Use identification nameplate or identification label to identify the information required by NFPA 70 for marking of direct-current photovoltaic power sources. Locate at each DC disconnect means requiring marking.
 - 6. Use identification nameplate or identification label to identify the interactive system point of interconnection at the disconnecting means as a power source and with the rated AC output current and the nominal operating AC voltage.
 - 7. Use warning labels to identify electrical hazards for photovoltaic system disconnecting means. Include the word message "Warning - Electric Shock Hazard; Terminals on the line and load sides may be energized in the open position" or approved equivalent.
 - 8. Use wire and cable markers to identify photovoltaic system source, output, and inverter circuit conductors at all points of termination, connection, and splices.
 - 9. Use voltage markers, identification labels, stenciled text, or suitable permanent marking approved by authority having jurisdiction to identify exposed raceways, cable trays, pull boxes, junction boxes, and conduit bodies with the text "Warning: Photovoltaic Power Source" at maximum intervals of 10 feet in accordance with NFPA 70.

3.04 FIELD QUALITY CONTROL

- A. See Section 01-40-00 - Quality Requirements, for additional requirements.
- B. See article "SYSTEM STARTUP" below for additional requirements related to testing and inspection.
- C. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- D. Inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify that equipment enclosures, boxes, and associated connections installed outdoors are weatherproof.
 - 3. Verify proper wiring connections have been made and check for conductor continuity. Verify proper polarity.
 - 4. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 5. Perform insulation resistance tests.
 - a. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
 - 6. Measure and record ambient conditions, including date and time, ambient temperature, cell temperature, solar irradiance in the module plane, and wind speed.
 - 7. Measure and record open circuit voltage of each string.
 - 8. Measure and record voltages at the inverter AC and DC inputs.
 - 9. Measure and record AC output power.
 - 10. Perform inverter functional test.
 - a. Grid-Tied Inverters: Include simulation of loss of utility power and subsequent power restoration.
 - 11. Verify proper operation of monitoring system.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- F. Diagnostic Period: After successful completion of inspections and tests, operate system in normal mode for at least 14 days without any system or equipment malfunctions.
 - 1. Record all system operations and malfunctions.
 - 2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
- G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.05 SYSTEM STARTUP

- A. Provide services of a manufacturer's authorized representative to assist in performing system startup. Include manufacturer's detailed startup procedures with submittals.
- B. Obtain Owner's approval prior to performing system startup.
- C. Grid-Tied Systems: Obtain Utility Company's approval prior to performing system startup.
- D. Prepare and start system in accordance with manufacturer's instructions.

3.06 CLEANING

- A. Clean modules using only methods recommended by manufacturer to avoid scratches and other damage. Clean exposed surfaces on other components to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01-78-00 - Closeout Submittals, for closeout submittals.
- B. See Section 01-79-00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of photovoltaic system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of four hours of training.
3. Instructor: Manufacturer's authorized representative.
4. Location: At project site.

3.08 PROTECTION

- A. Protect installed products from subsequent construction operations.

3.09 MAINTENANCE

- A. See Section 01-70-00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of photovoltaic system for two years from date of Substantial Completion, to include the work described below; Include a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- C. Conduct site visit at least once every six months to perform inspection, testing, and preventive maintenance. Conduct tests similar to those made during original field quality control testing. Submit report to Owner comparing test results with those of original tests along with evaluations and recommendations.
- D. Provide trouble call-back service upon notification by Owner:
 1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION 26-31-00

SECTION 32-31-19
DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Decorative steel fences.

1.02 RELATED REQUIREMENTS

- A. Section 03-30-00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.
- D. ASTM D523 - Standard Test Method for Specular Gloss; 2014 (Reapproved 2018).
- E. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013 (Reapproved 2018).
- F. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2023.
- G. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2024).
- H. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test; 2023.
- I. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016 (Reapproved 2023).

1.04 SUBMITTALS

- A. See Section 01-30-00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings:
 - 1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
 - 2. Foundation details, concrete design mix and reinforcing schedule for anti-ram barrier system.
- D. Samples: Submit two samples of fence panels, mesh infill , 8 inch by 8 inch in size illustrating construction and colored finish.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Manufacturer's Warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.07 WARRANTY

- A. See Section 01-78-00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FENCES

- A. Fences: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with electrodeposition coating, and having the following performance characteristics:
- B. Electro-Deposition Coating: Multistage pretreatment/wash with zinc phosphate, followed by epoxy primer and acrylic topcoat.
 - 1. Total Coating Thickness: 2 mils, minimum.
 - 2. Color: As selected by Architect from manufacturer's standard range.
 - 3. Coating Performance: Comply with general requirements of ASTM F2408.
 - a. Adhesion: ASTM D3359 (Method B); Class 3B with 90 percent or more of coating remaining in tested area.
 - b. Impact Resistance: ASTM D2794; 60 inch pounds.
 - c. Weathering Resistance: ASTM D523, ASTM D822/D822M and ASTM D2244; less than 60 percent loss of gloss.
- C. Steel: ASTM A653/A653M; tensile strength 45,000 psi, minimum.
 - 1. Hot-dip galvanized; ASTM A653/A653M, G60.
 - 2. 62 percent recycled steel, minimum.
- D. Fasteners: ASTM A276/A276M, Type 302 stainless steel; finished to match fence components.
 - 1. Tamper-proof security bolts.
- E. Hinges: Finished to match fence components.
 - 1. Brackets: Round.
 - 2. Mounting: Center.
- F. Latches: Finished to match fence components.
 - 1. Brackets: Round.
 - 2. Locking: Mechanical.

2.02 WELDED STEEL FENCE

- A. Provide fence meeting requirements for Industrial class as defined by ASTM F2408.
- B. Fence Panels: Fusion welded; 6 feet high by 6 feet long.
 - 1. Panel Style: welded mesh.
 - 2. Attach panels to posts with manufacturer's standard panel brackets.
- C. Posts: Steel tube.
 - 1. Size: 2-1/2 inches square by 12 gauge, 0.109 inch, with manufacturer's standard cap.
 - 2. Post Cap: Flush plate.
- D. Flexibility: Capable of following variable slope of up to 1:2.
- E. Color: Black.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Set fence posts in accordance with the manufacturer recommended spacing.
- C. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
 - 1. Base type and quantity of gate hinges on the application, weight, height, and number of gate cycles.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.

- B. Maximum Offset From Indicated Position: 1 inch.
- C. Minimum Distance from Property Line: 6 inches.

3.05 FIELD QUALITY CONTROL

- A. See Section 01-40-00 - Quality Requirements, for additional requirements.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
 - 1. Hole diameter.
 - 2. Hole depth.
 - 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.
- F. Workmanship: Verify neat installation free of defects.

3.06 CLEANING

- A. Leave immediate work area neat at end of work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- C. Clean fence with mild household detergent and clean water rinse well.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.
- F. See Section 01-74-19 - Construction Waste Management and Disposal, for additional requirements.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01-78-00 - Closeout Submittals, for closeout submittals.
- B. See Section 01-79-00 - Demonstration and Training, for additional requirements.
- C. Demonstrate proper operation of equipment to Owner's designated representative.
- D. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Briefly describe function, operation, and maintenance of each component.

3.08 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION 32-31-19

**SINGLE PRIME CONTRACT
GENERAL CONSTRUCTION
PROPOSAL**

**TYVOLA SENIOR CENTER
PV PANEL INSTALLATION**
For Mecklenburg County, Charlotte, NC

PREPARED BY:
Innovative Design, Inc.
850 W. Morgan St.
Raleigh, NC 27603
919-832-6303

BID DATE: July xx, 2024

TO: Mecklenburg County
North Carolina

FROM: _____
Name of Bidder

The undersigned Bidder hereby declares that his Proposal is made without connection with any other person, company, or parties making a similar bid or proposal, and that it is in all respect fair and in good faith, without collusion or fraud. It is the Bidder's intention & purpose to enter into a Contract with Mecklenburg County. The Bidder signifies that his bid is all-inclusive to perform the Work to construct Medic Headquarters PV Panel Installation as illustrated in the Contract Documents prepared by Innovative Design, Inc. dated 05/26/2023. The Bidder has carefully examined the Contract Document and Proposal Form and is familiar with the scope, details, intent, and conditions under which the Work, or any part of it, is to be done, and the conditions which must be fulfilled in the furnishing and/or erection or construction of any or all items of the Work. The Bidder hereby proposes to furnish all labor, materials, equipment and services necessary to perform the Work required in the Construction Document and terms of this Proposal for the amounts listed below.

A. Base Bid: \$ _____

B. Contingency Allowance: \$200,000.00

C. Total Bid: (A+B) \$ _____
(Herein referred to as the Total Bid)

ALTERNATES:

Should the Alternate be accepted, the amount written below shall be the amount either "added to" or "deducted from" the Base Bid. The Bidder shall indicate if the Alternate is an "add" or "deduct" and the changes in the number of days for the over all construction of the work. If the Alternate is left blank, then the Alternate would not change the Base Bid if accepted. The Bidder agrees to construct the Alternate(s) as described in the Contract Document for the following prices:

The undersigned Bidder further proposes and agrees to commence the work promptly upon notice to proceed, with adequate forces.

The Bidder acknowledges receipt of the following addenda:

Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____

The undersigned has enclosed the following with this Proposal:

_____ Bid Bond or Bid Deposit
_____ Bidders Qualifications Affidavit
_____ BDI Form A
_____ BDI Form B
_____ Certificate of Nondiscrimination
_____ Certificate of Compliance with the Americans With Disabilities Act

CONTRACTOR: _____

ADDRESS: _____

SIGNATURE: _____

TITLE: _____

NAME (Print): _____

NC LICENSE NUMBER: _____

BIDDER'S QUALIFICATIONS AND AFFIDAVIT

PART 1 - REQUIREMENTS

1.1 INTRODUCTION

- A. This document must be fully completed, executed, and included with the Bid Proposal Form at the time of submission. Failure to submit an executed Bidder's Qualification Affidavit may be considered justification for rejection of the bid.
- B. The information requested in the Bidder's Qualification and Affidavit shall be provided for all of the following:
 - 1. The General Contractor (Prime Bidder)
 - a. The Prime Bidder shall also be responsible for obtaining signed/executed information pertaining to their subcontractors as indicated in Item 1.1, B. 2 below:
 - 2. Any subcontractor where a professional license is required to perform their specific scope (i.e., Mechanical, Electrical, Plumbing, Fire Protection, Low Voltage, etc.) and that the Prime Bidder does not possess that required license.

1.2 QUALIFICATION REQUIREMENTS

- A. To be considered a responsible Bidder for this project, the Prime Bidder and professionally licensed subcontractors defined in Section 1.1 must meet the following minimum qualification requirements:
 - 1. The principal, project manager, and superintendent on this project shall have performed similar types of work on at least three (3) projects of similar scope within the last eight (8) years.
 - 2. The organization shall have been in business as a licensed construction contractor for a minimum of five (5) years.
 - 3. The Project Manager and Superintendent assigned to this project shall have a minimum of eight (8) years' experience respectively in project management and overseeing construction work onsite,
 - 4. Past performance: Company must be capable of demonstrating responsible performance of past work for Mecklenburg County or other owners. Provide three (3) projects of similar scope and size with reference names and phone numbers performed within the last eight (8) years.
 - 5. Be licensed to perform work in North Carolina.
 - 6. Company and/or principals of firm must not have been assessed liquidated damages on similar types of projects in the past 5 years.
 - 7. Be capable of providing 100 percent performance and payment bonds.
 - 8. Be able to provide the insurance required by the General and Supplementary Conditions.

9. Confirm that your organization has never defaulted on, been terminated from, or otherwise failed to complete any work under contract within the last five (5) years.

PART 2 - GENERAL: *(It is the Prime Bidder's Responsibility to provide this signed/notarized information with the bid proposal and to obtain and submit this same signed/notarized information with the bid proposal for each professionally licensed subcontractor as defined in Section 1.1)*

2.1 BIDDER INFORMATION:

- A. Name of Bidder: _____
- B. Address of Bidder: _____
- C. Telephone of Bidder: _____

2.2 ORGANIZATIONAL BACKGROUND:

- A. Type of Organization:
- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Corporation | <input type="checkbox"/> Individual |
| <input type="checkbox"/> Partnership | <input type="checkbox"/> Joint Venture |
| <input type="checkbox"/> Other _____ | |
- B. How long has your organization been in business:
1. As a Contractor? _____ Years
 2. As a Contractor engaged in construction work of the type proposed under this Contract: _____ Years
 3. Under your current business name? _____ Years
- C. If the bidder is a corporation, complete this section:
1. Date of Incorporation _____
 2. State of Incorporation _____
 3. Names & Title of Officers:
_____, _____
_____, _____
_____, _____
_____, _____

- D. If the bidder is other than a corporation, describe the structure of your organization including date of initiation as a business and list the principals involved:

- E. What portions of the work (i.e., trades work items, etc.) included in the proposed contract will be performed by subcontractors?

PART 3 - WORK HISTORY

3.1 SIMILAR PROJECT EXPERIENCE

- A. Attach or list the following information on at least (3) similar projects which your organization has completed in the last (8) years:

1. Past Project-1
 - a. Name of project: _____
 - b. Owner of project: _____
 - c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
 - d. Contract Amount: _____
 - e. Date of Completion: _____

2. Past Project-2
 - a. Name of project: _____
 - b. Owner of project: _____
 - c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
 - d. Contract Amount: _____
 - e. Date of Completion: _____

3. Past Project-3

- a. Name of project: _____
- b. Owner of project: _____
- c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
- d. Contract Amount: _____
- e. Date of Completion: _____

B. Attach or list the following information on similar project(s) which your organization now has in progress.

1. Current Project-1

- a. Name of project: _____
- b. Owner of project: _____
- c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
- d. Contract Amount: _____
- e. Date of Completion: _____

2. Current Project-2

- a. Name of project: _____
- b. Owner of project: _____
- c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
- d. Contract Amount: _____
- e. Date of Completion: _____

3. Current Project-3

- a. Name of project: _____
- b. Owner of project: _____
- c. Designer of Record (prime design contract)
 - 1) Name: _____
 - 2) Telephone Number: _____
- d. Contract Amount: _____
- e. Date of Completion: _____

PART 5 - CERTIFICATION

5.1 BIDDER ACKNOWLEDGEMENT

I have read and understand all sections of the bidding documents and required Bidder's Qualifications.

This Bidder Qualification Statement has been prepared on behalf of the following organization:

Name of Organization: _____

Name of Preparer: _____

Title of Preparer: _____

Date: _____

5.2 AFFIDAVIT

State of _____, County of _____

I, _____, being duly sworn, according to law,
(Name of Official)

depose and say that I am the _____, of the
(Position)

above organization, and that the responses provided in the Bidder Qualification

Statement, including any attachments thereto are true and correct to the best of my knowledge and belief.

Sworn and Subscribed _____
(Signature of Official)

to before me this _____ day of _____, 20 _____.

Notary Public

END OF BIDDER'S QUALIFICATIONS AFFIDAVIT FORM

the Contractor under this Contract, as damages for the non-completion of the Work within the Contract Time herein stipulated for completion in accordance with the provisions of this Contract. Liquidated Damages shall be fixed or allowed for such performance and completion in the amount of **Five Hundred (\$500.00)** dollars per day. Liquidated Damages is an estimate of expenses the Owner will suffer by reason of such default and is not by way of a penalty.

5. **CONTRACT PAYMENTS:** Partial payments will be made once a month. The County shall retain retainage as indicated in section 01290 Payment Procedures.

6. **FAILURE TO TIMELY COMPLETE CLOSE-OUT DOCUMENTATION:**
If the County has not received 100% of the close-out documentation, as required in Section 01290 - Payment Procedures, within one hundred and twenty (120) calendar days after Substantial Completion, the Contractor shall forfeit any and all claims to any funds due the Contractor under this contract.

In addition, if the County has not received 100% of the close-out documentation, as required in Section 01290 - Payment Procedures, within one hundred and twenty (120) calendar days after Substantial Completion, the County reserves the right to deem the Contractor to be not-a-responsible contractor for future projects. If the Contractor deemed to be not-a-responsible contractor is the lowest bidder on any future bids, the County may elect to award the Contract to another contractor, i.e., the lowest responsible bidder, taking into consideration quality, performance, and the time specified in the bids for performance, thus recognizing that the low bidding Contractor has been deemed to be not-a-responsible contractor or bidder.

Exceptions:

1. The final Change Order has not been executed by the County. The Contractor shall have one hundred and twenty (120) calendar days after receiving the final executed change order to provide the County close out documentation before being considered to be not-a-responsible contractor.
 2. The County has requested the Contractor keep his contract open in anticipation of future work on the project.
 3. The Contractor's failure to provide the missing close-out documentation is not caused by the Contractor, but is caused by a third party's failure to provide necessary information to the Contractor.
7. **CHANGES IN WORK; CLAIMS:** No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph.

Notice: Written notice stating the general nature of each claim shall be delivered by the claimant to the other party to the Contract promptly, but in no event later than thirty (30) days after the start of the event giving rise to the claim.

The responsibility to substantiate a claim shall rest with the party making the claim. The amount or extent of the claim, with supporting data, shall be delivered to the other party to the Contract within fifteen (15) days after the initial Notice of the Claim. Each claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the claimant within thirty (30) days after receipt of the claimant's last submittal.

The parties agree to make a good faith effort to resolve the claim or dispute prior to the time it must be submitted to the Consultant or to mediation as set forth in paragraph 8 below.

8. **DISPUTE RESOLUTION:** Claims and Disputes arising under this Contract shall be subject to one of the following dispute resolution processes:

A. Claims and Disputes Not Subject to Mediation

The following claims and disputes, if validly submitted as provided in Paragraph 7, are not subject to mediation, and are to be decided by the Consultant without mediation:

- A. A claim or dispute seeking a non-monetary recovery; and
- B. A claim or dispute seeking a monetary recovery of \$15,000 or less; and
- C. A claim or dispute seeking the extension of any time limit shall be subject to mediation pursuant to the Contract Mediation Provisions only if the damages which would be suffered by the Party seeking the extension would exceed \$15,000. To the extent that liquidated damages are set forth in the Contract Documents and is the measurement of damages for failure by such Party(s) to meet the time limit, the liquidated damages shall be the exclusive standard for determining the amount of damages associated with such dispute.

CLAIMS NOT SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT FOR DECISION WITHIN SIXTY (60) DAYS AFTER THE START OF THE EVENT GIVING RISE TO THE CLAIM OR DISPUTE.

B. Claims and Disputes Subject to Mediation

Any other claim or dispute arising between or among the Parties listed herein that arises from the Project, including without limitation a breach of such Contract, shall be subject to non-binding mediation administered by the American Arbitration Association under its Construction Industry Mediation Rules, or to such other mediation process to which the parties may agree, except as otherwise expressly set forth in these Contract Mediation Provisions. To the extent any provision of the Construction Industry Mediation Rules is inconsistent with the provisions of these Contract Mediation Provisions, the provisions of the Contract Mediation Provisions shall control.

The Owner and any Party contracting with the Owner or with any first-tier or lower-tier subcontractor for the Project hereby agree to participate in good faith in any mediation of a claim or dispute subject to these Contract Mediation Provisions, including without limitation the following Parties: Consultant(s), architect(s), engineer(s), surveyor(s), prime contractor(s), surety(ies), subcontractor(s), and supplier(s).

The Contractor, and all other Parties, shall include these Contract Mediation Provisions in every agreement to which they are a Party for the Project, without variation or exception. Failure to do so will constitute a breach of the Construction Contract, and the Contractor or other Party failing to include these Contract Mediation Provisions in any agreement shall indemnify and hold harmless the remaining Parties from and against any and all claims, including without limitation reasonable attorney fees and other costs of litigation arising in any manner from such breach.

For purposes of these Contract Mediation Provisions, a claim or dispute is limited to the recovery of monetary damages from the same transaction or occurrence against a single Party or two or

more Parties alleged to be jointly liable. Two or more claims or disputes may not be consolidated without the consent of all Parties to such disputes.

A request for mediation shall include the amount of the monetary relief requested.

A request for mediation must be made within ninety (90) days after giving notice of the claim or dispute as required by Paragraph 7 above.

Prior to requesting mediation, a Party must believe that it is entitled under applicable law to recover the monetary amount to be included in the request from one or more of the remaining Parties. Such belief must be based on a reasonable and prudent investigation into the claim or dispute. The request for mediation must be based on such investigation and may not include any amount or the name of any remaining Party(s), unless supported by such investigation by the Party requesting the mediation.

If a Party does not perform a reasonable and prudent investigation, it shall indemnify and hold harmless all other Parties from any costs, including reasonable attorney fees and other costs of mediation, litigation, and damages incurred by such other Parties.

All expenses incurred by a Party in preparing and presenting any claim or defense, shall be paid by the Party preparing for mediation. Such expenses shall include, without limitation, any associated cost for witnesses, exhibits, and attorney fees. All other expenses, including filing fees and required traveling expenses by the mediator, and other expenses of the mediator, shall be borne as follows: (1) One half by the Party requesting the mediation, with the remaining parties paying equal shares of the remaining expenses and costs. (2) If the Owner is named as a party to the mediation, the Owner shall pay at least one-third of the mediation expenses and 2/3 of the expenses shall be divided among the remaining Parties. (3) If more than one Party to dispute requests mediation, the mediation expenses and costs to be divided among the Parties shall be borne equally by the Parties to the dispute; however, if the Owner is named as one of the parties to the mediation, the Owner shall pay at least one-third of the mediation expenses.

The mediation shall be held at a location agreeable to the mediator and all of the Parties. If no agreement can be reached, the mediation will be held at a location in Mecklenburg County as the mediator shall determine.

The provision of these Contract Mediation Provisions is subject to any other provisions of the Construction Contract concerning the submission, documentation and/or proof of any claim(s) or dispute(s).

C. Claims and Disputes Submitted to the Consultant

For purposes of this Contract, the “Consultant” shall be Consultant Name

Claims should be submitted to the Consultant at the following address:

Consultant Name
Address
City, NC Zip

Initials of Contractor

FINAL RESOLUTION OF DISPUTES: ANY VALIDLY SUBMITTED CLAIM OR DISPUTE UNRESOLVED AFTER SUCH MEDIATION, OR THAT DOES NOT REQUIRE MEDIATION, SHALL BE SUBMITTED TO THE CONSULTANT FOR FINAL RESOLUTION IN ACCORDANCE WITH THE FOLLOWING PROVISIONS:

CLAIMS NOT SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT FOR DECISION WITHIN SIXTY (60) DAYS AFTER THE START OF THE EVENT GIVING RISE TO THE CLAIM OR DISPUTE.

CLAIMS SUBJECT TO MEDIATION MUST BE SUBMITTED TO THE CONSULTANT WITHIN THIRTY (30) DAYS AFTER THE MEDIATION ENDS.

THE CONSULTANT WILL BE THE INTERPRETER OF THE REQUIREMENTS OF THIS CONTRACT AND THE JUDGE OF THE PERFORMANCE THEREUNDER BY THE OWNER AND CONTRACTOR.

IT IS AGREED BY AND BETWEEN THE PARTIES TO THIS CONTRACT THAT THE CONSULTANT SHALL RESOLVE ALL DISPUTES, INCLUDING, WITHOUT LIMITATION, DISPUTES INVOLVING (i) THE QUANTITY AND QUALITY OF THE SEVERAL KINDS OF WORK AND MATERIALS WHICH ARE TO BE PAID FOR UNDER THIS CONTRACT; (ii) THE APPORTIONMENT OF LIQUIDATED DAMAGES AMONG CONTRACTORS, INCLUDING THE CONTRACTOR; (iii) ALL QUESTIONS IN RELATION TO LINES, ELEVATIONS, AND DIMENSIONS OF THE WORK; AND (iv) THE PROPER INTERPRETATION OF THE PLANS AND SPECIFICATIONS.

IN MAKING ITS DECISION IN THESE MATTERS, THE CONSULTANT SHALL REQUIRE SUCH INFORMATION AND EVIDENCE, AS THE CONSULTANT, IN ITS SOLE DISCRETION, SHALL DEEM NECESSARY TO FULLY AND FAIRLY CONSIDER THE MATTER AND TO ALLOW IT TO RENDER A FULL, FAIR, AND IMPARTIAL DETERMINATION OF THE CLAIM OR DISPUTE SUBMITTED TO IT.

Consultant's Action: Consultant will review each claim or dispute and, within thirty (30) days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the claim in whole or in part; or
2. approve the claim in whole or in part.

THE CONSULTANT'S DECISIONS UPON THESE CLAIMS AND DISPUTES SHALL BE FINAL AND BINDING UPON THE OWNER AND THE CONTRACTOR.

9. **DOCUMENTS INCORPORATED BY REFERENCE:** It is agreed and understood that the Bid Package, including without limitation, any Addendum to the Bid Package, the Notice to Bidders, Instructions to Bidders, the General Conditions, the MWBE Provisions, Supplementary Conditions, all information in the Project Manual including the Technical Specifications, the Contractor's Itemized Proposal, and all other specifications and drawings referenced therein (herein "Contract Documents") are part of this Contract and are incorporated herein in full.
10. **MISCELLANEOUS PROVISIONS:** The Contractor hereby agrees that he has read each and every clause of this Contract, including all Contract Documents, and fully understands the

meaning of the same, and that he will comply with all its terms. This Contract is to be executed with one (1) copy to be delivered to the Contractor and one (1) to be retained by the Owner. Each Contract shall contain an original Performance Bond and a copy of the Certificate of Insurance.

The Performance and Payment Bond shall be addressed to:

Mecklenburg County
600 East Fourth St.
Charlotte, NC 28202
Attn: County Manager's Office
Mr. Tyrone C. Wade

The Certificate of Liability Insurance shall be addressed to:

Mecklenburg County
Asset and Facility Management Department
3205 Freedom Dr., Suite 6000
Charlotte, NC 28208

11. **GOVERNING LAW AND JURISDICTION:** The parties acknowledge that the Contract is made and entered into in Charlotte, North Carolina, and will be performed in Charlotte and Mecklenburg County, North Carolina. The parties further acknowledge and agree that North Carolina law shall govern all the rights, obligations, duties and liabilities of the parties under the Contract, and that North Carolina law shall govern in the interpretation and enforcement of the Contract and any other matters relating to the Contract (all without regard to North Carolina conflicts of law principles).

The parties further agree that any and all legal actions of proceedings relating to the Contract shall be brought in a state of federal court sitting in Mecklenburg County, North Carolina. By execution of the Contract, the parties submit to the jurisdiction of said courts and hereby irrevocably waive any and all objections, which they may have with respect to venue in any court sitting in Mecklenburg County, North Carolina.

12. **INDEMNIFICATION:** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless each of the "Indemnitees" (as defined below) from and against any and all "charges" (as defined below) paid or incurred by any of them as a result of any claims, demands, lawsuits, actions or proceedings either: (i) alleging violation, misappropriation, or infringement of any copyright, trademark, patent, trade secret or other proprietary rights with respect to the Work, or any products or deliverables provided to the County pursuant to this Contract ("infringement claims"); (ii) seeking payment for labor or materials purchased or supplied by the Contractor or its subcontractors in connection with this Contract; or (iii) arising from the Contractor's failure to perform its obligations under this Contract, or from any act of negligence or willful misconduct by the Contractor or any of its agents, employees or subcontractors relating to this Contract, including but not limited to any liability caused by an accident or other occurrence resulting in bodily injury, death, sickness, or disease to any person(s) or damage or destruction to any property, real or personal, tangible or intangible: or (iv) arising from a violation of any federal, state or local law, regulation or ordinance by the Contractor or any of its subcontractors, including without limitation, E-Verify (Article 2 of Chapter 64 of the North Carolina General Statutes) or other immigration laws; (v) arising from any claim that the Contractor or an employee or subcontractor of the Contractor is an employee of, including but not limited to claims relating to Workers' Compensation, failure to withhold taxes and the like. For purposes of this section : (a) the term "Indemnitees" means the County and each of the County's officers,

officials, employees, agents and independent contractors, excluding the Contractor; and (b) the term "charges" means any and all losses, damages, costs, expenses (including reasonable attorneys' fees), obligations, duties, fines, penalties, royalties, interest charges and other liabilities including settlement amounts.

13. **COMPLIANCE PROVISION:** The Contractor agrees to make itself aware of and comply with, and cause its subcontractors to comply with, all federal, state, and local laws, regulations and ordinances relating to the performance of this Contract, or to the products and services delivered hereunder, including without limitation, **E-Verify (Article 2 of Chapter 64 of the North Carolina General Statutes)**, Workers' Compensation, the Fair Labor Standards Act (FLSA), the Americans with Disabilities Act (ADA), the Family and Medical Leave Act (FMLA) and Occupational Safety And Health Administration (OSHA). The Contractor further agrees to obtain all verifications, permits and licenses applicable to the performance of this Contract. If any violation of this section has occurred or does occur, the Contractor will indemnify and save harmless the County from all losses, damages, costs, expenses (including reasonable attorneys' fees), obligations, duties, fines, penalties, interest charges and other liabilities (including settlement amounts) incurred on account of such violation.

14. **IRAN DIVESTMENT ACT CERTIFICATION:** Contractor certifies that as of the date of this agreement, contractor is not currently listed on the Final Divestment List created and maintained by the North Carolina State Treasurer pursuant to G.S.143-6A-4. Further, pursuant to G.S. 143C-6A-5(b), Contractor agrees not to sub-contract with any person or entity to perform any part of the contract terms herein, if, at the time, the sub-contractor's name appears on the then-current version of the Divestment Act List. Contractor further agrees to notify the County Procurement Department if at any time during the term of this agreement, it is added to the "List." The Divestment List may be found on the State Treasurer's website at www.nctreasurer.com/Iran.

In WITNESS WHEREOF, the parties have duly executed this Contract as of the date first above written.

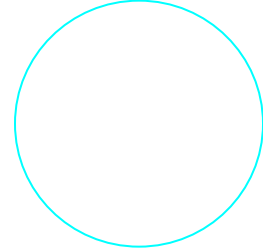
CONTRACTOR:

ATTEST:

Contractor Signature

for the Contractor

Corporate Seal



**MECKLENBURG COUNTY AUTHORIZED OFFICER SIGNATURES FOLLOW ON
NEXT PAGE**



Mecklenburg County

Signature Page

Contract Number: To be completed by County Finance Department
Amendment Number: To be completed by County Finance Department
Contractor Name: To be completed by County Finance Department

MECKLENBURG COUNTY:

ATTEST:

Assistant County Manager

Clerk to the Board of County Commissioners

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

APPROVED AS TO FORM:

Finance Director

County Attorney

APPROVED AS TO INSURANCE REQUIREMENTS:

Charlotte-Mecklenburg Division of Insurance Risk Management

PROPOSAL REQUEST LOG								PROJECT CONTINGENCY		CONTRACT CHANGE ORDER	
								Allowance-1	\$ 50,000.00	Change Order-1	\$ 75,000.00
NAME OF PROJECT: PROJECT X NAME OF CONTRACTOR: CONTRACTOR X CONTRACT NUMBER: XXX-XXX								Allowance-2	\$ -	Change Order-2	\$ -
								Allowance-3	\$ -	Change Order-3	\$ -
								TOTAL	\$ 50,000.00	TOTAL	\$ 75,000.00
PROP #	ISSUE DESCRIPTION	DATE			STATUS	TIME (Days)	EFFECT	PROPOSAL AMOUNT	RUNNING BALANCE	PROPOSAL AMOUNT	RUNNING BALANCE
		Original Submitted	Revision Submitted	Final Response							
1	Description				Approved	0.50	Cost	\$2,000.00	\$48,000.00		
2	Description				Pending	1.00	Cost	\$4,000.00	\$44,000.00		
3	Description				Approved	0.00	Credit	-\$1,000.00	\$45,000.00		
4	Description				Approved	10.00	Cost			\$75,000.00	\$0.00
5	Description				Approved	1.00	Cost	\$3,500.00	\$41,500.00		
6											
7											
8											
9											
10											
						12.50	TOTAL DAYS	\$8,500.00	CONTINGENCY PROP TOTAL	\$75,000.00	C.O. PROP TOTAL

**Mecklenburg County - AFM
Proposal Request Form**

Proposal Number 1

- Select One
 Project Contingency
 Contract Change Order

Name of Contractor:
Contract Number:
Name of Project:
Date:
Description of Change: <i>Attach Additional Sheets as Necessary</i>

SUB-CONTRACTOR		
1	Cost of Materials (Including sales tax)	\$ -
2	Rental Equipment	\$ -
3	Labor	\$ -
4	Insurance (Workman's Comp., Social Security or as Required/Specified)	\$ -
5	SubTotal	\$ -
6	Overhead & Profit (10% of Line 5)	\$ -
7	SUB-CONTRACTOR Total	\$ -
PRIME CONTRACTOR		
8	Cost of Materials (Including sales tax)	\$ -
9	Rental Equipment	\$ -
10	Labor	\$ -
11	Insurance (Workman's Comp., Social Security or as Required/Specified)	\$ -
12	Guarantee Bond	\$ -
13	SubTotal	\$ -
14	Overhead & Profit (10% of Line 7 + Line 13)	\$ -
15	PRIME CONTRACTOR Total	\$ -
16	PROPOSAL TOTAL (Sum of Lines 7 and 15)	\$ -

Additional Contract Time Required (Impact to Project Critical Path):

Days: _____

Submitted By:

Date: _____

Contractor's Representative

Verified and Approved By:

Date: _____

Consultant's Representative

Date: _____

Owner's Representative

Date _____
(Date Project Accepted by Owner)

GENERAL GUARANTEE

(Name of Contractor) _____
guarantees all products and workmanship incorporated in the (Name and Location of Project)

_____ against defect due to faulty products or faulty workmanship or negligence for a period of (12) twelve months for the General Guarantee and a period of (24) twenty four months for incidental building watertightness not covered by specific Sections of the Project Manual as set forth in the General Conditions and the Supplementary Conditions or for such longer periods as may be designated by specific Sections of the Project Manual.

He shall, immediately upon notification by the Owner of water penetration, determine the source of water penetration and, at his own expense, do any and all work necessary to return the building to a watertight condition. He shall also, at his own expense, repair or replace any other damaged products, finishes, and furnishings, damaged as a result of this water penetration, to return the building to its original condition.

This guarantee is binding where defects occur due to normal usage conditions and does not cover willful or malicious damage, damage caused by acts of God, or other casualty.

(Contractor)

By: _____

Title: _____

Date: _____

Sworn to and subscribed before me
this ____ day of _____, 20____

Notary Public

My Commission Expires: _____

Date _____
(Date Project Accepted by Owner)

GENERAL GUARANTEE and WATER-TIGHTNESS GUARANTEE

(Name of Contractor) _____
guarantees all products and workmanship incorporated in the (Name and Location of Project)

against defect due to faulty products or faulty workmanship or negligence for a period of (12) twelve months for the General Guarantee and a period of (24) twenty-four months for incidental building water-tightness not covered by specific Sections of the Project Manual as set forth in the General Conditions or for such longer periods as may be designated by specific Sections of the Project Manual.

Contractor shall, immediately upon notification by the Owner of water penetration, determine the source of water penetration and, at Contractor's own expense, do any and all work necessary to return the building to a watertight condition. Contractor shall also, at own expense, repair or replace any other damaged products, finishes, and furnishings, damaged as a result of this water penetration, to return the building to its original condition.

This guarantee is binding where defects occur due to normal usage conditions and does not cover willful or malicious damage, damage caused by acts of God, or other casualty.

(Contractor)

By: _____

Title: _____

Date: _____

Sworn to and subscribed before me
this ____ day of _____, 20____

Notary Public

My Commission Expires: _____

CONTINUATION SHEET

APPLICATION AND CERTIFICATION FOR PAYMENT, containing

Contractor's signed Certification is attached.

APPLICATION NUMBER:

APPLICATION DATE:

PERIOD TO:

OWNER'S PROJECT NO:

CONTRACT DATE:

PROJECT NAME:

ITEM	DESCRIPTION OF WORK	MATERIAL VALUE	LABOR EQUIPMENT VALUE	SCHEDULED VALUE	WORK COMPLETED		TOTAL COMPLETED TO DATE	PERCENT COMPLETE	BALANCE TO FINISH	RETAINAGE
					TOTAL THIS PERIOD	TOTAL PREVIOUS MONTH S				
1				-			-	#DIV/0	-	-
2				-			-	#DIV/0	-	-
3				-			-	#DIV/0	-	-
4				-			-	#DIV/0	-	-
5				-			-	#DIV/0	-	-
6				-			-	#DIV/0	-	-
7				-			-	#DIV/0	-	-
8				-			-	#DIV/0	-	-
9				-			-	#DIV/0	-	-
10				-			-	#DIV/0	-	-
11				-			-	#DIV/0	-	-
12				-			-	#DIV/0	-	-
13				-			-	#DIV/0	-	-
14				-			-	#DIV/0	-	-
15				-			-	#DIV/0	-	-
16				-			-	#DIV/0	-	-
17				-			-	#DIV/0	-	-
18				-			-	#DIV/0	-	-
19				-			-	#DIV/0	-	-
20				-			-	#DIV/0	-	-
21				-			-	#DIV/0	-	-
22				-			-	#DIV/0	-	-
23				-			-	#DIV/0	-	-
24				-			-	#DIV/0	-	-
25				-			-	#DIV/0	-	-
26				-			-	#DIV/0	-	-
	TOTAL JOB COST	-	-	-	-	-	-	#DIV/0	-	-

