ORANGE COUNTY
NORTH CAROLINA

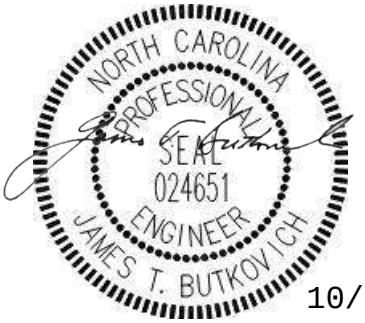
ORANGE COUNTY, NORTH CAROLINA
COURT STREET ANNEX
MDP REPLACEMENT

HILLSBOROUGH, NORTH CAROLINA

PDC PROJECT #23016

November 2024

10/30/24



10/30/24

Prepared by
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COUNTY OF ORANGE
FINANCIAL SERVICES – PURCHASING
PO BOX 8181
HILLSBOROUGH, NORTH CAROLINA 27278

ORANGE COUNTY BID NO. 367-OC5416

November 18, 2024

ATTENTION:

INTERESTED VENDORS

Orange County requests your competitive quotation to furnish the item(s) listed below for Orange County **Court Street Annex MDP Replacement**, Hillsborough, NC.

A mandatory site visit is scheduled for Wednesday**, December 4, 2024** at 10:00 am at the site. We will meet at the Orange County Court Street Annex (Main Entrance) located at 109 Court Street, Hillsborough, NC. This is the only scheduled time for contractors to view the site. By submission of a bid, the contractor acknowledges he/she fully understands the extent of the project.

Please transmit this quotation via email to the Orange County Purchasing Agent- jamaro@orangecountync.gov no later than **December 18, 2024, at 2:00 PM**

Item #	Commodities/Goods or Services
1	The Work consists of providing all labor and materials for the Orange County Court Street Annex MDP Replacement per the drawings and specifications dated: 10/30/2024 Drawings: G0.01, E0.00, E1.01, E5.01, E6.01, E7.01. SUBMIT PRICING ON ATTACHMENT A
Will any people working on this job make less than the current adopted Orange County Living Wage Yes _____ No_____ If yes, the lowest hourly wage to be paid to any employee shall be: $_____/ Hour	
****SEE ATTACHED INSTRUCTIONS TO BIDDERS****	

License _____ (if applicable)

FIRM NAME _____

BY _____
(Proposal must be signed in writing)

ADDRESS _____

_____

FAX: _____

TELEPHONE: _____

EMAIL: _____

COUNTY OF ORANGE
FINANCIAL SERVICES – PURCHASING
PO BOX 8181 131 WEST MARGERET LANE
HILLSBOROUGH, NORTH CAROLINA 27278
Instructions to Bidders

1. All bids and proposals shall be for furnishing apparatus, supplies, materials, equipment, and/or work and services in accordance with the applicable plans and specifications prescribed by Orange County. Plans and/or specifications may be obtained at Orange County's website https://www.orangecountync.gov/Bids.aspx

2. Orange County reserves the right to:
   - award to the lowest responsible bidder that is responsive,
   - to reject any or all bids,
   - And to waive minor informalities.

3. The successful bidder shall comply fully with the requirements of General Statutes, Section 143-129 and 143-131, as amended. This is an informal range; therefore, there will not be a formal opening. Results will be made available after the award.

4. In the event of default by any contractor or vendor Orange County may procure from other sources whatever service or item is being bid and holds the contractor responsible for any excess cost occasioned thereby.

5. Payment by electronic funds transfer is due thirty days after completion and inspection unless otherwise specifically provided; subject to any discounts allowed.

6. North Carolina sales and use tax shall be included in the bid amount.

7. Bids shall be submitted **via email to jamaro@orangecountync.gov**

8. Proposals received after the opening date and time shall not be considered.

9. Bids must be signed and submitted on the attached form of the proposal.

10. The successful contractor shall be responsible for obtaining all permits and inspections.

11. The successful contractor shall be required to agree to and sign the Orange County Construction Agreement (copy attached). Among the items included in that agreement are the County's Insurance requirements and sales tax.

12. All contractors are hereby notified that they must have proper licenses as required under the state laws governing their respective trades. General contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for "Unlimited Building" or "Unclassified," required by the NC General Contractors Licensing Board under G.S. 87-1.

13. Please direct questions concerning this bid document to Jovana Amaro, Purchasing Agent, Orange County Financial Services, (919.245.2651, or via email at jamaro@orangecountync.gov. Please direct any questions about the scope, site visit, details of the work, or the proposal to Angel Barnes, Orange County Capital Projects Manager, Asset Management Services, 919.245.2628 or email at abarnes@orangecountync.gov.

14. A mandatory site visit is scheduled for Wednesday, December 4, 2024, at 10:00 am at the site. We will meet at the Orange County Court Street Annex (Main Entrance) located at 109 Court Street, Hillsborough, NC. This is the only scheduled time for contractors to view the site. By submission of a bid, the contractor acknowledges he/she fully understands the extent of the project.

15. **Minority Business Participation Requirements:** Orange County has established a ten percent (10%) minority business participation goal for the total monetary value of this project.

Provide with the bid – Under GS 143-128.2(c) the undersigned bidder shall identify on its bid (**Identification of HUB Certified/ Minority Business Participation Form**) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. It is also required to submit the **State of North Carolina - Affidavit A** - **Listing of the Good Faith Efforts** made to solicit minority participation in the bid effort.

NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit **(B)** to that effect in addition of Affidavit **(A)** required above. The MB Participation Form must still be submitted even if there is zero participation.

After the bid opening – The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. ***Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:***

An **Affidavit (C)** that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary.

OR

If less than the 10% goal, an Affidavit (D) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations, and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

Note: Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors, and suppliers that will be used. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

16. The following forms are required to be returned with your bid package.

- Contractor Signed Bid Forms
- Living Wage Contractor Policy
- E-Verify Affidavit
- Orange County Nondiscrimination Certification
- Supplemental Vendor Information: Historically Underutilized Businesses
- Minority Business Participation Forms

Attachment A

Bid Proposal Form: Orange County Court Street Annex MDP Replacement

The contractor agrees to furnish all materials, labor, and any other supplies or equipment necessary to complete the above work, for the sum of:

$_____ Labor

$_____ Materials

$_____ Total BID

- All work must be completed within **300** days of the project start date (approx. January 20, 2025) (anticipated completion date November 16, 2025).
- Contractor is willing to participate in the County's "Docusign" digital contracting process and enter into a standard contract with the County.
- No proposal may be withdrawn after the scheduled closing time and date for the receipt of Bids for a period of (60) sixty days.

_____
(Name of firm or corporation making bid)

By: _____
Signature

Name: _____
Print or type

Title _____
(Owner/Partner/Pres./V.Pres)

Address _____

_____

License No._____

Federal I.D. No. _____

Email Address: _____

Addendum(s) received and used in computing bid: (Check or date beside each addendum your firm using for computing your bid)

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5 _____ Addendum No. 7 _____

Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 8 _____

Checklist for Items to be returned with the bid.
All items listed below must be returned with your bid package.

- ☐ Contractor's Completed and Signed Form of Proposal
- ☐ Living Wage Contractor Policy
- ☐ E-Verify Affidavit
- ☐ Orange County Nondiscrimination Certification
- ☐ Supplemental Vendor Information: Historically Underutilized Businesses
- ☐ MB Participation Forms

[Departmental Use Only]
TITLE CSA MDP Replacement
FY FY2023-2024 RFP5416

NORTH CAROLINA

CONSTRUCTION AGREEMENT UNDER $250,000.00

ORANGE COUNTY

THIS CONSTRUCTION AGREEMENT (hereinafter called "Agreement"), made as of the day of , 20 , by and between , (hereinafter called the "Contractor"), and Orange County, a political subdivision of the State of North Carolina, (hereinafter called the "County," "Orange County," or "Owner").

W I T N E S S E T H:

That the Contractor and the Owner, for the consideration herein named, agree as follows:

1. CONTRACT DOCUMENTS; PRIORITY

The Contract Documents consist of this Agreement, the Request for Proposals, Proposal, Construction Drawings, and Written Specifications. The Contract Documents form the Contract. In the event of any inconsistency between or among the Contract Documents the Contract Documents shall be interpreted in the following order of priority:

a. This Agreement.

b. Designer Approved Bulletins and Field Orders.

c. Request for Proposals and addenda thereto.

d. Proposal.

2. SCOPE OF WORK

The Contractor shall furnish and deliver all of the materials, and perform all of the work required by this Agreement within the time period stipulated in a written Notice-to-Proceed to be executed by the Contractor and Owner and in accordance with the following enumerated documents, which are made a part hereof as if fully contained herein:

a. Construction Drawings prepared by (Sheet dated)

b. Written specifications prepared by the project engineer.

c. proposal dated , 20 which fully describes the work to be performed. Such work will hereafter be called the "Work".

d. Related documents listed under Section 1 above.

3. TERM AND SCHEDULING

a. The Contractor agrees to commence work pursuant to the written Notice to Proceed.

b. The Contractor agrees to complete substantially all Work by , 20 .

c. Time is of the essence with respect to all dates specified in the Contract Documents as Completion Dates.

d. The Contractor shall perform the Work in the time, manner, and form required by the Contract Documents and as stipulated in a written Notice-to-Proceed to be executed by the Contractor and Owner.

e. It is expressly understood that the Owner will employ other contractors to perform work as a part of the Project whose work will be performed simultaneously and sequentially with the performance of the Work by the Contractor. It shall be necessary for the Contractor to coordinate its activities with such other contractors, particularly with respect to access to work areas, storage of materials and other common facilities.

f. Should the Owner determine that the Contractor is behind schedule Owner may require, at no additional cost to the Owner, the Contractor to expedite and accelerate its efforts, including providing additional resources and working overtime, as necessary, to perform the Work in accordance with the approved project schedule.

4. STANDARD OF CARE

a. The Contractor shall exercise reasonable care and diligence in performing the Work in accordance with the highest generally accepted standards of this type of Contractor practice throughout the United States and in accordance with applicable federal, state and local laws and regulations applicable to the performance of these services. Contractor is solely responsible for the professional quality, accuracy and timely completion and submission of all work.

b. The Contractor shall not load or permit any part of the Work to be loaded with a weight that will endanger its safety, intended performance or configuration.

c. Contractor shall be responsible for all errors or omissions caused by its employees, agents, contractors, or assigns in the performance of the Agreement. Contractor shall correct any and all errors, omissions, discrepancies, ambiguities, mistakes or conflicts at no additional cost to the Owner.

d. Contractor is an independent contractor of Owner. Any and all employees of the Contractor engaged by the Contractor in the performance of any work or services required of the Contractor under this Agreement, shall be considered employees or agents of the Contractor only and not of the Owner, and any and all claims that may or might arise under any workers compensation or other law or contract on behalf of said employees while so engaged shall be the sole obligation and responsibility of the Contractor.

e. If activities related to the performance of this Agreement require specific licenses, certifications, or related credentials Contractor represents that it or its employees, agents and subcontractors engaged in such activities possess such licenses, certifications, or credentials and that such licenses certifications, or credentials are current, active, and not in a state of suspension or revocation.

f. The Contractor is responsible for all physical damage to owned or rented machinery, tools, equipment, forms, and other items owned, rented or used by the Contractor and Subcontractor(s) in the performance of the Work including all of Owner's property in Contractor's care, custody, or control, and all such property while it is in transit.

g. The Contractor is solely responsible for obtaining all permits necessary to complete the Work in compliance with all local, state, and federal laws.

5. PAYMENT & TAXES

a. The Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement and the Contractor hereby agrees to perform all of the Work for a sum not-to-exceed Dollars ($). Not later than the fifth (5th) day of each calendar month the Contractor shall submit to the Owner's Representative, generally the architect if an architect is retained on the Work, a Request for Payment for work done during the previous calendar month.

i. The Request for Payment shall be in form of a standardized invoice or AIA Document G702-703 appropriately addressed to Owner's Representative at and shall show substantially the value of work done during the previous calendar month.

ii. The amount due for payment shall be ninety-five percent (95%) of the value of work completed since the last Request for Payment and this amount shall be paid by the Owner on or before the last business day of the month. Owner shall retain five percent (5%).

1. Upon Owner's Representative's certification that ninety percent (90%) of the Work has been satisfactorily completed retainage may be discontinued. Retainage may be discontinued, at Owner's Discretion, so long as work continues to be completed satisfactorily and on schedule.

iii. Final payment shall not be due to the Contractor until thirty (30) days after one hundred percent (100%) of the Work, including punch list work, has been satisfactorily (as determined by the County) completed and an appropriate affidavit as required in Section 7(c) below has been received by Owner.

b. Should Owner reasonably determine that Contractor has failed to perform the Work related to a Request for Payment, Owner, at its discretion may provide the Contractor ten (10) days to cure the breach. Owner may withhold the accompanying payment without penalty until such time as Contractor cures the breach.

i. Should Contractor or its representatives fail to cure the breach within ten (10) days, or fail to reasonably agree to such modified schedule, Owner may immediately terminate this Agreement in writing, without penalty or incurring further obligation to Contractor.

ii. This section shall not be interpreted to limit the definition of breach to the failure to perform the Work related to a Request for Payment.

c. The Contractor has included in the Contract Price and shall pay all taxes assessed by any authority on the Work or the labor and materials used therein. It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales and use tax paid by the Contractor and each of its subcontractors.

6. INSURANCE AND BONDS

a. Minimum requirements – Contractor shall obtain, at its sole expense, Commercial General Liability Insurance, Automobile Insurance, Workers' Compensation Insurance, and any additional insurance as may be required by Owner's Risk Manager as such insurance requirements are described in the Orange County Risk Transfer Policy and Orange County Minimum Insurance Coverage Requirements (each document is incorporated herein by reference and may be viewed at http://www.orangecountync.gov/departments/purchasing_division/contracts.php). If Owner's Risk Manager determines additional insurance coverage is required such additional insurance shall be designated here (if no additional insurance required mark N/A as being not applicable). Contractor shall not commence construction work until such insurance is in effect and certification thereof has been received by the Owner's Risk Manager.

b. Performance Bonds – Contractor shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising under any of the Contract Documents or related in any way to the Work. Contractor shall immediately furnish a copy of such bonds to any requesting person who appears to be a potential beneficiary of bonds covering payment obligations arising under any of the Contract Documents. This subsection 6(b) applies only to Contracts of fifty thousand dollars ($50,000.00) or more where the total cost for the project is three hundred thousand dollars ($300,000.00) or more.

7. INDEMNITY

a. To the extent authorized by North Carolina law the Contractor shall indemnify, without limitation, and hold harmless to the maximum extent permitted by law the Owner and its agents and employees from and against any and all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance or nonperformance of the Work, provided that any such claim, damages, loss or expense (A) is attributable to bodily injury, sickness, disease or death or injury to, or destruction of, property, including the loss of use resulting therefrom; and (B) is caused in whole or in part by any breach of any provision of the Agreement or by any negligent or wrongful act or omission of the Contractor, any Subcontractor, or supplier of the Contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. The indemnification obligation under this paragraph shall not be limited in any way by any limitation of the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' compensation acts, disability benefits acts or other employee benefit acts. It is the intent of this section that the Contractor shall indemnify the County to the maximum extent allowed by law.

b. The Contractor shall indemnify and hold harmless Owner from any lien of whatever type through the purchase of appropriate bonds and insurance as designated in Section 6 above. In the event any such lien is filed against Owner's property Contractor shall, through such bonds and insurance or at Contractors expense, defend Owner against all such claims of lien.

c. Upon completion of the Work the Contractor shall execute an affidavit stating there are no unpaid debts for any work that has been done or materials that have been furnished to the

project prior to and as of the date of substantial completion and further stating that Contractor shall indemnify, save and protect Owner and Owner's lender, if any, harmless from and against any and all claims, liabilities, losses, damages, causes of action, and expenses (including court costs and reasonable attorney's fees related thereto) arising out of, in connection with, or resulting from any such debts and liens. Such indemnification shall be in a form and substance acceptable to Owner.

d. By executing this Agreement Contractor agrees to abide by and be bound by the indemnification provisions herein.

8. DISPUTE RESOLUTION AND GOVERNING LAW

a. Any dispute with respect to any provision of, or the performance or non-performance of, this Agreement shall be subject to the Dispute Resolution Rules and Procedures for Orange County Design, Building Construction, Renovation, and Repair Projects. The policy is incorporated herein by reference and may be viewed at http://www.orangecountync.gov/departments/purchasing_division/contracts.php).

b. The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement or the Contract shall be brought in the General Court of Justice of North Carolina sitting in Orange County, North Carolina and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions.

c. Notice of any claim by Owner or Contractor must be initiated by written notice to the other Party within thirty (30) days of the occurrence of the event giving rise to the claim or within thirty (30) days of the discovery of the event or condition giving rise to the claim, whichever is later.
   i. Should any claim be made, regardless of whether such claim is made by Owner or Contractor, Contractor shall continue to faithfully and diligently perform the Work in such a manner as to meet all scheduled timelines. Any failure to faithfully and diligently perform the Work may be deemed, by the Owner, a breach of the Contract.
   ii. If a claim is made such claim shall be made to the initial decision maker, if applicable, who may request more supporting data, reject the claim in whole or in part, approve the claim in whole or in part or advise the parties the claim is unable to be resolved.
   iii. If a claim is made by the Owner the Owner may, but is not obligated to, notify the surety.

9. NON–APPROPRIATION

a. Contractor acknowledges that Owner is a governmental entity, and the validity of this Agreement is based upon the availability of public funding under the authority of its statutory mandate.

b. In the event that public funds are unavailable or not appropriated for the performance of Owner's obligations under this Agreement, then this Agreement shall automatically expire without penalty to Owner immediately upon written notice to Contractor of the

unavailability or non-appropriation of public funds. It is expressly agreed that Owner shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this Agreement.

c. In the event of a change in the Owner's statutory authority, mandate or mandated functions, by state or federal legislative or regulatory action, which adversely affects Owner's authority to continue its obligations under this Agreement, then this Agreement shall automatically terminate without penalty to Owner upon written notice to Contractor of such limitation or change in Owner's legal authority.

10. NOTICES

Any notice required by this Agreement shall be in writing and delivered by certified or registered mail, return receipt requested to the following:

Owner:	Contractor:
Orange County Attn: P.O. Box 8181 Hillsborough, NC 27278	

11. MISCELLANEOUS

a. Duties and Obligations imposed by the Contract Documents shall be in addition to any Duties and Obligations imposed by state, federal or local law, rules, regulations and ordinances.

b. No act or failure to act by the Owner or Contractor shall constitute a waiver of any right or duty granted them under the Contract Documents, nor shall any act or failure to act constitute any approval except as specifically agreed in writing.

c. The Work shall be tested and inspected as required by the Contract Documents and as required by law. Unless prohibited by law the costs of all such tests and inspections related to state and federal codes such as ADA, Administrative, Electrical, Plumbing, Mechanical and Building Codes shall be borne by the Contractor. The costs for material and structural testing shall be conducted by an independent third party at the expense of the Owner. Delays related to any of the aforementioned tests and inspections shall not be grounds for delaying the completion of the work. If any such tests and inspections reveal deficiencies in the Work such that the Work does not comply with terms or requirements of the Contract Documents and the requirements of any code or law the Contractor is solely responsible for the cost of bringing such deficiencies into compliance with the terms of the Contract Documents and any code or law.

d. Should the Architect, if an architect is retained for the project involving the Work, or Owner reject any portion of the Work for failing to comply with the Contract Documents Contractor shall immediately, at Contractor's expense, correct the Work. Any such rejection may be made before or after substantial completion. If applicable, any additional expense borne by the Architect under this section shall be paid at Contractor's expense.

e. The Contractor shall not assign any portion of this Agreement nor subcontract the Work in

its entirety without the prior written consent of the Owner.

f. By executing this Agreement Contractor affirms that Contractor and any subcontractors of Contractor are and shall remain in compliance with Article 2 of Chapter 64 of the North Carolina General Statutes.

g. By executing this Agreement Contractor certifies that Contractor has not been identified, and has not utilized the services of any agent or subcontractor identified, on the list created by the State Treasurer pursuant to G.S. 147-86.58.

h. By executing this Agreement Contractor certifies that Contractor has not been identified, and has not utilized the services of any agent or subcontractor identified, on the list created by the State Treasurer pursuant to G.S. 147-86.81.

i. The County has designated ( ) to act as the County's representative with respect to the Work and shall have the authority to render decisions within guidelines established by the County Manager or the County Board of Commissioners and shall be available during working hours as often as may be reasonably required to render decisions and to furnish information.

j. Contractor shall at all times remain in compliance with all applicable local, state, and federal laws, rules, and regulations including but not limited to all state and federal non-discrimination laws, policies, rules, and regulations and the Orange County Non-Discrimination Policy and Orange County Living Wage Policy (each Orange County policy is incorporated herein by reference and may be viewed at http://www.orangecountync.gov/departments/purchasing_division/contracts.php). Any violation of the Orange County Non-Discrimination Policy is a breach of this Agreement and County may immediately terminate this Agreement without further obligation on the part of the County. This paragraph is not intended to limit and does not limit the definition of breach to discrimination.

k. This Agreement together with any amendments or modifications may be executed electronically. All electronic signatures affixed hereto evidence the consent of the Parties to utilize electronic signatures and intent of the Parties to comply with Article 11A and Article 40 of North Carolina General Statute Chapter 66.

l. In the event of a breach by Contractor Owner has sole authority to determine the reasonableness of Contractor's actions to remedy such breach or complete the performance of its obligations.

m. Upon request of the Owner, the Contractor shall submit to County all relevant documentation, including but not limited to, job cost records, to support its claims for final compensation and if such request is made final compensation shall not be due until all relevant documentation is received, reviewed, and approved by Owner.

12. CONSEQUENTIAL AND LIQUIDATED DAMAGES

a. Owner and Contractor mutually waive any claim against each other for consequential damages. Consequential Damages include:

i. Damages incurred by Owner for loss of use, income, financing, or business.

ii. Damages incurred by Contractor for office expenses, including personnel, loss of financing, profit, income, business, damage to reputation, or any other non-direct damages.

b. Liquidated damages shall be in accord with the Contract Documents. If the Contract Documents do not otherwise address liquidated damages, such damages shall be in the amount of five hundred dollars ($500.00) per day.

13. TERMINATION OR SUSPENSION

a. The Owner may, without cause, order the Contractor to terminate, suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

i. If Owner issues a written order to delay, suspend, or interrupt the Work, and such order is not due to or as a result of any fault on the part of the Contractor or any subcontractor, the Contractor may recover a per diem amount of five hundred dollars ($500.00) per day with a not-to-exceed limit of ten thousand dollars ($10,000.00).

ii. In the event of termination by the Owner under this Agreement, the Contractor shall be entitled to receive its reasonable and documented direct costs incurred prior to the date Owner mails the notice of termination, including the cost of materials purchased for the Work, but only if such purchases cannot be canceled, or materials returned, or which material cannot reasonably be used by the Contractor on other work, and the cost of closing down the work in a safe and efficient manner.

iii. If Owner elects to suspend or terminate the contract pursuant to subparagraphs 13.a.i. or 13 a.ii. the sole remedy available to the Contractor are those listed in said subparagraphs and Contractor is not entitled to any right to further claims for any amount owed or disputed or for payment of damages alleged to have been sustained as a result of Owner's order to delay, suspend, or interrupt the Work.

b. The Owner may, with cause, order the Contractor to suspend, delay or interrupt the Work in whole or in part for such period of time as the cause remains.

i. If Owner issues a written order to delay, suspend, or interrupt the Work, and such order is due to or as a result of any fault on the part of the Contractor or any subcontractor, the Owner may reduce payment at a per diem amount of five hundred dollars ($500.00) per day for the full duration of the delay, suspension, or interruption.

c. Contractor may terminate the Contract if, at the Owner's written direction, the Work is stopped for thirty (30) consecutive days through no act or fault of the Contractor, their agents or employees, or a subcontractor or their agents or employees or any other person performing work pursuant to the Contract Documents. Contractor may terminate the Contract if a Court or other Public authority having jurisdiction enters a lawful order that

requires all work to be stopped and such stoppage lasts for thirty (30) consecutive days.

d. Either party may terminate this Agreement upon notice to the other party that obligations pursuant to this Agreement are made impossible due to declarations of emergency by Orange County or by North Carolina due to events directly impacting Orange County. Both parties shall remain responsible for all payment and performance due up to the receipt of such notice, but shall have no further obligation or responsibility beyond that date provided the terminating party has taken all reasonable steps to complete the performance of its obligations.

14. ENTIRE AGREEMENT

All of the documents listed, referenced or described in this Agreement, the written Notice-to-Proceed, together with Modifications made or issued in accordance herewith are the Contract Documents, and the work, labor, materials and completed construction required by the Contract Documents and all parts thereof is the Work. The Contract Documents constitute the entire agreement between Owner and Contractor. This Agreement may be amended only by written instrument signed by both parties. Modifications may be evidenced by facsimile signatures. If any provision of the Agreement shall be declared invalid or unenforceable, the remainder of the Agreement shall continue in full force and effect.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the day and date first above written wholly or in a number of counterparts each of which shall, without proof or accounting for other counterparts, be deemed an original contract.

ORANGE COUNTY	**CONTRACTOR**
_____	_____
Signature County Manager	Signature
	_____
	Printed Name and Title

ORANGE COUNTY—INTERNAL USE ONLY

Finance Information
Vendor Name: _____ Vendor Contact Person: _____ Phone: _____ Address: _____ City _____ State: _____ Zip: _____
Department: _____ Amount: _____ Purpose: _____ Budget Code(s): _____ Vendor # _____
Vendor Status with NCSOS:_____Vendor is a BOCC consultant: ☐ Yes ☐ No

Contract Details
Contract Type: ☐ New ☐ Amendment (Original Contract: _____) (Most Recent Amendment _____)
Effective Date _____ End Date _____ Notice Date _____ (Notice Purpose _____)

Award
☐ Approved by Board (Agenda Date: _____); ☐ Made or Administered by _____

Signature Authority
- ☐ BOCC Express Delegation (Agenda Date: _____)
- Policy 9.4: ☐ Under $5,000; ☐ Service Under $90,000; ☐ Construction Under $250,000
- ☐ Budget Policy Section XV (Capital Improvement Project: _____)

Bidding
☐ Informal Bidding ($30k-$90k); ☐ Formal RFP ($90k+); ☐ Other (<$30k); ☐ Exception(#_____)

Department Affirmation
☐ This agreement is approved as to technical form and content and I as Department Director affirmatively state work on this project has not been initiated prior to execution of the agreement; OR
☐ This agreement is approved as to technical form and content. Services related to this agreement have already begun or been completed. Description of the nature of the emergency condition that was addressed:

Department Director's Signature _____ Date: _____

Information Technologies
This agreement has been reviewed and is approved as to information technology content and specifications:

Office of the Chief Information Officer_____ Date: _____
☐ *Inapplicable because no hardware/software purchases or related services*

Risk Management
This agreement is approved for sufficiency of insurance standards, specifications, and requirements:

Office of the Risk Management Officer_____ Date: _____

Financial Services
This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act:

Office of the Chief Financial Officer _____ Date: _____

Legal Services
This agreement is approved as to legal form and sufficiency:

Office of the County Attorney _____Date: _____

Clerk to the Board
All Docusign contracts must be copied to the Clerk upon completion: occlerkdocs@orangecountync.gov
The following signature block is for hard copies only and is not required for Docusign contracts:
Received for record retention:
Office of the Clerk to the Board _____Date:_____

Section 00 73 00 - Supplementary General Conditions

TIME OF COMPLETION

The Contractor shall commence work to be performed under this Contract on a date to be specified in written order from the Designer/Owner and shall fully complete all work hereunder within three hundred (300) consecutive calendar days from the Notice to Proceed (expected to be January 20, 2025) with Final Completion on November 16, 2025 (date is based on 300 calendar days after NTP, dates are subject to change dependent on issue date of the NTP). For each day in excess of the above number of days, the Contractor shall pay the Owner the amount of two hundred fifty Dollars ($ 250) as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner should the Contractor fail to complete the Work within the time specified.

The existing MDP removal and building power downtime shall not exceed 21 calendar days. Must be coordinated with local AHJ and power company.

If the Contractor is delayed at any time in the progress of his work by any act or negligence of the Owner, his employees or his separate contractor, by changes ordered in the work; by abnormal weather conditions; by any causes beyond the Contractor's control or by other causes deemed justifiable by Owner, then the contract time may be reasonably extended in a written order from the Owner upon written request from the contractor within ten days following the cause for delay. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents.

PRE-BID CONFERENCE:

Meeting: On December 4, 2024 a Pre-bid meeting will be held at 10:00am at 109 Court Street, Hillsborough, NC 27278 for all interested parties.

CONTRUCTION SCHEDULE:

The Contractor shall commence work to be performed under this Contract on a date to be specified in written order from the Designer/Owner and shall fully complete all work hereunder within three hundred (300) consecutive calendar days from the Notice to Proceed (expected to be January 20, 2025) with Final Completion on November 16, 2025 (date is based on 300 calendar days after NTP, dates are subject to change dependent on issue date of the NTP). For each day in excess of the above number of days, the Contractor shall pay the Owner the amount of two hundred fifty Dollars ($ 250) as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner should the Contractor fail to complete the Work within the time specified.

PROJECT STORAGE:

The contractor must store equipment in a bonded warehouse prior to installation.

PAYMENTS:

The Owner will use e-procurement for all payments to be made to the contractor. The contractor shall carry any fees required in his bid. The Owner will make two payments at the beginning of the shutdown after material is onsite and after final inspection and close-out material is provided and accepted.

UTILITIES:

Contractor may use existing utilities and facilities at no additional costs. Owner will provide multiple parking spaces at building..

USE OF SITE:

Refer to time of completion for work schedule information.

NO SMOKING POLICY:

The building is non-smoking. See smoking locations on door decals at egress doors.

FIRE ALARM WORK:

Contractor shall coordinate temporary shut down of Fire Alarm system in isolated areas during construction with the owner. System must be active at end of shift.

BID BOND:

Contractor shall furnish a Bid Bond. Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond in an amount equal to not less than five percent (5%) of the proposal, said deposit to be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law (G.S. 143-129).

Bid bond shall be conditioned that the surety will, upon demand, forthwith make payment to the oblige upon said bond if the bidder fails to execute the contract. The owner may retain bid securities of any bidder(s) who may have a reasonable chance of award of contract for the full duration of time stated in the Notice to Bidders. Other bid securities may be released sooner, at the discretion of the owner. All bid securities (cash or certified checks) shall be returned to the bidders promptly after award of contracts, and no later than seven (7) days after expiration of the holding period stated in the Notice to Bidders.

PERFORMANCE AND PAYMENT BONDS:

Contractor shall furnish a Performance Bond and Payment Bond executed by a surety company authorized to do business in North Carolina. The bonds shall be in the full contract amount. Bonds shall be executed in the form bound with these specifications (Forms 307 & 308). An authorized agent of the bonding company who is licensed to do business in North Carolina shall countersign all bonds.

MINORITY BUSINESS PARTICIPATION:

Refer to attached Minority Business Employment Requirements.

ORANGE COUNTY

NORTH CAROLINA

DISPUTE RESOLUTION RULES AND PROCEDURES FOR ORANGE COUNTY DESIGN, BUILDING CONSTRUCTION, RENOVATION, AND REPAIR PROJECTS

RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

A. Purpose of Mandatory Settlement Conferences. Pursuant to G.S. §143-128(f1) and 143-135.26(11), these Rules are promulgated to implement a mediated settlement program designed to focus the parties' attention on settlement rather than on claim preparation and to provide an opportunity for orderly settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.

B. Initiating the Dispute Resolution Process

1. Any party to a County public construction contract (referred to herein generally as the "Contract") governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. § 143-128(f1) and who is a party to a dispute arising out of the Contract and the construction process in which the amount in controversy is at least $15,000 may submit a written request to the County for mediation of the dispute.

2. Prior to submission of a written request for mediation to the County, the party requesting mediation should give notice of any and all claims in accordance with their respective contracts, obtain decisions on the claims as required or allowed by their respective contracts, and attempt to resolve the dispute according to the terms and conditions in their respective contracts. The Mediator may adjourn any mediated settlement conference if the Mediator believes, in his or her sole discretion, that the parties have not satisfied all of the terms and conditions of their respective contracts and that doing so will enhance the prospects for a negotiated settlement.

C. Condition Precedent to Litigation. Before any party to a Contract may commence a civil action against the County seeking remedies for breach or non-performance of the Contract by the County, said party must first initiate the dispute resolution process under these rules and attend and participate in good faith in the mediated settlement conference.

RULE 2. SELECTION OF MEDIATOR

A. Mediator Listing. A List of Mediators acceptable to the County is maintained by the County Attorney and that list is incorporated by reference into these Rules.

B. Selection of Mediator. The party requesting mediation shall select a Mediator from the List of Mediators and shall file, with the County, a Notice of Selection of Mediator within 21 days of the request for mediation. Such notice shall state the name, address, and phone number of the Mediator selected. If

the Mediator selected is not available or declines to participate for any reason, the requesting party shall select another person from the List of Mediators. If the party requesting mediation does not select and designate a mediator within 21 days of the request for mediation, the County shall have the right in its absolute discretion to appoint a mediator from its List of Mediators.

C. Disqualification of Mediator. Any party may request replacement of the Mediator for good cause. Nothing in this provision shall preclude Mediators from disqualifying themselves.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

A. Where Conference is to be Held. Unless all parties and the Mediator otherwise agree, the mediated settlement conference shall be held in county seat of Orange County. The Mediator shall be responsible for reserving a place, making arrangements for the conference, and giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons or entities required to attend.

B. When Conference is to be Held. The mediation shall be completed within 90 days after selection of the Mediator unless all parties to the mediation agree to a different schedule.

C. Request to Accelerate or Extend Deadline for Completion. Any party or the Mediator may request the County to accelerate or extend the deadline for completion of the conference. Such request shall state the reasons the acceleration or extension is sought and shall be served by the moving party upon the other parties and the Mediator. Objections to the request must be promptly communicated to the County and to the Mediator.

The County, with the concurrence of the designated Mediator, may grant the request by adjusting the time for completion of the conference.

D. Recesses. The Mediator may recess the mediation conference at any time and may set times for reconvening. If the Mediator determines the time and place where the conference is to reconvene before the conference is recessed, no further notice is required to persons present at the conference.

E. Project Delay. The mediated settlement conference that results from a construction contract dispute shall not be cause for the delay of the construction project.

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS

A. Attendance.

1. All parties to the dispute must designate an official representative to attend the mediation.

2. “Attendance” means physical attendance, not by telephone or other electronic means. Any attendee representing a party must have authority from that party to bind it to any agreement reached as a result of the mediation.

3. Attorneys representing parties may attend the mediation, but are not required to do so.

4. Sureties and insurance company representatives are required to physically attend the mediation unless the Mediator and all of the other parties to the mediation excuse their attendance or consent to their attendance by telephone or other electronic means.

5. The parties who attend a duly scheduled mediation conference shall have the right to recover their share of the Mediator's compensation from any party or parties who fail to attend the conference without good cause.

B. Finalizing Agreement. If an agreement is reached in the conference, the terms of the agreement shall be confirmed in writing and signed by all parties.

C. Payment of Mediation Fee: Mediation Fees charged by the Mediator shall be paid in accordance with G.S. § 143-128(f1).

D. Failure to Compensate Mediator. Any party's failure to compensate the Mediators in accordance with G.S. § 143-128(f1) shall subject that party to a withholding by the County of said amount of money from the party's payment or any other moneys owed by that party to the County.

Should the County fail to compensate the Mediator, it shall hereby be subject to a civil cause of action from the Mediator for the County's portion of the Mediator's total fee as required by G.S. § 143-128(f1).

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

A. Authority of Mediator.

1.Control of Conference. The Mediator shall at all times be in control of the conference and the procedures to be followed.

2.Private Consultation. The Mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.

3.Scheduling the Conference. The Mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants, attorneys and Mediator. In the absence of agreement, the Mediator shall select the date for the conference.

4.Determining good cause for a party's failure to appear at a scheduled mediation conference.

B.Duties of Mediator.

1.The Mediator shall define and describe the following at the beginning of the conference:

a.The process of mediation.

b.The difference between mediation and other forms of conflict resolution.

c.The costs of the mediated settlement conference.

d.That the mediated settlement conference is not a trial, the Mediator is not a judge, and the parties retain their legal rights if they do not reach settlement; however, the

Mediator will advise all parties that failure to appear at mediation without good cause may result in imposition of sanctions and may be asserted as a bar to lawsuits by claimants who have failed to exhaust this administrative remedy.

e.The circumstances under which the Mediator may meet and communicate privately with any of the parties or with any other person.

f.Whether and under what conditions communications with the Mediator will be held in confidence during the conference.

g.The inadmissibility of conduct and statements as provided by G.S. §7A-38.1(1).

h.The duties and responsibilities of the Mediator and the participants.

i.That any agreement reached will be reached by mutual consent.

2. Disclosure: The Mediator has a duty to be impartial and to advise all participants of any possible bias, prejudice or partiality.

3. Declaring Impasse: The Mediator may determine at any time during the mediation conference that an impasse exists and that the conference should end.

4. Reporting Results of Conference. The Mediator shall submit a written report to the County and the other parties within 10 days of the conference stating whether or not the parties reached an agreement. The Mediator's report shall indicate the absence of any party from the mediated settlement conference without permission or good cause.

5. Scheduling and Holding the Conference. It is the duty of the Mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. The Mediator shall strictly observe deadlines for completion of the conference unless said time limit is changed by agreement of the parties.

RULE 6. COSTS AND COMPENSATION OF THE MEDIATOR

The Parties shall compensate the Mediator for mediation services at the rate proposed by the Mediator and agreed to by the parties at the time the Mediator is selected. The Parties shall be jointly responsible for the Mediator's costs and expenses subject to Rule 4.C. above. Each Party is responsible for its own costs and expenses, including reasonable attorneys' fees, related to the Meiation.

RULE 7. RULE MAKING

These Rules may be amended by the County at any time. Amendments will not affect mediations where claims or requests for mediation have been filed at the time the amendment takes effect.

RULE 8. DEFINITIONS

A. "County" shall mean Orange County North Carolina.

B. "Project Designer" is that person or firm stipulated as project designer in the Contract Documents for the project.

C. “Claim” is a demand or assertion by a party seeking adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term “Claim” also includes other disputes and matters in question between the parties to a Contract involved in the County’s building construction renovation and repair projects arising out of or relating to the Contract or the construction process. Claims must be initiated by a written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

D. “Good Cause” generally includes any circumstance beyond the control of a party, which prevents that party from meeting obligations. When good cause is asserted as an excuse for a party’s failure to appear at a mediation conference or to otherwise comply with the requirements of these Rules, the Mediator, in his or her sole discretion, will determine whether good cause exists to excuse the party’s failure to appear or otherwise comply with these rules.

RULE 9. TIME LIMITS

A. Any time limit provided for by these Rules may be waived or extended at the sole discretion of the County, if no Mediator has been selected, and at the discretion of the County with concurrence of the Mediator if a Mediator has been selected.

Section I:	General Government and Administration
Policy 10.0:	Living Wage Contractor Policy
Reviewed by:	County Attorney/County Manager
Approved by:	County Manager
Original Effective Date:	April 21, 2016
Revisions:	August 1, 2016

Policy Statement
It is the policy of Orange County to ensure its employees, and all individuals who provide services for Orange County, are paid a living wage.

Purpose
To encourage all vendors and contractors to pay a living wage to all employees who perform work pursuant to a contract with Orange County.

Applicability
Applies to all Orange County contracts and purchases.

Policy

10.1 Living Wage

10.1.1 Orange County is committed to providing its employees with a living wage and encourages all contractors and vendors doing business with Orange County to pursue the same goal. Orange County's living wage is as reflected in the adopted Orange County Budget and as that budget document is amended from time to time. To the extent possible, Orange County recommends that contractors and vendors seeking to do business with Orange County provide a living wage to their employees.

10.1.2 Prior to final execution of a contract with Orange County all contractors and vendors seeking to do business with Orange County shall submit to the County's representative a statement indicating whether those employees who will perform work on the Orange County contract are paid at least the living wage amount set out above. If such employees do not make at least the living wage amount set out above the contractor or vendor shall indicate in the statement the actual amount paid to such employees. For bid projects this statement should be submitted as part of the bid packet.

This policy may be reviewed annually and updated as needed by the Manager's Office

Acknowledged Receipt by: _____

Company Name: _____

Date: _____

STATE OF NORTH CAROLINA

AFFIDAVIT

ORANGE COUNTY

****

I, _____(the individual attesting below), being duly authorized by and on behalf of

_____ (the entity bidding on project hereinafter "Employer") after first being duly

sworn hereby swears or affirms as follows:

1. Employer understands that E-Verify is the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law in accordance with NCGS §64-25(5).

2. Employer understands that Employers Must Use E-Verify. Each employer, after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS§64-26(a).

3. Employer is a person, business entity, or other organization that transacts business in this State and that employs 25 or more employees in this State. (mark Yes or No)

a. YES _____, or

b. NO _____

4. Employer's subcontractors comply with E-Verify, and if Employer is the winning bidder on this project Employer will ensure compliance with E-Verify by any subcontractors subsequently hired by Employer.

This ____ day of _____, 20__.

_____

Signature of Affiant

Print or Type Name: _____

State of North Carolina, _____ County

Signed and sworn to (or affirmed) before me, this the _____

day of _____, 20__.

My Commission Expires:

_____

Notary Public

(Affix Official/Notarial Seal)

Chapter 12 Civil Rights.

Sections 12-23 – 12-49 Reserved.

AN ORDINANCE PROHIBITING DISCRIMINATION THROUGHOUT ORANGE COUNTY

Sec. 12-50. - Title.

This Ordinance shall be known and may be cited as the Orange County Non-Discrimination Ordinance.

Sec. 12-51. – Policy and Severability.

(a) It is the policy of Orange County not to enter into a contract with any business, company, or firm that has discriminated in the solicitation, selection, hiring or treatment of vendors, suppliers, subcontractors or commercial customers against a Protected Class, or on the basis of any otherwise unlawful use of individual or personal characteristics regarding such vendor's, suppliers, commercial customers, employees, or owners in connection with a county contract or solicitation; provided that nothing in this non-discrimination policy shall prohibit or limit otherwise lawful efforts to remedy the effects of discrimination that has occurred or is occurring in the marketplace.

    1. It is the policy of Orange County that every Orange County created contract and subcontract for goods or services shall contain a non-discrimination clause that prohibits discrimination as that term is defined herein.

(b) It is further the policy of Orange County that discrimination has no place in Orange County, North Carolina and it is the intent of this ordinance to provide uniform legal protection to individuals in all Protected Classes, making it unlawful for any person to discriminate in housing, public accommodations, and transportation.

(c) Should any provision of this Ordinance be found to be unconstitutional by a court of law such provision shall be severed from the remainder of the Ordinance and such action shall not affect the enforceability of the remaining provisions of the Ordinance.

Sec. 12-52. - Definitions.

(a) *Discrimination* means any disadvantage, difference, or distinction in the solicitation, selection, hiring, service to, or treatment of a vendor, supplier, subcontractor, or customer on the basis of Protected Class status or on the basis of any otherwise unlawful use of personal or individual characteristics.

(b) *Housing* and *public accommodations* have the same common meaning as those terms are defined in the Orange County Civil Rights Ordinance.

(c) *Person* means any individual, business, or company, regardless of organizational structure, providing for profit goods, facilities, services, accommodations, transportation, or access to the general public.

(d) *Protected Class* means age (as defined in the Orange County Civil Rights Ordinance), race, ethnicity, color, national origin, religion, creed, sex, sexual orientation, gender, gender identity, gender expression, marital status, familial status, source of income, disability, political affiliation, veteran status, disabled veteran status.

(e) *Public Accommodation* has the same meaning as that term is defined in the Orange County Civil Rights Ordinance except that for purposes of this Ordinance Public Accommodation includes:

    1. Transportation companies and transportation providers operating company-owned or privately-

owned vehicles providing transportation to the general public; and

2. Private residences providing short-term rentals to members of the general public. A short-term rental means the provision of a room, space, or residential unit that is suitable or intended for occupancy for dwelling, sleeping, or lodging purposes, for a period of fewer than 30 consecutive days, in exchange for a charge for the occupancy.

Sec. 12-53. - Contractor bid requirements.

(a) All requests for bids or proposals issued for county contracts shall include a certification to be completed by the bidder or proposer in substantially the following form:

The undersigned bidder or proposer hereby certifies and agrees that the following information is correct:

1. In preparing its enclosed bid or proposal, the bidder or proposer has considered all bids and proposals submitted from qualified, potential subcontractors and suppliers, and has not engaged in discrimination as defined in Section 12-52 of the Orange County Non-discrimination Ordinance.

2. Without limiting any other remedies that Orange County may have for a false certification, it is understood and agreed that, if this certification is false, such false certification will constitute grounds for Orange County to reject the bid or proposal submitted with this certification, and terminate any contract awarded based on such bid or proposal. It shall also subject the bidder or proposer to disqualification from participating in county contracts or bid processes for up to two years.

3. As a condition of contracting with Orange County, the bidder or proposer agrees to promptly provide to Orange County all information and documentation that may be requested by Orange County from time to time regarding the solicitation and selection of suppliers and subcontractors in connection with this solicitation process. Failure to maintain or failure to provide such information constitutes grounds for Orange County to reject the bid or proposal and to terminate, without penalty to Orange County, any contract awarded on such bid or proposal. All such information and documentation shall be maintained for a period of three years after the expiration of the contract.

4. As part of its bid or proposal, the bidder or proposer shall provide to Orange County a list of all instances within the past ten years where a complaint was filed or pending against bidder or proposer in a legal or administrative proceeding alleging that bidder or proposer discriminated against its subcontractors, vendors, suppliers, or commercial customers, and a description of the status or resolution of that complaint, including any remedial action taken.

5. As a condition of submitting a bid or proposal to Orange County the bidder or proposer agrees to comply with the Orange County Non-discrimination Ordinance. Falsification of this certification shall constitute a violation of the Orange County Non-Discrimination Ordinance and shall be grounds for rejection of the bid or proposal or termination, without fault to Orange County, of a contract.

6. As a condition of submitting a bid or proposal to Orange County the bidder or proposer agrees that Orange County may consider the information submitted as part of this certification in its determination of the responsibility of the bidder or proposer. The bidder or proposer, as the case may be, waives the right to challenge the rejection of a bid or proposal when such rejection is based, in its entirety, on information contained in this certification.

Sec. 12-54. - Prohibited acts.

(a) It shall be unlawful for any person to deny any person the full and equal enjoyment of the goods, services, facilities, privileges, advantages, and accommodations of a place of public accommodation on the basis of Protected Class status or on the basis of any otherwise unlawful use of individual or personal characteristics.

(b) It shall be unlawful for any person to make, print, circulate, post, mail or otherwise cause to be published a statement, advertisement, or sign which indicates that the full and equal enjoyment of the transportation, access, goods, services, facilities, privileges, advantages, and accommodations of a place of public accommodation will be refused, withheld from, or denied any person on the basis of Protected Class status or on the basis of any otherwise unlawful use of individual or personal characteristics, or that any person's patronage of or presence at a place of public accommodation is objectionable, unwelcome, unacceptable, or undesirable on the basis of Protected Class status or on the basis of any otherwise unlawful use of individual or personal characteristics; provided, however, this section does not apply to a private club or other establishment not, in fact, open to the public.

(c) It shall be unlawful for any person to intentionally or knowingly:

1. Perform or attempt to perform any act which directly or indirectly results in an individual's bodily injury or property damage where such act is directed at an individual or a group of individuals because of that person's or that group's perceived or actual Protected Class status or on the basis of any otherwise unlawful use of individual or personal characteristics.

2. Solicit, encourage, compensate, assist, or conspire with another to perform or attempt to perform any act which directly or indirectly results in an individual's bodily injury or property damage where such act is directed at an individual or a group of individuals because of that person's or that group's perceived or actual Protected Class status or on the basis of any otherwise unlawful use of individual or personal characteristics.

(d) No person shall be found to have violated this Ordinance solely on the basis of the content of any speech or communication used by such person.

Sec. 12-55. Exemptions.

(a) All applicable exemptions found in Section 12-11 of the Orange County Civil Rights Ordinance related to housing shall apply to alleged violations of Section 12-54 of this Ordinance.

Sec. 12-56. Investigation, Enforcement, and Remedy.

(a) Sections 12-16 through and including 12-21 of the Orange County Civil Rights Ordinance shall be followed and adhered to during the investigation of any alleged violation of this Ordinance. Any remedies available through said sections of the Orange County Civil Rights Ordinance shall be available hereunder.

ORANGE COUNTY NONDISCRIMINATION CERTIFICATION

The undersigned bidder or proposer hereby certifies and agrees that the following information is correct:

1. In preparing its enclosed bid or proposal, the undersigned bidder or proposer has considered all bids and proposals submitted from qualified, potential subcontractors and suppliers, and has not engaged in discrimination as defined in Section 12-52 of the Orange County Non-discrimination Ordinance.

2. Without limiting any other remedies that Orange County may have for a false certification, it is understood and agreed that, if this certification is false, such false certification will constitute grounds for Orange County to reject the bid or proposal submitted with this certification, and terminate any contract awarded based on such bid or proposal. It shall also subject the bidder or proposer to disqualification from participating in county contracts or bid processes for up to two years.

3. As a condition of contracting with Orange County, the undersigned bidder or proposer agrees to promptly provide to Orange County all information and documentation that may be requested by Orange County from time to time regarding the solicitation and selection of suppliers and subcontractors in connection with this solicitation process. Failure to maintain or failure to provide such information constitutes grounds for Orange County to reject the bid or proposal and to terminate, without penalty to Orange County, any contract awarded on such bid or proposal. All such information and documentation shall be maintained for a period of three years after the expiration of the contract.

4. As part of its bid or proposal, the undersigned bidder or proposer shall provide to Orange County a list of all instances within the past ten years where a complaint was filed or pending against bidder or proposer in a legal or administrative proceeding alleging that bidder or proposer discriminated against its subcontractors, vendors, suppliers, or commercial customers, and a description of the status or resolution of that complaint, including any remedial action taken.

5. As a condition of submitting a bid or proposal to Orange County the undersigned bidder or proposer agrees to comply with the Orange County Non-discrimination Ordinance. Falsification of this certification shall constitute a violation of the Orange

County Non-Discrimination Ordinance and shall be grounds for rejection of the bid or proposal or termination of an existing contract, without fault or further obligation to Orange County.

6. As a condition of submitting a bid or proposal to Orange County the undersigned bidder or proposer agrees that Orange County may consider the information submitted as part of this certification in its determination of the responsibility of the undersigned bidder or proposer. The undersigned bidder or proposer, as the case may be, waives the right to challenge the rejection of a bid or proposal when such rejection is based, in its entirety, on information submitted as part of this certification.

The bidder or proposer certifies the undersigned has full authority to sign on its behalf.

By:_____

_____
Printed Name and Title

On behalf of _____

_____
Company or Corporate name

Supplemental Vendor Information: HISTORICALLY UNDERUTILIZED BUSINESSES

Historically Underutilized Businesses (HUBs) consist of minority, women and disabled business firms that are at least fifty-one percent owned and operated by an individual(s) of the categories. Also included in this category are disabled business enterprises and non-profit work centers for the blind and severely disabled.

Pursuant to G.S. 143B-1361(a), 143-48 and 143-128.4, the County invites and encourages participation in this procurement process by businesses owned by minorities, women, disabled, disabled business enterprises and non-profit work centers for the blind and severely disabled. This includes utilizing subcontractors to perform the required functions in this RFP/RFQ. Any questions concerning NC HUB certification, contact the **North Carolina Office of Historically Underutilized Businesses** at (919) 807-2330. The Vendor shall respond to question #1 and #2 below.

1) Is Vendor a Historically Underutilized Business? ☐ **Yes** ☐ **No**

2) Is Vendor Certified with North Carolina as a Historically Underutilized Business? ☐ **Yes** ☐ **No**

If so, state HUB classification:

_____

MINORITY BUSINESSES PARTICIPATION REQUIREMENTS

Orange County has established a verifiable ten percent (10%) minority business participation goal for the total monetary value of this project. Verifiable goal means that the awarding authority has adopted written guidelines specifying the actions that the prime contractor must take to ensure a good faith effort in the recruitment and selection of minority businesses for participation in contracts awarded; the required actions must be documented in writing by the contractor to the appropriate awarding authority. These guidelines are published to accomplish that end.

DEFINITIONS:

Minority - a person who is a citizen or lawful permanent resident of the United States and who is:

a. Black, that is, a person having origins in any of the black racial groups in Africa;
b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
d. American Indian or Alaskan Native, that is, a person having origins in any of the original peoples of North America; or
e. Female.

Socially and Economically Disadvantaged Individual:
Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities. Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged.

Minority Business - means a business:

a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons; and
b. Of which the management and daily business operations are controlled by one or more of the minority persons who own it; and
c. Is certified in one of the MWBE categories as defined by the NC Department of Administration/Historically Underutilized Business (HUB) and the NC Department of Transportation/Disadvantaged Business Enterprise (DBE).

Bidder Responsibilities:

Under the single prime contract system, the prime contractor will:

a. Attend the scheduled Prebid conference.
b. Identify or determine those work areas of a contract where MBEs may have an interest in performing contract work.

c. At least ten (10) days prior to the scheduled day of bid opening, notify certified MBEs of potential contracting opportunities listed in the proposal. The notification will include the following:

1. A description of the work for which the bid is being solicited.
2. The date, time and location where bids are to be submitted.
3. The name of the individual within the agency/institution who will be available to answer questions about the project.
4. Where bid documents may be reviewed.
5. Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.

e. Submit with the bid a description of that portion of the work to be executed by MBEs expressed as a percentage of the total price.

f. Identify the MBEs the bidder intends to use on the contract, along with the dollar amount of the work to be performed by each minority business.

g. Submit an affidavit that details the good faith efforts taken to procure minority business participation.

h. Upon being named the apparent low bidder, the bidder shall provide the necessary documentation as listed in the contract documents. Failure to comply with procedural requirements as defined in contract documents may render that bid as non-responsive and may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

i. Upon being named apparent low bidder, the bidder shall provide an affidavit that lists the proportion of the work to be performed by MBEs. **If the MBEs do not account for ten percent (10%) of the contract price, the bidder must submit an affidavit that verifies the bidder's good faith efforts by certifying that it has undertaken at least five of the following ten (10) steps:**

1. Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contract or available on these State or local government-maintained lists at least ten (10) days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.
2. Made the construction plans, specifications, and requirements available for review by prospective minority businesses, or providing these documents to them at least ten (10) days before the bid proposals are due.
3. Broke down or combined elements of work into economically feasible units to facilitate minority participation.
4. Worked with minority trade, community, or contractor organizations identified by the Office of Historical Underutilized Businesses and included in the bid documents that provided assistance in recruitment of minority businesses.
5. Attended any prebid meetings scheduled by the public owner.

6. Provided assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
7. Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualifications should have the reasons documented in writing.
8. Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help the minority businesses in establishing credit.
9. Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
10. Provide quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

j. During the construction of the project, if it becomes necessary to replace an MBE subcontractor, advise the owner of the circumstances involved.

k. If, during the construction of a project, additional subcontracting opportunities become available, make a good faith effort to solicit subbids from MBEs.

STATE OF NORTH CAROLINA
COUNTY SALES AND USE TAX REPORT
SUMMARY TOTALS AND CERTIFICATION

CONTRACTOR: _____ Page __1____ of _____

PROJECT: _____ FOR PERIOD: _____

	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL ALL COUNTIES
CONTRACTOR							
SUBCONTRACTOR(S)*							
COUNTY TOTAL							

* Attach subcontractor(s) report(s)
** Must balance with Detail Sheet(s)

I certify that the above figures do not include any tax paid on supplies, tools and equipment which were used to perform this contract and only includes those building materials, supplies, fixtures and equipment which actually became a part of or annexed to the building or structure. I certify that, to the best of my knowledge, the information provided here is true, correct, and complete.

Sworn to and subscribed before me,

This the _____ day of _____, 20____

_____
Signed

_____
Notary Public

_____
Print or Type Name of Above

My Commission Expires: _____

Seal

NOTE:
This certified statement may be subject to audit.

STATE OF NORTH CAROLINA
SALES AND USE TAX REPORT DETAIL

CONTRACTOR: _____

SUBCONTRACTOR _____ FOR PERIOD: _____

PROJECT: _____

PURCHASE DATE	VENDOR NAME	INVOICE NUMBER	TYPE OF PROPERTY	INVOICE TOTAL	COUNTY TAX PAID	COUNTY OF SALE *
				$	$	
				TOTAL:	$	

* If this is an out-of-state vendor, the County of Sale should be the county to which the merchandise was shipped.

Orange County Minimum Insurance Coverage Requirements

Note: An Exception or Waiver of Minimum Coverage may only be granted at the discretion and approval of Risk Management based on assessment of risk posed to the county.

Coverage	Low Risk Profile	Standard Risk Profile	High Risk Profile	Specialty	Encroachment	Premises Lease
Commercial General Liability Products/Completed Operation Explosion, Collapse & Underground (XCU)	$1,000,000/$2,000,000 Per accident As above	$1,000,000/$2,000,000 As Above If any, Limit to be determined.	$1,000,000/$2,000,000 As above If any, TBD.	$1,000,000* As Above If any, TBD.	$1,000,000	$1,000,000
Automobile Liability	$1,000,000 (CSL) Per occurrence	$1,000,000*	$1,000,000*	$1,000,000*	N/A	N/A
****Workers' Compensation**	Statutory	Statutory	Statutory	Statutory	N/A	Statutory
****Employer's Liability**	100/500/100	500/500/500*	500/500/500	500/500/500*	N/A	100/500/100
** Waiver of Subrogation on WC	Required if available	Required if available	Required	Required	N/A	N/A
Umbrella Liability	$1,000,000	$2,000,000	$2,000,000+	$9,000,000+	N/A	N/A
Professional Liability *may* be required on a risk profile depending on nature of services provided by contract. Coverage required for professional service such as accountant, attorney, architect, design, engineering, health care and most consultants.	$1,000,000 per occurrence	$1,000,000	TBD	TBD	N/A	N/A
Sexual Misconduct (Sexual Abuse/Molestation) *may* be required for contractors working directly one-on-one with children and elderly or in overnight sheltering capacities.	$1,000,000/$2,000,000	$1,000,000/$2,000,000	TBD	TBD	N/A	TBD
Cyber Liability *may* be required for contractors having access to personal identifying information, and/or computer networks.	$1,000,000/$2,000,000	TBD	TBD	TBD	N/A	
Environmental/Pollution Liability required **if** demolition, use of	N/A	$1,000,000	$1,000,000+*	$1,000,000+*	N/A	N/A

Orange County Minimum Insurance Coverage Requirements

Note: An Exception or Waiver of Minimum Coverage may only be granted at the discretion and approval of Risk Management based on assessment of risk posed to the county.

hazardous material or environmentally sensitive						
Fidelity Bond (loss of money or other property due to dishonest acts). Only for contracts such as Banking, Janitorial, Fundraising, TPA's and similar, ETA	TBD	Amount depends on exposure to loss	TBD	TBD	N/A	N/A
Other Coverage As required	TBD	TBD	TBD	TBD	N/A	N/A
Bid, Performance & Payment Bonds	TBD	TBD	TBD	TBD	N/A	N/A

*A combination of Umbrella/Excess and primary limit may be used to provide coverage for the amount shown.

** Workers' Compensation is required if the contractor/vendor has employees. Owner Waiver is acceptable for a Sole Proprietor.

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.02 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.03 CONTRACTOR USE OF SITE AND PREMISES

A. Arrange use of site and premises to allow:
   1. Owner occupancy.

B. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

END OF SECTION 01 10 00

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

1.02 WORK SEQUENCE:

A. Work shall begin after NTP. Work shall not disrupt service to Owner's facility.

1.03 WORK RESTRICTION:

A. Behavior policy: All construction personnel shall be respectful of all state employees and visitors of the project site. Any incidents of disrespect, verbal abuse, threatening statements, unwelcome comments, unwelcome interaction or any form of harassment from any construction personnel toward any state employee or visitor is strictly prohibited. Any such act shall constitute sufficient cause for NC State to remove any individual permanently from the project and property. In addition, any of the contractor(s) project personnel who ignore or refuse to take action on any requirements of the contract documents; ignore or refuse to take immediate action to correct any endangerment to the health and safety of the public; as solely determined by NC State; then those actions shall be sufficient cause for NC State to permanently remove those individuals from the project and property. If in the sole determination of NC State, it would be in the best interest of the project and NC State to have any of the contractor(s) personnel removed from the project then the contractor shall do so upon request. Such actions taken shall not constitute grounds for a delay claim. NC State will not be responsible for any delays caused to the project due to any individual being removed from the project.

B. Use of the Premises: Parking is limited on site and will be coordinated during construction.

C. OSHA Compliance.
   1. It is the intent of NC State that all projects be designed in such a manner that they can be constructed and built in utilizing work practices in accordance with OSHA regulations. All Contractors and Subcontractors shall meet all requirements specified in 29 CFR 1910 and 1926, along with the Association of General Contractors Accident Prevention Manual.
   2. Contractors are referred to resources including, but not limited to, OSHA standards 1910 and 1926, and the Association of General Contractors Accident Prevention Manual. Also, each project will have a designated safety manager.
   3. The Contractor must designate, in writing, a safety manager for each project.
   4. It shall be the Contractor's responsibility to:
      a. Provide a safe and healthful workplace free from recognized hazards to minimize the likelihood of accident or injury to all personnel.
      b. Comply with OSHA standards 1910 and 1926, and any other applicable environmental health and safety regulations.
      c. Comply with the requirements of the Association of General Contractors Accident Prevention Manual.
      d. Provide adequate work-area protection to protect the safety and well-being of faculty, staff, and visitors.
      e. Maintain an accurate list of chemicals used during construction, which must be made available to campus or other requesting personnel.
      f. Establish and maintain an effective safety and health program involving all levels of the contracting organization, including managers, supervisors, and employees. A person designated as being responsible for safety must be present on site at all times work is in progress.
         1) Assure that a "competent person" as defined by OSHA is present during all projects that involve trenching or use of scaffolding.

1.04 BUILDING ACCESS:

A. The building will be occupied during construction. Contractor shall coordinate all construction activities with the Owner.

END OF SECTION 01 14 00

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 20 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the General and Supplementary Conditions.

B. Use Form AIA G702 and Form AIA G703.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit one electronic and three hard-copies of each Application for Payment.

H. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. State Tax form if required

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.

C. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

END OF SECTION 01 20 00

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contingency allowance.

1.02 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.03 ALLOWANCES SCHEDULE

A. Contingency Allowance: Include the stipulated sum/price of $15,000 for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 21 00

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

B. Submittal Form (before award of contract):
   1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

3.04 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION 01 25 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Progress meetings.

D. Construction progress schedule.

E. Submittals for review, information, and project closeout.

F. Number of copies of submittals.

G. Requests for Interpretation (RFI) procedures.

H. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Construction Contracts are finalized.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract and Engineer.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.
   5. Major subcontractors.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 32 16

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

3.04 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.05 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.06 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.07 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
   1. PDFs are to be bookmarked with approriate sections.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.08 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   5. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Send submittals in electronic format via email to Architect.
   6. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 10 business days excluding delivery time to and from the Contractor.
      b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
   7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   8. Provide space for Contractor and Architect review stamps.
   9. When revised for resubmission, identify all changes made since previous submission.

B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Do not reproduce Contract Documents to create shop drawings.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.09 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will not acknowledge receipt, and take no other action.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
   1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
         2) A corrected submittal shall be included in the closeout documents.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.

1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.

2. Not Authorizing fabrication, delivery, and installation:
   a. "Revise and Resubmit".
      1) Resubmit revised item, with review notations acknowledged and incorporated.
   b. "Rejected".
      1) Submit item complying with requirements of Contract Documents.

E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
   a. "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
   a. "Reviewed" - no further action is required from Contractor.

END OF SECTION 01 30 00

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

D. Submit updated schedule with each Application for Payment.

1.03 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 22 x 17 inches.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

3.05 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION 01 32 16

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Control of installation.

C. Defect Assessment.

1.02 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION 01 40 00

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations.

D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 REFERENCE STANDARDS

A. NEMA MG 1 - Motors and Generators; 2018.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:

1. Containing lead, cadmium, or asbestos.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 60 00

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Cutting and patching.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Demonstration and instruction of Owner personnel.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

1.02 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.04 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.05 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire

unit.

2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.09 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, and area drains.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 70 00

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Provide a PDF copy, properly bookmarked as well.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

END OF SECTION 01 78 00

SECTION 01 91 13
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
   1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
   2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
   3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
   4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.

B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Substantial Completion.

C. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

D. The Commissioning Authority is employed by Owner.

1.02 SCOPE OF COMMISSIONING

A. The following are to be commissioned:

B. Plumbing Systems:
   1. Water heaters.
   2. Booster pumps.

C. HVAC System, including:
   1. Major and minor equipment items.
   2. Piping systems and equipment.
   3. Terminal units.
   4. Control system.
   5. Variable frequency drives.

D. Special Ventilation:
   1. Specialty fans.

E. Electrical Systems:
   1. Emergency power systems.
   2. Uninterruptible power systems.
   3. Lighting controls other than manual switches.

F. Electronic Safety and Security:
   1. Security system, including doors and hardware.

G. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

B. Section 22 08 00 - Commissioning of Plumbing

C. Section 23 08 00 - Commissioning of HVAC: HVAC control system testing; other requirements.

D. Section 26 08 00 - Commissioning of Electrical Systems

1.04 REFERENCE STANDARDS

A. CSI/CSC MF - Masterformat; 2016.

B. PECI (Samples) - Sample Forms for Prefunctional Checklists and Functional Performance Tests; Current Edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Architect; in that case, submit to Architect first.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.
   5. As soon as possible after submittals made to Architect are approved, submit copy of approved submittal to the Commissioning Authority.

B. Product Data: If submittals to Architect do not include the following, submit copies as soon as possible:
   1. Manufacturer's product data, cut sheets, and shop drawings.
   2. Manufacturer's installation instructions.
   3. Startup, operating, and troubleshooting procedures.
   4. Fan and pump curves.
   5. Factory test reports.
   6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.

C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.

D. Startup Plans and Reports.

E. Completed Prefunctional Checklists.

F. Commissioning Issues Log:
   1. Construction observations.
   2. Supporting photographs.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
   1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
   2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
   3. Calibration: According to the manufacturer’s recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of

Owner.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
   1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

A. Commissioning Authority will prepare the Commissioning Plan.
   1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
   2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

D. Commissioning Schedule:
   1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 20 days after award of Contract.
   2. Re-submit anticipated startup dates whenever revised, but not less than 4 weeks prior to startup.
   3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
   4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 DOCUMENTATION IDENTIFICATION SYSTEM

A. Give each submitted form or report a unique identification; use the following scheme.

B. Type of Document: Use the following prefixes:
   1. Startup Plan: SP-.
   2. Startup Report: SR-.
   3. Prefunctional Checklist: PC-.
   4. Functional Test Procedure: FTP-.
   5. Functional Test Report: FTR-.

C. System Type: Use the first 4 digits from CSI/CSC MF (Master Format), that are applicable to the system; for example:
   1. 2300: HVAC system as a whole.
   2. 2320: HVAC Piping and Pumps.
   3. 2330: HVAC Air Distribution.

D. Component Number: Assign numbers sequentially, using 1, 2, or 3 digits as required to accommodate the number of units in the system.

E. Test, Revision, or Submittal Number: Number each successive iteration sequentially, starting with 1.

F. Example: PC-2320-001.2 would be the Prefunctional Checklist for equipment item 1 in the HVAC piping system, probably a pump; this is the second, revised submittal of this checklist.

3.03 STARTUP PLANS AND REPORTS

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 3 weeks prior to startup.

B. Submit directly to the Commissioning Authority.

3.04 PREFUNCTIONAL CHECKLISTS

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
   1. No sampling of identical or near-identical items is allowed.
   2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
   3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
      a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
      b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
      c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
      d. Serial number of installed unit.
      e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer’s start-up checklist items and minor testing.
      f. Sensor and actuator calibration information.
   4. PECI (Samples) found at http://www.peci.org/library/mcpgs.htm indicate anticipated level of detail for Prefunctional Checklists.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
   1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
   2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
   3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
   4. If any Checklist line item is not relevant, record reasons on the form.
   5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
   6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
   7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
   1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
   2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
   3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
   4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:
   1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
   2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.05 FUNCTIONAL TESTS

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
   1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
   2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
   3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
   4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
   5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:
   1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
   2. Examples of Functional Testing:
      a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
      b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
      c. Systems are run through all the HVAC control system’s sequences of operation and components are verified to be responding as the sequence's state.
      d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
   3. PECI (Samples) found at http://www.peci.org/library/mcpgs.htm indicated anticipated level of detail for Functional Tests.

F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.06 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:
   1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
   2. Verify that sensors with shielded cable are grounded only at one end.
   3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
   4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:
   1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
   2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
   3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.
   1. Disconnect sensor.
   2. Connect a signal generator in place of sensor.
   3. Connect ammeter in series between transmitter and building automation system control panel.
   4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
   5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
   6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
   7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
   8. Reconnect sensor.
   9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
   10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
   11. If not, replace sensor and repeat.
   12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
   1. Watthour, Voltage, Amperage: 1 percent of design.
   2. Pressure, Air, Water, Gas: 3 percent of design.
   3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.
   4. Relative Humidity: 4 percent of design.
   5. Barometric Pressure: 0.1 inch of Hg.
   6. Flow Rate, Air: 10 percent of design.
   7. Flow Rate, Water: 4 percent of design.
   8. AHU Wet Bulb and Dew Point: 2.0 degrees F.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

3.07 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
   1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
   2. Sampling is not allowed for:
      a. Major equipment.
      b. Life-safety-critical equipment.
      c. Prefunctional Checklist execution.
   3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
   4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
   5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
   6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
   7. If YY percent of the units in the second sample fail, test all remaining identical units.
   8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
   1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority’s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
   2. Other points will be monitored by the Commissioning Authority using dataloggers.
   3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
   4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
   5. Graphical output is desirable and is required for all output if the system can produce it.
   6. Monitoring may be used to augment manual testing.

3.08 OPERATION AND MAINTENANCE MANUALS

A. See Section 01 78 00 - Closeout Submittals for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION 01 91 13

SECTION 09 51 23
ACOUSTICAL TILE CEILINGS

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. This Section includes acoustical tiles for ceilings and the following:
   1. 2'x2' Acoustical Tile Lay-in Ceiling
   2. Suspended ceiling grid

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.03 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light-Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.04 SUBMITTALS

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

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Ceiling suspension system members.
   2. Method of attaching hangers to building structure.

C. Samples for Initial Selection: For components with factory-applied color finishes.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical tile ceiling.

E. Maintenance Data: For finishes to include in maintenance manuals.

F. Certificates: Submit certificates from manufacturers of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements.

1.05 QUALITY ASSURANCE

A. Source Limitations:
   1. Acoustical Ceiling Tile: Obtain each type through one source from a single manufacturer.
   2. Suspension System: Obtain each type through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
   1. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
      a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:
      a. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be

protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

1.08 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 PRODUCTS

2.01 ACOUSTICAL TILES, GENERAL

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
   1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Sound Attenuation Performance: Provide acoustical ceiling units with ratings for ceiling sound transmission class (STC) of range indicated as determined according to AMA 1-II "Ceiling Sound Transmission Test by Two-Room Method" with ceilings continuous at partitions and supported by a metal suspension system of type appropriate for ceiling unit of configuration indicated (concealed for tile, exposed for panels).

D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.02 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING

A. Refer to drawings for locations of ceiling finish.

B. Basis-of-Design Product (as listed below): Subject to compliance with requirements, provide Armstrong product as specified or a comparable product by one of the following:
   1. CertainTeed
   2. USG Interiors, Inc
   3. Armstrong World Industries, Inc.

C. Lay-in Ceiling “A” Armstrong 1713 School Zone Fine Fissured, USG 22421 Radar Education or equal by CertainTeed HHF-454-HNR. Use in Finished Areas.
   1. Color: White.
   2. LR: Not less than 0.83.
   3. NRC: Not less than 0.70.
   4. CAC: Not less than 35.
   5. Edge/Joint Detail: Square Edge
   6. Thickness: min. 3/4 inch.
   7. Modular Size: 24 by 24 inches.
   8. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.
   9. 15 Year No-Sag Resistance: Provide 15 year no-sag warranty.

D. Lay-in Ceiling “B” Armstrong Kitchen Zone 673 or vinyl covered gypsum by USG 3260, CertainTeed Performa Vinylrock 1142-CRF-1. Use in Mechanical Rooms.
   1. Color: White.
   2. LR: Not less than 0.77.
   3. NRC: N/A.
   4. CAC: min. 33.
   5. Edge/Joint Detail: Square.
   6. Thickness: min. 1/2 inch.
   7. Modular Size: 24 by 24 inches.
   8. Humidity tolerant: Humiguard Plus, ClimaPlus Performance, or Sag Resistant
   9. 15 Year No-Sag Resistance: Provide 15 year no-sag warranty.
   10. Tile shall be approved for use in food processing areas

2.03 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Galvanized, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 12 gauge diameter wire.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.

2.04 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc.
   2. USG Interiors, Inc.
   3. Chicago Metalic
   4. CertainTeed

C. Intermediate Duty, Direct-Hung, Double-Web, Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.
   1. Structural Classification: Intermediate-duty system.
   2. Access: Upward and end or side pivoted, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

D. Indirect-Hung, Fire-Rated Suspension System: Main and cross runners roll formed from cold-rolled steel sheet with 15/16” wide exposed faces on structural members, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation.
   1. Structural Classification: Intermediate-duty system.
   2. Carrying Channels: Cold-rolled steel, 0.059850-inch- minimum base (uncoated) metal thickness, not less than 3/16-inch- wide flanges by 1-1/2-inch- deep steel channels, 475 lb/1000 feet, with rust-inhibitive paint finish.
   3. Access: Where access is indicated, provide special cross runners or split splines to allow for removal of acoustical units in indicated access areas. Identify access tile with manufacturer's standard unobtrusive markers for each access unit.

2.05 METAL EDGE MOLDINGS AND TRIM

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc.
   2. Chicago Metallic Corporation
   3. USG Interiors, Inc.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
   1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
   2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.06 ACOUSTICAL SEALANT

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:
   1. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation; SHEETROCK Acoustical Sealant.
   2. Acoustical Sealant for Concealed Joints:
      a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
      b. Pecora Corporation; BA-98.
      c. Tremco, Inc.; Tremco Acoustical Sealant.

C. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

D. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.07 MISCELLANEOUS MATERIALS

A. Hold-Down Clips for Non-Fire-Rated Ceilings: For interior ceilings composed of lay-in panels weighting less than 1 lb per sq.ft., provide hold-down clips spaced 2'-0" o.c. on all cross tees.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   8. Do not attach hangers to steel deck tabs.
   9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
   11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without

attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:
   1. Install tiles with pattern running in one direction parallel to long axis of space.

3.04 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 26 01 00
ELECTRICAL GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Contractor shall provide all materials, equipment and labor necessary to install and set into operation the electrical equipment as shown on the Engineering Drawings and as contained herein.

1.02 QUALITY ASSURANCE

A. See the General and Supplementary General Conditions and Architectural Divisions.

B. All work shall be in accordance with the North Carolina State Building Code, which includes the 2020 edition of the National Electrical Code.

C. The Contractor shall be responsible for obtaining all permits and shall notify inspection departments as work progresses.

D. Wherever the words "Approved", "Approval", and "Approved Equal" appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.

E. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. “Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.

F. All personnel under this Contractor’s supervision shall be qualified to perform those portions of the work assigned to them. Personnel (including project managers) deemed to be negative to the overall success of the project shall be removed from the project and replaced with qualified personnel who will be positive for the project. Upon written notification that particular personnel have been deemed negative to the overall success of the project, this Contractor shall immediately replace such particular personnel. The engineer shall be sole arbiter and any decision regarding fitness of this Contractor’s personnel for this project shall not be subject to appeal.

1.03 SUBMITTALS

A. See General and Supplementary General Conditions and Division 1.

B. Within ten (10) days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit for approval to the Architect/Engineer a detailed list of equipment and material which he proposes to use.

C. The Contractor shall provide an electronic pdf copy of the submittal data on the products, methods, etc. proposed for use on the project. The submittal shall contain complete submittal data on all products, methods, etc. proposed for use on the project.

D. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number and all necessary performance and fabrication data. Detailed submittal data shall be provided when items are to be considered as substitution for specified items. Acceptance for approval shall be in writing from the Engineer.

E. The Contractor shall submit to the Engineer a set of accurately marked-up plans indicating all changes encountered during the construction. Final payment will be contingent on receipt of these as-built plans.

F. The Contractor shall furnish an electronic copy of maintenance and operating instructions.

G. The Contractor shall submit to the Engineer a duplicate set of final electrical inspection certificates prior to final payment.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.

B. The Contractor shall protect all material and equipment from breakage, theft or weather damage. No material or equipment shall be stored on the ground.

C. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.

D. Where equipment cannot be stored at the site due to exposure to the elements or lack of storage space , the contractor shall store all equipment in a bonded warehouse until the time of installation.

1.05 WORK CONDITIONS AND COORDINATION

A. The Contractor shall review the entire set of plans to establish points of connection and the extent of electrical work to be provided in his Contract.

B. The contractor is responsible for reviewing the complete set of contract documents. Coordinate all phasing requirements with architectural drawings. Coordinate equipment locations and utility routing with all trades to ensure code compliance and constructibility.

C. This Contractor shall be responsible for all electrical work and make final connections to equipment installed in his Contract.

D. Pipe, conduit and duct chases required for installation of work shall be provided by the General Contractor unless otherwise noted. This Contractor shall be responsible for coordinating the location of all required chases.

E. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be approved by Architect/ Engineer and shall be at the Contractor's expense with no extra cost to the Owner.

1.06 GUARANTEE

A. See the General and Supplementary General Conditions.

B. Where extended warranties or guarantees are available from the manufacturer, the Contractor shall prepare the necessary Contract Documents to validate these warranties as required by the manufacturer and present them to the Architect/Engineer.

PART 2 PRODUCTS

2.01 MATERIAL QUALITY

A. Material and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Material and equipment found defective shall be removed and replaced at the Contractor's expense.

2.02 EQUIPMENT LISTINGS

A. All materials and equipment shall be third party listed by an agency accredited by the NCBCC and NC Department of Insurance (NC DOI). The list of accredited agencies may be obtained on NCDOI's web site.

PART 3 EXECUTION

3.01 INSPECTION

A. If any part of this Contractor's work is dependent for its proper execution or for its subsequent efficiency or appearance on the character or conditions of contiguous work not executed by him, the Contractor shall examine and measure such contiguous work and report to the Architect or Engineer in writing any imperfection therein, or conditions that render it unsuitable for the reception of this work. Should the Contractor proceed without making such written report, he shall be held to have accepted such work and the existing conditions and he shall be responsible for any defects in this work consequent hereon and will not be relieved of the obligation of any guarantee because of any such imperfection or condition.

B. After the designer pre-final inspection and confirmation that the final punch list items have been completed. The contractor shall schedule a final electrical inspection with the local inspections office.

3.02 INSTALLATION

A. All work shall be performed in a manner indicating proficiency in the trade.

B. All conduit, pipes, ducts, etc., shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.

C. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.

D. All patching shall be done in such a manner as to restore the areas or surfaces to match existing finishes.

E. The Contractor shall lay-out and install his work in advance of pouring concrete floors or walls. He shall furnish and install all sleeves or openings through poured masonry floors or walls above grade required for passage of all conduits, pipes or duct installed by him. The Contractor shall furnish and install all inserts and hangers required to support his equipment.

F. The Contractor shall be responsible for removing all spray-on fireproofing overspray from all equipment, light fixtures, and all other materials provided as part of the electrical contract.

3.03 PERFORMANCE

A. The Contractor shall perform all excavation and backfill operations necessary for installation of his work.

B. Rock excavation shall be defined in the Supplementary General Conditions, Division 1 or Division 2. Unless specifically stated, neither rock excavation nor a unit price for rock excavation shall be required in the bid.

3.04 ERECTION

A. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.

3.05 FIELD QUALITY CONTROL

A. The Contractor shall conform to the requirements of Division 3 for concrete testing.

B. The Contractor shall test his entire installation and shall furnish the labor and materials required for these tests. Tests shall be performed in accordance with the requirements of the particular section of the specifications and in accordance with the requirements of the State Ordinances and Codes, and the National Electrical Code. The Contractor shall notify the Architect or Engineer of his readiness for such test. A final inspection by the Electrical Inspector or Local Authority Having Jurisdiction is required, and an inspection certificate is required prior to authorization of final payment.

C. Testing required for compliance with the Contract shall be stated in subsequent sections.

D. All tests specified shall be completely documented indicating time of day, date, temperature and all other pertinent test information including the entity conducting the test.

E. All required documentation of readings required by each test shall be submitted to the Engineer prior to, and as one of the prerequisites for, final acceptance of the project.

3.06 ADJUST AND CLEAN

A. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.

B. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for the intended service. In no event shall nameplates be painted.

C. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract (in the presence of the Engineer).

3.07 MAINTENANCE AND OPERATING MANUAL

A. The Contractor shall prepare an electronic submission of a manual describing the proper maintenance and system operation. This manual shall not consist of standard factory printed data intended for dimension or design purposes (although these may be included), but shall be prepared to describe this particular job. This manual shall include the following:

B. Data on all equipment as listed on the equipment schedules on the plans as applicable to the project.

C. Warranties as required for each product.

D. A check list for periodic maintenance of all equipment requiring maintenance. (i.e. panelboards, etc.)

E. Maintenance and spare parts data for all equipment.

F. As-Built wiring for equipment containing field wired systems as applicable to the project.

G. The manuals shall be dated and signed by the Contractor when completed.

H. The operating and maintenance manuals shall be submitted to the Engineer for approval. When the manuals are considered complete by the Engineer, they will be turned over to the Owner for their permanent use.

END OF SECTION 26 01 00 26 01 00

SECTION 26 05 05
ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Report discrepancies to Architect before disturbing existing installation.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Owner at least 48 hours before de-energizing system.

E. Fire alarm system shall be maintained to all occupied portions of the building.
   1. Notify Owner and Fire Marshall a least 48 hours before partially or completely disabling system.
   2. If the Fire alarm system cannot be maintained in the occupied portion of the building contractor shall provide a fire watch in accordance with NFPA 72 and local authority requirements.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Lamps are to be disposed of in accordance with NC G.S. 130A - 310.60. Applicable equipment and materials include, but are not limited to:
   1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
   2. PCB- and DEHP-containing lighting ballasts.
   3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Where conduit cannot be removed from floors or walls, cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Repair adjacent construction and finishes damaged during demolition and extension work.

G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

H. Remove all devices from walls or ceilings shown to be removed on the Architectural drawings wether shown on the electrical demolition plans or not.

I. Where existing downstream devices are to remain, extend existing branch circuit conduit and conductors to maintain service.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION 26 05 05

SECTION 26 05 19
POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Underground feeder and branch-circuit cable.

C. Wiring connectors.

D. Electrical tape.

E. Oxide inhibiting compound.

F. Wire pulling lubricant.

1.02 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

B. Field Quality Control Test Reports.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing of exterior below grade conduit and associated hand holes or man holes..

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Service entrance cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. All conductors shall be labeled two feet on centers indicating size, type, voltage, rating, and manufacturer's name.

D. Provide new conductors and cables manufactured not more than one year prior to installation.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

F. Comply with NEMA WC 70.

G. Conductor Material:
   1. Provide copper conductors only! Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors.
   3. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors.

H. Minimum Conductor Size:12 AWG.

I. Maximum Conductor Size: 500 kcmil

J. Conductors for branch circuits shall be sized to prevent a voltage drop exceeding three percent (3%) at the farthest outlet of power, heating and lighting loads, or any combination of such loads. The maximum total voltage drop on both feeders and branch circuits to the farthest outlet shall not exceed five percent (5%).
   1. Where the branch circuit conductor length from the panel to the first outlet on a 277 volt circuit exceeds 125 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Increase the branch circuit conductor size an additional wire size for reach 125’ of additional length of the entire circuit. The ground conductor size shall be increased proportionately to the increase in the phase conductors per 2020 NEC 250.122(B).
   2. Where the conductor length from the panel to the first outlet on a 120 volt circuit exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Increase the branch circuit conductor size an additional wire size for reach 100’ of additional length of the entire circuit. The ground conductor size shall be increased proportionately to the increase in the phase conductors per 2020 NEC 250.122(B).

K. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method:
      a. Conductors #10 AWG and smaller shall be factory color coded.
      b. Conductors #3 and larger shall be factory color coded on the entire length.
   3. Color Code:
      a. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.

3) Phase C: Blue.
4) Neutral/Grounded: White.

b. Equipment Ground, All Systems: Green.

2.03 BUILDING WIRE

A. Approved Manufacturers as listed below or approved equal:
1. Copper Building Wire:
a. Triangle
b. Okonite
c. Houston Wire and Cable
d. or approved equal

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Class B Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or XHHW-2.
2. Conductors routed on roofs or other exterior surface where raceway is exposed to direct sunlight shall be type XHHW-2 insulation.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

C. Wiring Connectors for Splices and Taps:
1. Splices or taps shall not be allowed for feeder conductors unless specifically noted on plans.
2. Where a splice or tap for feeder conductors is noted on the plans, connectors shall be Blackburn insulated multi-tap or approved equal.
3. Splices in branch circuit conductors shall be allowed in accessible junction boxes, troughs, or gutters.
a. Copper Conductors #10 AWG and smaller: Use twist-on insulated spring connectors.
b. Copper Conductors #8 AWG and larger: Use mechanical connectors with gum rubber tape or friction tape. Solderless mechanical connectors with UL listed insulating covers may be used at contractor's option.
4. Use of split bolts is not allowed.
5. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuit connections.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

2.05 ACCESSORIES

A. Electrical Tape:

1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   a. Product: Okonite 2000 or approved equal.
2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Circuit routing indicated is diagrammatic.
   2. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   3. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
   5. A dedicated green equipment grounding conductor shall be provided for all raceways containing branch circuit or feeder conductors. Equipment ground conductor shall be sized in accordance with the NEC.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner. Neatly train and lace wiring inside boxes, equipment, and panelboards.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant for conductors #4 AWG or larger, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train conductors inside boxes, wireways, panelboards and other equipment enclosures. Condcutors shall not be laced or bundled to avoid overheating.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   2. Do not remove conductor strands to facilitate insertion into connector.
   3. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

K. Insulate ends of spare conductors using vinyl insulating electrical tape.

L. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. All tests shall be completely documented indicating time of day, date, temperature and all pertinent test information. All required documentation shall be submitted to the Engineer prior to, and as a prerequisite for, final acceptance of the project. All test results shall be included in the Owner's operation and maintenance manual.

B. Inspect and test in accordance with NETA ATS, Section 7.3.2.
   1. Perform each of the following visual and electrical tests:
      a. Compare cable data with drawings and specifications to ensure compliance with contract documents.
      b. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
      c. Test bolted connections for high resistance using one of the following:
         1) A low-resistance ohmmeter.
         2) Calibrated torque wrench.
      d. Inspect compression-applied connectors for correct cable match and indentation.
      e. Inspect for correct identification.
      f. Inspect cable jacket and condition.
      g. Continuity test on each conductor and cable.
      h. Uniform resistance of parallel conductors.

C. Insulation resistance test is required for all feeder conductors prior to energizing feeders, sub-feeders, or service entrance conductors.
   1. All current carrying feeder phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt insulation resistance tester. In the procedures listed below shall be followed:
      a. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conducts and between conductor and the grounding conductor.
      b. After all fixtures, devices and equipment are installed and all connections completed to each panel, the Contractor shall disconnect the neutral feeder conductor from the neutral bar and take a insulation resistance reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the Contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The Contractor shall correct troubles, reconnect and retest until at 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
      c. The Contractor shall send a letter to the Engineer certifying that the above has been done and tabulating the insulation resistance readings for each panel. This shall be done at least four (4) days prior to final inspection.

d. At final inspection, The Contractor shall furnish a insulation resistance tester and show the Engineer's representatives that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed by the representatives.
e. Results of the test shall be made available to the engineer at the required pre-energization walk through.

2. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables and re-test as indicated above. Contractor shall submit new test results to the Engineer to demonstrate the deficiency has been corrected.

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

1.02 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.

C. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.

D. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Field quality control test reports.

D. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

F. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
   3. Metal In-Ground Support Structure:
      a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
   4. Concrete-Encased Electrode:
      a. Where metallic structural components meet the definition of a concrete encased electrode as defined in NEC 250.52, the concrete encased electrode shall be bonded to the grounding electrode system per NEC 250.50. Coordinate with the structure prior to pouring concrete foundations.
      b. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
   5. Ground Rod Electrode(s):
      a. Space electrodes not less than 10 feet from each other and any other ground electrode until maximum allowed resistance to ground is achieved.
      b. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible,

locate in softscape (uncovered) area.

6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar in main electrical room, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4" x 2" x 18" unless otherwise indicated or required.
   b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
8. unless otherwise noted. Location as identified on plans.
9. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

G. Service-Supplied System Grounding:
   1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
   2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

H. Separately Derived System Grounding:
   1. Separately derived systems include, but are not limited to:
      a. Transformers.
      b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
      c. Generators, when neutral is switched in the transfer switch.
   2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
   3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
   4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
   5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.

I. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    b. Metal gas piping.
    c. Metal process piping.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
    a. Exceptions:
        1) Use bare copper conductors where installed underground in direct contact with earth.
        2) Use bare copper conductors where directly encased in concrete (not in raceway).
2. Where insulated grounding conductors are used conductors shall be colored solid green.
3. Grounding electrode conductors #4 AWG and larger shall be installed in raceway.

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use double crimp compression connectors or exothermic welded connections for accessible connections.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated elsewhere in this section.
3. Holes for Connections: All mechanical connectors shall be double hole double crimp compression connectors..

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner.

C. Boxes with concentric, eccentric or oversized knockouts shall be provided with bonding bushings and jumpers. The jumper shall be sized per NEC table 250-122 and lugged to the box.

D. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle.

1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.

E. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Compression Connectors: Secure connections using manufacturer's recommended tools and dies. Connectors must be UL listed for use with grounding electrode conductors.

F. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS Section 7.13.
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
   2. Verify that ground system was installed in accordance with the contract documents and NEC Article 250.
   3. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
      a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter.
   4. 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.

B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

D. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 26 05 26

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 05 36 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.

C. Section 26 05 33.16 - Boxes and Cabinets: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

B. Sequencing:

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Anchors and Fasteners:
   1. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

2. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
3. Hollow Masonry: Use toggle bolts.
4. Hollow Stud Walls: Use toggle bolts.
5. Steel: Use beam clamps, machine bolts, or welded threaded studs.
6. Sheet Metal: Use sheet metal screws, bolts, or bolts.
7. Wood: Use wood screws.
8. Plastic and lead anchors are not permitted.
9. Powder-actuated fasteners are not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Conduits installed on the interior of exterior building walls shall be spaced off the wall surface a minimum of 1/4 inch using "clamp-backs" or strut.

I. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 05 29

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Flexible metal conduit (FMC).

C. Liquidtight flexible metal conduit (LFMC).

D. Electrical metallic tubing (EMT).

E. Conduit fittings.

F. Accessories.

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.

D. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

G. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

H. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

B. Project Record Documents: Record actual routing for conduits installed underground exterior to the building envelope.

1.05 QUALITY ASSURANCE

A. Conduit shall be delivered to the project site in bundles of full length pipes, each length marked with the trademark of the manufacturer and the Underwriters' Laboratories, Inc. stamp. Each conduit length shall be straight, true and free from scales, blisters, burrs and other imperfections.

1. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications.

C. Embedded Within Concrete:
   1. Within Slab on Grade: Not permitted.
   2. Within Slab Above Ground: Not permitted.
   3. Within Poured Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).

D. Outdoors: Apply raceways as indicated below unless otherwise noted
   1. Above ground conduit: Rigid galvanized steel conduit with 90o rigid elbow below grade transition to PVC.
   2. Roof: Rigid galvanized steel conduit supported on rubber blocks and unistrut frame. Conduit must be at least 3-1/2" above roof surface.
   3. Feeders: PVC Type DB concrete encased
   4. Branch circuits: Schedule 40 PVC direct buried
   5. Telecommunications: Schedule 40 PVC concrete encased
   6. Connections to vibrating equipment including transformers, generators, and other motor driven equipment: Liquid tight flexible metal conduit.
   7. Boxes and enclosures above ground Nema Type 4

E. Indoors: Finished spaces (not subject to physical damage)
   1. Raceway shall be routed concealed in interior portions of furred spaces, ceilings, and cavities, unless other than concrete or solid plaster where possible.
   2. Raceways 2 inch or less shall be allowed to be EMT conduit.
   3. All raceways concealed in exterior walls shall be rigid galvanized steel conduit.
   4. All raceways larger than 2 inch shall be rigid galvanized conduit.
   5. Where surface mounted conduit is required in finished spaces, contractor shall utilize surface metal raceway wire mold.
   6. Where there is a transition between RGS in a wall to EMT above ceiling, it shall be made at a junction box above accessible ceiling.
   7. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

F. Stub Ups
   1. All feeder stub ups shall transition below grade from PVC to rigid a minimum of 3 feet horizontally from stub up location.
   2. All branch circuit stub ups, where exposed or in non-CMU walls, shall transition to rigid galvanized steel at 90 degree elbow.
   3. Schedule 40 rigid polyvinyl (PVC) stub ups are only allowed where conduits come up in CMU walls or the bottom of floor mounted equipment.

G. Unfinished spaces subject to damage (Electrical, Mechanical etc.)
   1. All conduit in unfinished spaces shall rigid galvanized steel. Conduit is not considered subject to damage when installed at least 10 feet above finished floor or tight to structure.
   2. Conduits are not required to transition to transition to rigid galvanized steel where they are routed down into panelboards or other wall mounted equipment.

H. Exposed, Interior finished spaces: Use surface metal raceway as identified on the drawings.
   1. Surface metal raceway shall be manufactured by Wiremold or approved equal.
   2. A separate equipment ground conductor shall be run in the surface metal raceway.

I. Connection to vibrating equipment shall be made with flexible metal conduit or liquid tight flexible metal conduit depending on the environment installed.

J. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit shall be allowed.
   1. Maximum Length: 6 feet.

K. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Motors.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Interior: 3/4 inch (21 mm) trade size.
   2. Flexible Connections to Luminaires: 1/2 inch (13 mm) trade size.
   3. Exterior: 1 inch (27 mm) trade size.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit.
   2. Republic Conduit.
   3. Wheatland Tube Company.
   4. or approved equal.

B. Description: NFPA 70, Type RMC standard weight mild steel, hot dipped galvanized, sherardised or zinc-coated rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Thomas & Betts Corporation.
      b. Rayco.
      c. Appleton.
      d. or approved equal.
   2. Connectors and Couplings: Use steel compression fittings with insulated throats.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 FLEXIBLE METAL CONDUIT AND LIQUIDTIGHT FLEXIBLE METAL CONDUIT (FMC LFMC)

A. Manufacturers:
   1. Allied Tube & Conduit.
   2. Republic Conduit.
   3. Wheatland Tube Company.
   4. or approved equal.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

D. Spiral strip construction shall allow the conduit to bend up to four times its internal radius.

E. Fittings shall be compression type with insulated throats and listed for use with conduit specified.

2.06 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit.
   2. Republic Conduit.
   3. Wheatland Tube Company.
   4. or approved equal.

B. Description: NFPA 70, Type EMT cold-rolled steel electrical metallic tubing with zinc coating on the inside and protected on the inside by a zinc, enamel or equivalent corrosion-resistant coating complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use hexagonal compression (gland) type.
      a. Do not use indenter type connectors and couplings.
      b. Do not use set-screw type connectors and couplings.

2.07 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner tight against walls, columns or ceilings.

C. The conduit shall bend cold 90 degrees about a radius equal to ten (10) times its own diameter without signs of flaw or fracture in either pipe or protective coverings. All bends and offsets shall be made on a forming tool to prevent the conduit or its coating from being damaged in the bending.

D. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

E. Install intermediate metal conduit (IMC) in accordance with NECA 101.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. Conceal all conduits unless specifically indicated to be exposed.
   3. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
   4. Arrange conduit to maintain maximum headroom, clearances, and access.
   5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   6. Arrange conduit to provide no more than 100 feet between pull points.
   7. In every instance, conduit shall be installed in such a manner that the conductors may readily and easily be drawn or pulled in without strain or damage to the insulation; and, also, so that defective conductors may be readily and easily withdrawn and replaced by new conductors. Long radius bends and a sufficient number of approved pull and junction boxes shall be approved for this purpose, and as may be directed by the Engineer. All conduit shall be securely supported and grounded.
   8. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   9. Where conduits join any couplings or threaded fittings, the ends shall be made watertight.
   10. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:

G. Conduit Support:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   4. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
   5. Use conduit strap to support single surface-mounted conduit.
      a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
   6. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
   7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
   8. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
   9. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
   10. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
      a. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
      b. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

H. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
7. Condulet fittings shall not be used in lieu of pull boxes.

I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   a. All raceway penetrating exterior walls or other water proof membranes shall slope away from the building with a minimum slope of 4" over 100 feet.
4. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as required to preserve integrity of roofing system and maintain roof warranty.
5. Install firestopping to preserve fire resistance rating of partitions and other elements. Refer to penetration details on plans.
6. Where conduits cross building expansion joints or pass between areas with a temperature difference of 14 degrees C, provide expansion fittings on all raceway.

J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
2. Provide underground warning tape six to eight inches below finished grade directly above raceway. Tape shall be six inches wide with a minimum thickness of seven mil, non-distorting, colorfast, no-stretch, 600 pound tensile strength per six inch width, ultraviolet light fast. Message must repeat within a maximum of 40 inches. Painted legend shall be indicative of the type of underground line.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
3. Where conduits penetrate coolers or freezers.

M. Provide 200 pound tensile strength pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end. All empty conduits shall terminate in a junction box.

N. All ducts shall be sealed at terminations, using sealing compound and plugs, as required to withstand 15 psi minimum hydrostatic pressure.

3.03 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16
BOXES AND CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 REFERENCE STANDARDS

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

B. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, junction and pull boxes, cabinets and enclosures, and floor boxes.

B. Project Record Documents: Record actual locations for outlet and device boxes, cabinets and enclosures, and floor boxes.

1.05 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. The Electrical Contractor shall provide junction boxes, pull boxes, cable, support boxes, and wiring troughs as required by NEC and as otherwise indicated in the Drawings.
   2. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   3. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   4. Provide products listed, classified, and labeled as suitable for the purpose intended.

5. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
6. Provide grounding terminals within boxes where equipment grounding conductors terminate.
7. Each outlet designated on the plans shall be provided with an outlet box.
8. In general, outlets shall be installed at the heights indicated. The Contractor shall examine the plans of and coordinate with all other trades to assure mounting heights are correct for the intended purpose. Assure that all mounting heights comply with the latest version of ADA. Outlets installed at incorrect heights shall be relocated to the correct elevation at the Contractor's expense.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Outlet boxes shall be 4" square, 2 1/8" deep unless otherwise noted.
4. Use suitable concrete type boxes where flush-mounted in concrete.
5. Use suitable masonry type boxes where flush-mounted in masonry walls.
6. Do not use "through-wall" boxes designed for access from both sides of wall.
7. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
8. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
9. Junction boxes larger than 4" square shall be galvanized and without pre-formed knockouts.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
12. Manufacturers Recessed:
    a. Steel City Electric Company
    b. Metropolitan
    c. B & C
    d. or approved equal.
13. Manufacturers Surface:
    a. Crouse-Hinds
    b. Appleton
    c. Rayco
    d. or approved equal.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 12" square and Larger: Provide hinged-cover enclosures with quick access latches.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
5. Manufacturers Surface:
    a. Cooper.
    b. Hoffman.
    c. Hubbell Incorporated.
    d. or approved equal..

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner.

C. Arrange equipment to provide maximum clearances.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Box Locations:
   1. Locate boxes in accessible locations.
   2. Locate boxes so that wall plates do not span different building finishes.
   3. Locate boxes so that wall plates do not cross masonry joints.
   4. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   5. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   6. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.

G. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

H. Install boxes plumb and level.

I. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

J. Install boxes as required to preserve insulation integrity.

K. Boxes in damp or wet locations shall be provided with gaskets and covers.

L. Install permanent barrier between ganged wiring devices when voltage difference between adjacent devices exceeds 300 V.

M. Close unused box openings.

N. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION 26 05 33.16

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Underground warning tape.

E. Warning signs and labels.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.04 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location.
         4) Use identification nameplate to identify main overcurrent protective device.
         5) Use identification nameplate to identify load(s) served for each branch devicewhere not identified in a panelboard schedule.
      b. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location.
         4) Use typewritten circuit directory to identify load(s) served.
      c. Transformers:
         1) Identify kVA rating.
         2) Identify voltage and phase for primary and secondary.
         3) Identify power source and circuit number. Include location.
         4) Identify load(s) served. Include location.
      d. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.

2) Identify power source and circuit number. Include location.
3) Identify load(s) served. Include location.

e. Enclosed Contactors:
1) Identify ampere rating.
2) Identify voltage and phase.
3) Identify coil voltage.
4) Identify load(s) and associated circuits controlled. Include location.

f. Transfer Switches:
1) Identify voltage and phase.
2) Identify power source and circuit number for both normal power source and standby power source. Include location.
3) Identify load(s) served. Include location.
4) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.

2. Service Equipment:
a. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.

3. Emergency System Equipment:
a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.

4. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.

5. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
a. Service equipment.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
3. Use underground warning tape to identify power and communication feeders and branch circuits exterior to the building.

C. Identification for Cable Tray: Comply with Section 26 05 36.

D. Identification for Boxes:
1. Use color coded boxes to identify specified systems.
a. Color-Coded Boxes: Field-painted per the same color coding as identified in this section for the system contained within.
b. Fire alarm junction boxes shall be painted on all sides including the box cover.
2. For boxes concealed above accessible ceilings or exposed in mechanical or electrical rooms use neatly handwritten text using indelible marker to identify circuits enclosed.
3. For exposed boxes in public areas, use only type written labels.

E. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
2. Use identification label to identify fire alarm system devices.
3. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
4. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

F. Color Coding
1. Phenolic Nameplates and associated conduit and boxes shall be identified with the following color scheme. Note: For existing buildings the contractor shall field verify the existing building standard and revise the color scheme to match the existing field conditions. Failure to match

existing conditions will result in the contractor correcting the mislabeled equipment at his expense.

a. Blue surface white core - 120/208V equipment.
b. Black surface white core - 277/480V equipment.
c. Bright red surface white core - fire alarm equipment.
d. Dark red (burgundy) surface white core - security equipment.
e. Green surface white core - emergency systems.
f. Orange surface white core - telephone systems.
g. Brown surface white core - data systems.
h. White surface black core - paging systems.
i. Purple surface white core - TV systems.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
4. Nameplates shall be secured with self tapping stainless steel screws; if screws have sharp ends they shall be protected, otherwise rivets shall be used.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
a. Use only for indoor locations.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Text: All capitalized unless otherwise indicated.
3. Minimum Text Height:
a. Equipment Designation: 1/2 inch.
b. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.

D. Wiring device circuit labels.
1. All wiring devices (receptacles and switches) shall be labeled with the circuit serving the device. Label shall be a typed adhesive label affixed to the front of the wiring device face plate. Label shall have black text on clear background.

2.03 UNDERGROUND WARNING TAPE

A. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 7 mil, unless otherwise required for proper detection.

B. Legend: Type of service, continuously repeated over full length of tape.

C. Color:
1. Tape for Buried Power Lines: Black text on red background.
2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.04 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
1. Materials:
a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.

b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.

2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at six to eight inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 REFERENCE STANDARDS

A. UL 67 - Panelboards; Current Edition, Including All Revisions.

B. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

C. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
   1. Contractor shall confirm that all lug sizes and quantities submitted are compatible with the conductors specified on the contract documents. Changes required to lug sizes and quantities due to lack of coordination between the contractor and the supplier are to be made at the contractor's expense.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. It is the contractor's responsibility to ensure that the equipment submitted to comply with the requirements of this section are in compliance with the requirements and recommendations of the power system studies. Any changes recommended by the power system study shall be incorporated at no expense to the project.

C. Field Quality Control Test Reports.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

D. Contractor shall schedule a pre-energization site visit with the Engineer. Meeting shall be scheduled at least 7 days in advance. The results of the megger test and service ground resistance test shall be made available to the Engineer prior to scheduling the pre-energization site visit.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.geindustrial.com/#sle.

B. Eaton Corporation.

C. Schneider Electric; Square D Products.

D. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. When a power system study is included in the contract short circuit current ratings shall be verified with the study prior to submitting equipment for approval. Any changes required to meet the maximum available fault current shall be made in the submittal.
   3. Series rating is not allowed.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: As indicated on the drawings.
2. Boxes: Galvanized steel unless otherwise indicated.
3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   c. All covers shall be door in door type where one door can be opened to access the breakers and and dead front and the second door opens to the wire bending space adjacent to the dead front.
   d. Door in door covers shall feature a full length piano hinge.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

L. Load centers are not acceptable.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
2. Main and Neutral Lug Type: Compression.

C. Bussing:
1. Phase and Neutral Bus Material: Copper.
2. Ground Bus Material: Copper.

D. Circuit Breakers:
1. Provide bolt-on type.
2. Provide thermal magnetic circuit breakers for circuit breaker frame sizes less than 250 amperes.
3. Provide electronic trip circuit breakers for circuit breaker frame sizes 250 amperes and above.

E. Enclosures:
1. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
2. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
2. Main and Neutral Lug Type: Compression.

C. Bussing:

1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Provide electronic trip circuit breakers for circuit breaker frame sizes [250] amperes and above.

F. Enclosures:
1. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
2. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. PANELBOARDS USED FOR SERVICE ENTRANCE SHALL HAVE 100% RATED MAIN BREAKER.

2.06 MOLDED CASE CIRCUIT BREAKERS:

A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

B. Interrupting Capacity:
1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

C. Conductor Terminations:
1. Provide compression lugs.
2. Lug Material: Copper, suitable for terminating copper conductors only.

D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
1. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 100 amperes and larger.

E. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

F. Provide electronic trip circuit breakers for circuit breaker frame sizes larger than 250 amperes.
1. Provide the following individually field-adjustable trip response settings:
a. Long time pickup, adjustable by setting dial.
b. Long time delay.
c. Short time pickup and delay.
d. Instantaneous pickup.
e. Ground fault pickup and delay where ground fault protection is indicated.

G. Do not use handle ties in lieu of multi-pole circuit breakers.

H. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

I. Provide the following features and accessories where indicated or where required to complete installation:
1. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
2. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.
a. Provide handle locks for all breakers serving fire alarm equipment or elevator emergency communication systems. Handle locks shall be Space Age Electronics ELOCK series or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards securely, in a neat and workmanlike manner.

D. Arrange equipment to provide at least clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Install all field-installed branch devices, components, and accessories.

J. Set field-adjustable circuit breaker tripping function settings as directed. If a power system study is included in the contract, set breakers according to the recommendations made in the study.

K. Provide filler plates to cover unused spaces in panelboards.

L. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Emergency and night lighting circuits.
   2. Fire detection and alarm circuits.
   3. Intrusion detection and access control system circuits.
   4. Video surveillance system circuits.

M. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 600 amperes. Tests listed as optional are not required.
   1. Verify equipment nameplate is in accorance with contract documents.
   2. Inspect physical and mechanical condition.
   3. Inspect anchorage and anlignment.
   4. Verify unit is clean.
   5. Operate breaker to enusre smooth operation.
   6. Perform breaker adjustamants in accorance with the power system study.
   7. Perform resistance measurements through bolted connectionswith a low-resistance ohmmeter.
   8. Perform insulation-resistance test for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed.
   9. Perform contact/pole resistance test.
   10. Determine long-time and short time pickup and delay settings by primary current injection.
   11. Determine ground fault pickup and time delay by primary current injection.

B. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

C. Test GFCI circuit breakers to verify proper operation.

D. Test AFCI circuit breakers to verify proper operation.

E. Test shunt trips to verify proper operation.

F. Correct deficiencies and replace damaged or defective panelboards or associated components.

G. For Services and feeders 1000 amperes and larger, and any installation utilizing selective coordination, the following test should be performed on the circuit breakers. Testing shall be performed by a qualified manufacturer's factory technician at the job site. All readings shall be tabulated.
   1. Phase Tripping tolerance (within 20% of UL requirements).
   2. Trip time (per phase) in seconds.
   3. Instantaneous trip (amps) per phase.
   4. Insulation resistance (in megohms) at 1000-volts DC (phase to phase, and line to load).

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 24 16

SECTION 26 43 00
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices for service entrance locations.

1.02 REFERENCE STANDARDS

A. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.

B. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

C. NFPA 70 - National Electrical Code; National Fire Protection Association, Including All Applicable Amendments and Supplements; 2020.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.04 SUBMITTALS

A. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
   1. SPDs with EMI/RFI filter: Include noise attenuation performance.

B. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

C. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
   1. UL 1449.
   2. UL 1283 (for Type 2 SPDs).

D. Field Quality Control Test Reports.

E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

G. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

H. Project Record Documents: Record actual connections and locations of surge protective devices.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to label Electrical and Mechanical Equipment.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.07 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

A. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

B. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Field-installed, Externally Mounted Surge Protective Devices:
   1. Schneider Electric; Square D Brand Surgelogic Products[<>].
   2. Advanced Protection Technologies, Inc (APT).
   3. Current Technology/ABB.
   4. Approved equal.

B. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mouonted SPDs.

C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

D. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

E. UL 1449 Voltage Protection Ratings (VPRs):
   1. 208Y/120V System Voltage: Not more than 700 V for L-N, L-G, and N-G modes and 1,000 V for L-L mode.

F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

G. Enclosure Environment Type per NEMA 250: As indicated on the drawings.

H. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
   1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

A. Unless otherwise indicated, provide field-installed, externally mounted SPDs.

B. Surge Current Rating:
   1. Ampacity: 600 - 1000A 200 kA per mode 400 kA per phase.

C. Opening of supplementary protective devices, internal or external, shall not be permissible during UL 1449 3rd Edition Nominal Discharge testing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.

C. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of drawings and manufacturer's instructions.

D. Verify system grounding and bonding is in accordance with Section 26 05 26, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner.

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.

E. Provide conductors with minimum ampacity not less than manufacturer's recommended minimum conductor size.

F. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

G. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

H. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS Section 7.19.1.

C. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

3.04 CLEANING

A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 43 00