

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include unit-cost, quantity and lump sum allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.

1.2 DEFINITIONS

- A. Unit Cost Allowance is a dollar amount for a specified unit of work established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Quantity Allowance is an extent of work established in lieu of specific direction in the Contract Documents, used to establish extent of certain work results whose actual scope have not been determined at the time the Contract Documents are issued. The requirements for systems, products, material, equipment and installation are included in the technical specification. Include in the lump sum bid all cost to perform the work established by Quantity Allowance. If necessary, additional requirements will be issued by Change Order.

1.3 SELECTION AND PURCHASE

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

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific activities ordered by Owner under allowance and shall include delivery to Project site of material.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 UNIT-COST ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include delivery to Project site. Taxes are not included.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.9 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-

place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No 01: Site Lighting & Power Sleeves (2" Sch. 40 PVC)
1. Description: Include the quantities indicated for the installation of 2" schedule 40 PVC site lighting and site power sleeves not indicated in the construction documents.
 2. Unit of Measurement: LF
 3. Quantity Allowance: 200
- B. Allowance No 02: Mass Rock
1. Description: Include the quantity indicated for the removal of rock in open areas and disposal off-site at the discretion of the CMaR.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 15
- C. Allowance No 03: Trench Rock

1. Description: Include the quantity indicated for the removal of rock in trenches and pits and disposal off-site at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 15
- D. Allowance No 04: Unsuitable soils (On-site)
1. Description: Include the quantity indicated for the removal of undercut and waste unsuitable soils or existing loose fill and disposal on-site at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 3,500
- E. Allowance No 05: Unsuitable Soils (Off-site)
1. Description: Include the quantity indicated for the removal of undercut and waste unsuitable soils and disposal off-site at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 6,500
- F. Allowance No 06: Replacement Soil (Off-site)
1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils from off-site suitable soil at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 8,000
- G. Allowance No 07: Replacement Aggregate Base Course (ABC).
1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils with aggregate base course (ABC), including placement and compaction at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 1,500
- H. Allowance No 08: Replacement No.57 Washed Stone.
1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils with No.57 washed stone, including placement and compaction at the discretion of the CMAr.
 2. Unit of Measurement: CY
 3. Quantity Allowance: 500
- I. Allowance No 09: Woven Geo-Textile Fabric in place.
1. Description: Include the quantity indicated for woven geo-textile fabric in place for soil separation, stabilization, and reinforcement at the discretion of the CMAr.
 2. Unit of Measurement: SY
 3. Quantity Allowance: 1,000
- J. Allowance No 10: Biaxial Geo-Grid in place.
1. Description: Include the quantity indicated for biaxial geo-grid in place for drainage, load distribution, soil separation, and stabilization at the discretion of the CMAr.
 2. Unit of Measurement: SY
 3. Quantity Allowance: 500
- K. Allowance No 11: High-Capacity French Drain.

1. Description: Include the quantity indicated for the placement and installation of high-capacity French drain at the discretion of the CMAr.
 2. Unit of Measurement: LF
 3. Quantity Allowance: 200
- L. Allowance No 12: Lime Soil Stabilization.
1. Description: Include the quantity indicated for lime soil stabilization of unsuitable soils at the discretion of the CMAr.
 2. Unit of Measurement: SY
 3. Quantity Allowance: 1,000
- M. Allowance No 13: Temporary Construction Road(s), Parking and Laydown areas - Aggregate Base Course (ABC).
1. Description: Include the quantity indicated for the placement and installation of aggregate base course (ABC) for the construction of temporary construction roads, parking, and laydown areas at the discretion of the CMAr.
 2. Unit of Measurement: TON
 3. Quantity Allowance: TBD
- N. Allowance No 14: Temporary Construction Road(s), Parking and Laydown areas - Tensar TX-160 Geo-Grid.
1. Description: Include the quantity indicated for the placement and installation of Tensar TX-160 Geo-Grid for the construction of temporary construction roads, parking, and laydown areas at the discretion of the CMAr.
 2. Unit of Measurement: SY
 3. Quantity Allowance: TBD
- O. Allowance No 15: ~~Removal of ABC from~~ **Maintenance of** Temporary Construction Road(s), Parking and Laydown areas.
1. Description: ~~Include the quantity indicated for the removal and disposal of contaminated and non-contaminated aggregate base course (ABC) from the construction of temporary construction roads, parking, and laydown areas off-site at the discretion of the CMAr.~~ **Base bid shall include a Lump Sum Allowance of \$100,000.00 for the maintenance of temporary construction roads, parking, and laydown areas off-site at the discretion of the CmaR.**
 2. ~~Unit of Measurement: TON~~
 3. ~~Quantity Allowance: TBD~~
- P. Allowance No 16: Orange Construction / Temporary Tree Protection Fence
1. Description: Include the quantities indicated and installation of temporary orange fencing for the use in construction and tree protection to be used at the direction of the CMAr.
 2. Unit of Measurement: LF
 3. Quantity Allowance: TBD
 4. Clarification: Quantities listed are in addition to those in the base bid.
- Q. Allowance No 17: Removal of Unanticipated and Abandoned Structures, Tanks, or Refrigerant
1. Description: Bidder shall include in their Base Bid a Lump Sum Allowance of \$21,000.00 for Removal of Unanticipated and Abandoned Structures including but not limited to tanks, refrigerant, debris laden fill, underground utilities, and underground structures.
- R. Allowance No 18: Exterior Signage

1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$5,000.00 for purchase and installation of Exterior signage, as directed by the owner, architect, or local AHJ.
 2. Clarification: Allowance usage is in addition to the signage indicated in the contract documents and shall not be utilized for signage identified within the contract documents.
- S. Allowance No 19: Standard Duty Asphalt Patching and Repair
1. Description: Include the quantity indicated for standard duty asphalt pavement repairs and patching per 2" pavement section to be used at the direction of the owner.
 2. Unit of Measurement: SY
 3. Quantity Allowance: TBD
 4. Clarification: Price to include saw cutting, removal and disposal of existing and/or damaged asphalt, replacement of subbase, and patching.
- T. Allowance No 20: Heavy Duty Asphalt Patching and Repair
1. Description: Include the quantity indicated for heavy duty asphalt pavement repairs and patching per 2" pavement section to be used at the direction of the owner.
 2. Unit of Measurement: SY
 3. Quantity Allowance: TBD
 4. Clarification: Price to include saw cutting, removal and disposal of existing and/or damaged asphalt, replacement of subbase, and patching.
- U. Allowance No 21: Buffer Plantings
1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$10,000.00 for the purchase and installation of buffer plantings as directed by the owner, architect, or AHJ.
 2. Clarification: Allowance usage is for buffer planting in addition to those indicated on the contract drawings.
- V. Allowance No 22: Storm Pond Plantings
1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$50,000.00 for the purchase and installation of storm pond plantings as required for erosion control phasing or as directed by the owner, architect, or AHJ.
 2. Clarification: Allowance usage is for storm pond planting in addition to those indicated on the contract drawings.
- W. Allowance No 23: Temporary 8' Chain-link Fencing
1. Description: Include the quantity indicated for 8' tall temporary chain-link fencing.
 2. Unit of Measurement: LF
 3. Quantity Allowance: TBD
 4. Clarification: Price to include acquisition, installation, periodic maintenance, tear-down and removal from site.
- X. Allowance No 24: 24" x 24" Access Panels
1. Description: Include the quantity indicated and installation of 24" x 24" access panels installed in walls or ceilings as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 15
 4. Clarification: Allowance to include all associated framing required. Allowance is for additional access panels not indicated in the contract documents.
- Y. Allowance No 25: Fire Extinguishers and Cabinets

1. Description: Include the quantity indicated and installation of both 10lb ABC fire extinguishers and associated extinguisher cabinets as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 5
 4. Clarification: Allowance usage is in addition to the fire extinguishers and cabinets indicated in the contract documents and shall not be utilized for fire extinguishers and cabinets identified within the contract documents.
- Z. Allowance No 26: Interior Signage
1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$3,000.00 for the purchase and installation of interior signage as directed by the owner, architect, or AHJ.
 2. Clarification: Allowance usage is in addition to the signage indicated in the contract documents and shall not be utilized for signage identified within the contract documents.
- AA. Allowance No 27: Fire Sprinkler Heads
1. Description: Include the quantity indicated and installation of fire sprinkler heads at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 20
 4. Clarification: Include 15 linear feet of branch piping and associated fittings for a complete installation of each fire sprinkler head.
- BB. Allowance No 28: Occupancy Sensors
1. Description: Include the quantity indicated and installation of occupancy sensors at locations as directed by the owner or architect.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and wire for a complete installation of each occupancy sensor. Allowance usage is in addition to occupancy sensors indicated in the contract documents and shall not be utilized for occupancy sensors identified within the contract documents.
- CC. Allowance No 29: Duplex Receptacles
1. Description: Include the quantity indicated and installation of duplex receptacles at locations as directed by the owner or architect.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and wire for a complete installation of each duplex receptacle. Allowance usage is in addition to duplex receptacles indicated in the contract documents and shall not be utilized for duplex receptacles identified within the contract documents.
- DD. Allowance No 30: Emergency Lights
1. Description: Include the quantity indicated and installation of emergency lights at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and wire for a complete installation of each emergency light. Allowance usage is in addition to emergency lights indicated in the contract documents and shall not be utilized for emergency lights identified within the contract documents.
- EE. Allowance No 31: Exit Lights

1. Description: Include the quantity indicated and installation of exit lights at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 5
 4. Clarification: Include 30 linear feet of conduit and wire for a complete installation of each exit light. Allowance usage is in addition to exit lights indicated in the contract documents and shall not be utilized for exit lights identified within the contract documents.
- FF. Allowance No 32: 110CD speaker/strobe Fire Alarms
1. Description: Include the quantity indicated and installation of Fire Alarm Speaker/Strobes in either the ceiling or wall at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and 200' of wire for a complete installation of each device. Allowance usage is in addition to fire alarm speaker/strobes indicated in the contract documents and shall not be utilized for fire alarm speaker/strobes identified within the contract documents.
- GG. Allowance No 33: Fire Alarm Pull Stations
1. Description: Include the quantity indicated and installation of manual Fire Alarm Pull Stations with protective shields at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and 200' of wire for a complete installation of each device. Allowance usage is in addition to fire alarm pull stations indicated in the contract documents and shall not be utilized for fire alarm pull stations identified within the contract documents.
- HH. Allowance No 34: Fire Alarm Duct Detector & Remote Annunciator Indicator Light (RAIL)
1. Description: Include the quantity indicated and installation of Fire Alarm Duct Detector & RAIL at locations as directed by the owner, architect, or AHJ.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 5
 4. Clarification: Include 30 linear feet of conduit and 30' of wire for each duct detector and 50 linear feet of conduit and 30' of wiring for each RAIL for a complete installation of each device. Allowance usage is in addition to duct detectors and RAIL indicated in the contract documents and shall not be utilized for duct detectors and RAIL identified within the contract documents.
- II. Allowance No 35: 2-Port Data Outlets
1. Description: Include the quantity indicated and installation of 2-port data outlets at locations as directed by the owner or architect.
 2. Unit of Measurement: EA
 3. Quantity Allowance: 10
 4. Clarification: Include 30 linear feet of conduit and 30' of cabling per drop for a complete installation of each device. Allowance usage is in addition to 2-port data outlets indicated in the contract documents and shall not be utilized for 2-port data outlets identified within the contract documents.
- JJ. Allowance No 36: BDA System
1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$75,000.00 for a complete BDA system.

KK. Allowance No 37: CCTV Cameras

1. Description: Include the quantity indicated and installation of CCTV security cameras at locations as directed by the owner or architect.
2. Unit of Measurement: EA
3. Quantity Allowance: 5
4. Clarification: Include 30 linear feet of conduit and 30' of cabling for a complete installation of each device. Allowance usage is in addition to security cameras indicated in the contract documents and shall not be utilized for security cameras identified within the contract documents.

LL. Allowance No 38: Wireless Clocks

1. Description: Include the quantity indicated and installation of wireless wall clocks at locations as directed by the owner or architect.
2. Unit of Measurement: EA
3. Quantity Allowance: 10

MM. Allowance No 39: Temporary/Permanent Power

1. Description: Base bid shall include a Lump Sum Allowance of \$20,000.00 for temporary and permanent power and water fees to be used at the discretion of the CMaR.

NN. Allowance No 40: Temporary/Permanent Water

1. Description: Base bid shall include a Lump Sum Allowance of \$50,000.00 for temporary and permanent power and water fees to be used at the discretion of the CMaR.

OO. Allowance No 41: Duke Energy Permanent Power Fees

1. Description: Base bid shall include a Lump Sum Allowance of \$50,000.00 for Duke Energy permanent power fees to be used at the discretion of the CMaR.

PP. Allowance No 42: Dumpster Cost

1. Description: Base bid shall include a Lump Sum Allowance of \$75,000.00 for temporary dumpster fees to be used at the discretion of the CMaR.

QQ. Allowance No 43: Liquid Asphalt Escalation

1. Description: Base bid shall include a Lump Sum Allowance of \$ TBD for escalation of liquid asphalt to be used at the discretion of the CMaR.

RR. Allowance No 44: Topping Out Ceremony

1. Description: Base bid shall include a Lump Sum Allowance of ~~\$2,000.00~~ **\$5,000.00** for a topping out ceremony to be used at the discretion of the Owner.

SS. Allowance No 45: Plumbing Disconnect for **Existing** Modular Classroom Units

1. Description: Include the quantity indicated for the safe disconnect of all plumbing services within the modular classroom units.
2. Unit of Measurement: EA
3. Quantity Allowance: 2

TT. Allowance No 46: Mechanical Disconnect for **Existing** Modular Classroom Units

1. Description: Include the quantity indicated for the safe disconnect of all mechanical services within the modular classroom units.
2. Unit of Measurement: EA
3. Quantity Allowance: 2

| UU. Allowance No 47: Electrical Disconnect for **Existing** Modular Classroom Units

1. Description: Include the quantity indicated for the safe disconnect of all electrical services within the modular classroom units.
2. Unit of Measurement: EA
3. Quantity Allowance: 2

| VV. **Allowance No. 48: Additional Aggregate Piers**

1. **Description: Include the quantity indicated for the design and installation of Rammed Aggregate Pier(s).**
2. **Unit of Measurement: EA**
3. **Quantity Allowance: 1**

| WW. **Allowance No. 49: Groundbreaking Ceremony**

1. **Description: Base bid shall include a Lump Sum Allowance of \$5,000.00 for a groundbreaking ceremony to be used at the discretion of the Owner.**

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices, including quantity allowances.
- B. Related Sections include the following:
 - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Form of Proposal, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Quantity Allowance is an extent of work established in lieu of specific direction in the Contract Documents, used to establish extent of certain work results whose actual scope has not been determined at the time the Contract Documents are issued. The requirements for systems, products, material, equipment and installation are included in the technical specification. Include in the lump sum bid all cost to perform the work established by Quantity Allowance. If necessary, additional requirements will be issued by Change Order.

1.3 QUANTITY ALLOWANCES

- A. Include in the lump sum contract all costs related to the work described in the quantity allowances.
- B. Measurement: Owner will engage third party soils and material engineer to verify quantities of rock and soil, measured in place.
- C. Perform Work under quantity allowances only as authorized. Authorized work includes work required by Drawings and the Specifications and work authorized in writing by Architect.
- D. When work is performed and actual quantity or extent is measured, the Contract Sum will be adjusted by Change Order based on Unit Cost indicated in the Agreement.
- E. Submit claims for increased costs because of a change in scope or nature of the work described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

- B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- C. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No 1: Site Lighting & Power Sleeves (2" Sch. 40 PVC)
 - 1. Description: Include the quantities indicated for the installation of 2" schedule 40 PVC site lighting and site power sleeves not indicated in the construction documents.
 - 2. Unit of Measurement: Linear Foot (LF)
 - 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- B. Unit Price No 2: Mass Rock
 - 1. Description: Include the quantity indicated for the removal of rock in open areas and disposal off-site at the discretion of the CMAA.
 - 2. Unit of Measurement: Cubic Yard (CY)
 - 3. Method of Measurement: Quantities shall be verified by a soils and materials engineer employed by the Owner.
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site, excavation and labor.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Legal disposal of all materials.
 - e. All disposal fees.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- C. Unit Price No 3: Trench Rock
 - 1. Description: Include the quantity indicated for the removal of rock in trenches and pits and disposal off-site at the discretion of the CMAA.
 - 2. Unit of Measurement: Cubic Yard (CY)
 - 3. Method of Measurement: Quantities shall be verified by a soils and materials engineer employed by the Owner.
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site, excavation and labor.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.

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- d. Legal disposal of all materials.
 - e. All disposal fees.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- D. Unit Price No 4: Unsuitable soils (On-site)
- 1. Description: Include the quantity indicated for the removal of undercut and waste unsuitable soils or existing loose fill and disposal on-site at the discretion of the CMAA.
 - 2. Unit of Measurement: Cubic Yard (CY)
 - 3. Method of Measurement: Quantities shall be verified by a soils and materials engineer employed by the Owner.
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site, excavation and labor.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Legal disposal of all materials.
 - e. All disposal fees.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- E. Unit Price No 5: Unsuitable Soils (Off-site)
- 1. Description: Include the quantity indicated for the removal of undercut and waste unsuitable soils and disposal off-site at the discretion of the CMAA.
 - 2. Unit of Measurement: Cubic Yard (CY)
 - 3. Method of Measurement: Quantities shall be verified by a soils and materials engineer employed by the Owner.
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site, excavation and labor.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Legal disposal of all materials.
 - e. All disposal fees.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- F. Unit Price No 6: Replacement Soil (Off-site)
- 1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils from off-site suitable soil at the discretion of the CMAA.
 - 2. Unit of Measurement: Cubic Yard (CY)
 - 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Suitable soil materials from contractor's off-site source.
 - e. Placement and compaction of soil into void remaining from removed rock or unsuitable/existing loose soil.
 - 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- G. Unit Price No 7: Replacement Aggregate Base Course (ABC).

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1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils with aggregate base course (ABC), including placement and compaction at the discretion of the CMAA.
 2. Unit of Measurement: Cubic Yard (CY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Certified ABC materials from contractor's off-site source.
 - e. Placement and compaction of soil into void remaining from removed rock or unsuitable/existing loose soil.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- H. Unit Price No 8: Replacement No.57 Washed Stone.
1. Description: Include the quantity indicated for the replacement of removed rock or unsuitable soils with No.57 washed stone, including placement and compaction at the discretion of the CMAA.
 2. Unit of Measurement: Cubic Yard (CY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. Certified #57 washed stone from contractor's off-site source.
 - e. Placement and compaction of soil into void remaining from removed rock or unsuitable/existing loose soil.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- I. Unit Price No 9: Woven Geo-Textile Fabric in place.
1. Description: Include the quantity indicated for woven geo-textile fabric in place for soil separation, stabilization, and reinforcement at the discretion of the CMAA.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- J. Unit Price No 10: Biaxial Geo-Grid in place.
1. Description: Include the quantity indicated for biaxial geo-grid in place for drainage, load distribution, soil separation, and stabilization at the discretion of the CMAA.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

- K. Unit Price No 11: High-Capacity French Drain.
1. Description: Include the quantity indicated for the placement and installation of high-capacity French drain at the discretion of the CMAr.
 2. Unit of Measurement: Linear Foot (LF)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- L. Unit Price No 12: Lime Soil Stabilization
1. Description: Include the quantity indicated for the placement and installation of Lime Soil Stabilization at the discretion of the CMAr.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- M. Unit Price No 13: Temporary Construction Road(s), Parking and Laydown areas - Aggregate Base Course (ABC).
1. Description: Include the quantity indicated for the placement and installation of aggregate base course (ABC) for the construction of temporary construction roads, parking, and laydown areas at the discretion of the CMAr.
 2. Unit of Measurement: TON
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- N. Unit Price No 14: Temporary Construction Road(s), Parking and Laydown areas - Tensar TX-160 Geo-Grid.
1. Description: Include the quantity indicated for the placement and installation of Tensar TX-160 Geo-Grid for the construction of temporary construction roads, parking, and laydown areas at the discretion of the CMAr.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

- O. Unit Price No 15: ~~Removal of ABC from~~ **Maintenance of** Temporary Construction Road(s), Parking and Laydown areas.
1. Description: ~~Include the quantity indicated for the removal and disposal of contaminated and non-contaminated aggregate base course (ABC) from the construction of temporary construction roads, parking, and laydown areas off-site at the discretion of the CMAA. Base bid shall include a Lump Sum Allowance of \$100,000.00 for the maintenance of temporary construction roads, parking, and laydown areas off-site at the discretion of the CMAA.~~
 2. Unit of Measurement: ~~TON~~ **Lump Sum (LS)**
 3. Method of Measurement: ~~Quantities shall be verified by a soils and materials engineer employed by the Owner.~~
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site, excavation and labor.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - d. ~~Legal disposal of all materials.~~
 - e. ~~All disposal fees.~~
 5. ~~Quantity~~ **Lump-Sum** Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- P. Unit Price No 16: Orange Construction / Temporary Tree Protection Fence
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Description: Include the quantities indicated and installation of temporary orange fencing for the use in construction and tree protection to be used at the direction of the CMAA.
 3. Unit of Measurement: Linear Foot (LF)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- Q. Unit Price No 17: Removal of Unanticipated and Abandoned Structures, Tanks, or Refrigerant
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Bidder shall include in their Base Bid a Lump Sum Allowance of \$21,000.00 for Removal of Unanticipated and Abandoned Structures including but not limited to tanks, refrigerant, debris laden fill, underground utilities, and underground structures.
 3. Unit of Measurement: Lump Sum (LS)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to/from site and labor for complete demolition and removal.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- R. Unit Price No 18: Exterior Signage
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.

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2. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$5,000.00 for purchase and installation of Exterior signage, as directed by the owner, architect, or local AHJ.
 3. Unit of Measurement: Lump Sum (LS)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- S. Unit Price No 19: Standard Duty Asphalt Patching and Repair
1. Description: Include the quantity indicated for standard duty asphalt pavement repairs and patching per 2" pavement section to be used at the direction of the owner.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- T. Unit Price No 20: Heavy Duty Asphalt Patching and Repair
1. Description: Include the quantity indicated for heavy duty asphalt pavement repairs and patching per 2" pavement section to be used at the direction of the owner.
 2. Unit of Measurement: Square Yard (SY)
 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- U. Unit Price No 21: Buffer Plantings
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$10,000.00 for the purchase and installation of buffer plantings as directed by the owner, architect, or AHJ.
 3. Unit of Measurement: Lump Sum (LS)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- V. Unit Price No 22: Storm Pond Plantings
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.

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2. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$50,000.00 for the purchase and installation of buffer plantings as directed by the owner, architect, or AHJ.
 3. Unit of Measurement: Lump Sum (LS)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- W. Unit Price No 23: Temporary 8' Chain-link Fencing
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Description: Include the quantity indicated for 8' tall temporary chain-link fencing.
 3. Unit of Measurement: Linear Foot (LF)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- X. Unit Price No 24: 24" x 24" Access Panels
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Description: Include the quantity indicated and installation of 24" x 24" access panels installed in walls or ceilings as directed by the owner, architect, or AHJ.
 3. Unit of Measurement: Per device (1 location) (EA)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- Y. Unit Price No 25: Fire Extinguishers and Cabinets
1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 2. Description: Include the quantity indicated and installation of both 10lb ABC fire extinguishers and associated extinguisher cabinets as directed by the owner, architect, or AHJ.
 3. Unit of Measurement: Per device (1 location) (EA)
 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- Z. Unit Price No 26: Interior Signage

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$3,000.00 for the purchase and installation of interior signage as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Lump Sum (LS)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

AA. Unit Price No 27: Fire Sprinkler Heads

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of fire sprinkler heads at locations as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

BB. Unit Price No 28: Occupancy Sensors

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of occupancy sensors at locations as directed by the owner or architect.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

CC. Unit Price No 29: Duplex Receptacles

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of duplex receptacles at locations as directed by the owner or architect.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.

5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

DD. Unit Price No 30: Emergency Lights

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of emergency lights at locations as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

EE. Unit Price No 31: Exit Lights

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of exit lights at locations as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

FF. Unit Price No 32: 110CD speaker/strobe Fire Alarms

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of Fire Alarm Speaker/Strobes in either the ceiling or wall at locations as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

GG. Unit Price No 33: Fire Alarm Pull Stations

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of manual Fire Alarm Pull Stations with protective shields at locations as directed by the owner, architect, or AHJ.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:

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- a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- HH. Unit Price No 34: Fire Alarm Duct Detector & Remote Annunciator Indicator Light (RAIL)
- 1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 - 2. Description: Include the quantity indicated and installation of Fire Alarm Duct Detector & RAIL at locations as directed by the owner, architect, or AHJ.
 - 3. Unit of Measurement: Per device (1 location) (EA)
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- II. Unit Price No 35: 2-Port Data Outlets
- 1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 - 2. Description: Include the quantity indicated and installation of 2-port data outlets at locations as directed by the owner or architect.
 - 3. Unit of Measurement: Per device (1 location) (EA)
 - 4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - 5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- JJ. Unit Price No 36: BDA System
- 1. Description: Bidder shall include in their base bid a Lump Sum Allowance of \$75,000.00 for a complete BDA system.
 - 2. Unit of Measurement: Lump Sum (LS)
 - 3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
 - 4. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."
- KK. Unit Price No 37: CCTV Cameras
- 1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
 - 2. Description: Include the quantity indicated and installation of CCTV security cameras at locations as directed by the owner or architect.
 - 3. Unit of Measurement: Per device (1 location) (EA)

4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

LL. Unit Price No 38: Wireless Clocks

1. Purpose: To adjust the contract sum in case a quantity different from that indicated in the allowance is required.
2. Description: Include the quantity indicated and installation of wireless wall clocks at locations as directed by the owner or architect.
3. Unit of Measurement: Per device (1 location) (EA)
4. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

MM. Unit Price No 39: Temporary/Permanent Power

1. Description: Base bid shall include a Lump Sum Allowance of \$20,000.00 for temporary and permanent power and water fees to be used at the discretion of the CmaR.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

NN. Unit Price No 40: Temporary/Permanent Water

1. Description: Base bid shall include a Lump Sum Allowance of \$50,000.00 for temporary and permanent power and water fees to be used at the discretion of the CMAr.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

OO. Unit Price No 41: Duke Energy Permanent Power Fees

1. Description: Base bid shall include a Lump Sum Allowance of \$50,000.00 for Duke Energy permanent power fees to be used at the discretion of the CMAr.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

PP. Unit Price No 42: Dumpster Cost

1. Description: Base bid shall include a Lump Sum Allowance of \$75,000.00 for temporary dumpster fees to be used at the discretion of the CMAr.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

QQ. Unit Price No 43: Liquid Asphalt Escalation

1. Description: Base bid shall include a Lump Sum Allowance of \$TBD for escalation of liquid asphalt to be used at the discretion of the CMAr.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

RR. Unit Price No 44: Topping Out Ceremony

1. Description: Base bid shall include a Lump Sum Allowance of ~~\$2,000.00~~ **\$5,000.00** for a topping out ceremony to be used at the discretion of the Owner.
2. Unit of Measurement: Lump Sum (LS)
3. Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

SS. Unit Price No 45: Plumbing Disconnect for **Existing** Modular Classroom Units

1. Description: Include all disconnects for plumbing services for the modular classroom units in the quantity indicated.
2. Unit of Measurement: Per device (1 location) (EA)
3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

TT. Unit Price No 46: Mechanical Disconnect for **Existing** Modular Classroom Units

1. Description: Include all disconnects for mechanical services for the modular classroom units in the quantity indicated.
2. Unit of Measurement: Per device (1 location) (EA)
3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

UU. Unit Price No 47: Electrical Disconnect for **Existing** Modular Classroom Units

1. Description: Include all disconnects for electrical services for the modular classroom units in the quantity indicated.
2. Unit of Measurement: Per device (1 location) (EA)
3. Include the following in the unit price:
 - a. All materials, equipment, transport to site and labor for complete installation.
 - b. Overhead and profit.
 - c. Include all other related costs in the contract sum.
4. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."

VV. Unit Price No. 48: Additional Aggregate Piers

1. **Description: Include the quantity indicated for the placement and installation of additional aggregate pier(s) at the discretion of the CMAr.**

2. **Unit of Measurement: Per aggregate pier (EA)**
3. **Include the following in the unit price:**
 - a. **All materials, equipment, transport to site and labor for complete installation.**
 - b. **Overhead and profit.**
 - c. **Include all other related costs in the contract sum.**
4. **Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."**

WW. Unit Price No 49: Groundbreaking Ceremony

1. **Description: Base bid shall include a Lump Sum Allowance of \$5,000.00 for a groundbreaking ceremony to be used at the discretion of the Owner.**
2. **Unit of Measurement: Lump Sum (LS)**
3. **Lump-Sum Allowance: Coordinate unit price with allowance adjustment requirements of Section 012100 "Allowances."**

END OF SECTION 012200

SECTION 01 9113 GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Commissioning Defined:

Commissioning (Cx) is a systematic process of ensuring that all building systems perform interactively according to the owner's project requirements and operational needs. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing adjusting and balancing, performance testing and training. Commissioning is intended to achieve the following specific objectives:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by the installing contractors.
2. Verify and document proper functional performance of equipment and systems.
3. Verify that O&M documentation is complete.
4. Verify that the Owner's operating personnel are adequately trained.

B. Contractor Responsibilities:

1. This Section and other sections of the specification detail the Contractor's responsibilities relative to the Cx process. It expands on the Cx Plan, which covers the roles and responsibilities of Parties outside of the construction contract.
2. The Commissioning Authority (CxA) shall work with the Contractor and the design engineers to direct and oversee the Cx process and perform Functional Performance Testing

1.2 RELATED WORK

- A. Section 01 1100 – Summary of Work
- B. Section 01 3100 – Project Management and Coordination
- C. Section 01 3150 – Coordination Drawings
- D. Section 01 3300 – Submittal Procedures
- E. Section 01 7700 – Closeout Procedures
- F. Section 01 7823 – Operation and Maintenance Data

- G. Section 01 7900 – Demonstration and Training
- H. Section 07 0800 – Envelope Commissioning Requirements
- I. Section 21 1318 – Fire Protection Systems
- J. Section 22 0800 – Plumbing Commissioning Requirements
- K. Section 23 0800 – Heating, Ventilating and Air Conditioning Commissioning Requirements
- L. Section 25 0800 – Integrated Automation Commissioning
- M. Section 26 0800 – Electrical Commissioning Requirements

1.3 REFERENCE STANDARDS

1. ASHRAE Standard 202-2018, "The Commissioning Process for Buildings and Systems"
2. ASHRAE Guideline 4-2019, "Preparation of operating and Maintenance Documentation for Building Systems"
3. NEBB - Procedural Standards for Building Systems Commissioning
4. AABC – National Standards for Total System Balance
5. USGBC - LEED v4.1 for Building Design and Construction

1.4 ABBREVIATIONS AND DEFINITIONS

1. Acceptance Phase: This is the phase of the project when the facility and its systems and equipment are inspected, tested, verified, and documented; and when most of the Functional Performance Testing and final training occurs. This will generally occur after the Construction Phase is complete (after Start-Up Documentation have been completed). The Acceptance Phase begins upon System 'Turn-Over' with certification by the Contractor that the systems have been placed into service in accordance with the approved protocols and after the submission of the approved Start-Up Documentation. The Acceptance Phase ends with the successful completion of all Functional Performance Testing and sign-off by the CxA and Owner.
2. Action Item (AI): Any Cx-related issue that requires a response, completion, corrective or additional work, or any other action. Examples include a Request for Information (RFI), a work directive, a clarification request, a to-do item, an identified deficiency, or any other like item. Action Items must be categorized as appropriate.
3. Action List: This is a list that is maintained and updated by the CxA that includes all Action Items that relate to Cx activities.
4. A/E: General reference to the Architect/Engineer lead-design entity.
5. ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers.
6. Building Automation System (BAS): The computer-based control or automation system. BAS is used throughout these Sections. Alternate references common in the industry include facility management system, automatic temperature control system, direct digital control system, building management system, building management and control system, digital control system, Energy Management System, Energy Management and Control System or System Control and Data Acquisition (SCADA) System.

7. Checklist Item: An item to inspect to verify proper installation of equipment or systems by the Contractor. Checklist items simply require a 'Yes/No' or 'OK/Not' response. Start-Up Checklist items are one component of the Start-Up Documentation.
8. Commissioning (Cx): The process of ensuring that all building systems perform interactively according to the design intent, that the systems are efficient and cost effective, and that they meet the Owner's operational needs.
9. Commissioning Authority (CxA): The Owners QA Group representative or consultant representative retained by the Owner who will oversee and manage the Cx process, develop and stipulate many of the Cx requirements, and ensure and validate that systems and equipment are designed, installed and tested to meet the Owner's requirements.
10. Commissioning Coordinator (CxC): This refers to the Individual within each of the various Parties that is designated the POC for that Party relative to Cx activities. Each of the Contractors subject to the Cx process should designate a CxC and make that person available to the CxA as the point-of-contact for that Contractor.
11. Commissioning Specifications: Generic reference to any of the Cx-specific specification Sections, as inferred by the usage. Divisions 01, 22, 23, 26 and others contain Sections that are specific to or reference the Cx process. All Contractor requirements relating to Cx should be conveyed within the Cx Specs. Cx Specs should be referenced but not duplicated within the Cx Plan (the Cx Plan is designed to govern non-Contractor-related Cx issues).
12. Commissioning Team: The group of Parties involved in the Cx process for any given system. The Cx Team will include a core group involved with all systems, consisting of the CxA and CxC members representing the CM and the Owner. On any given system, the Cx Team will additionally include the CxC's for the Contractors responsible for the system or equipment.
13. Cx Web Tool: is a Web-based Internet hub used to electronically collaborate and coordinate activities throughout the Cx process. The Web-based interface is hosted by the CxA and is accessible by all Parties participating in the Cx program.
14. Contractor: As used herein, 'Contractor' is a general reference to the installing Party and can therefore refer to the CM, subcontractors, or vendors as inferred by its usage.
15. Construction Manager (CM): The Party acting as the primary coordinator of all the major subcontractors (MC, EC, TAB, BAC, etc.) as applicable.
16. Construction Phase: Phase of the project during which the facility is constructed and/or when systems and equipment are installed and started. Contractor and subcontractors complete the installation, complete Start-Up Documentation, submit O&M information, establish trends, and perform any other applicable requirements to make systems operational. Contractor and Vendors may also conduct 'Equipment and Systems Training' events during this phase. The Construction Phase concludes upon completed Start-Up and TAB of systems and equipment.
17. Contract Documents: The documents governing the responsibilities and relationships between Parties involved in the design and construction of this project including (but not necessarily limited to):
 - a. Agreements/Contracts;
 - b. Construction Plans and Drawings;
 - c. Specifications;
 - d. Addenda;
 - e. Change Orders;
 - f. Commissioning Plan (for reference only)

18. Construction Documents: Refers generally to the Contract Documents that dictate the details of the installation (all but item a. above).
19. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents, does not perform properly or is not complying with the design intent.
20. Design Engineer: Generic reference to the engineer-of-record or a specific engineering discipline as inferred by its usage.
21. Design Intent Document (DID): Outdated term that is synonymous with Owner's Project Requirements (see below). OPR is now used by both ASHRAE and LEED.
22. Design Phase: This is the phase of the project when the facility and its systems and equipment are developed and defined. The A/E Teams work to define the required features, functions, characteristics, qualities and/or properties of the project per the Owners Design Intent.
23. Electrical Contractor (EC): Contractor generally responsible for Division 26 work.
24. Factory-Authorized Representative: An individual fully trained on the equipment and certified by the manufacturer to perform the respective task.
25. Factory Testing: Testing of equipment off-site at the manufacturer's facility. May be witnessed by the members of the project team.
26. Fire Alarm Contractor (FAC): Contractor generally responsible for the fire alarm system installation
27. Functional Completion: A Cx program milestone that marks the successful completion of the FPTs by the CxA and therefore completion of the Acceptance Phase.
28. Functional Performance Tests/Testing (FPT): The detailed and thorough tests (and test procedure) developed and performed by the CxA to document proper operation of building systems and the components and equipment making up those systems during the Acceptance Phase. References made to FPT throughout the documents are inclusive of ISFPT unless specifically indicated otherwise.
29. IAQ: Indoor Air Quality
30. LEED (Leadership in Energy and Environmental Design): The LEED® Green Building Rating System is a voluntary, consensus-based rating system designed to encourage building owners to apply leading proven technologies for new construction. Areas of concentration include "Sustainable Sites", "Water Efficiency", "Energy and Atmosphere", "Materials and Resources", and "Indoor Environmental Quality". Contractor activities from demolition to procurement to commissioning to waste handling can be impacted by the LEED program.
31. Manufacturer's Representative: Either an individual in direct employ of the manufacturer of the applicable system, or an individual who is certified by that manufacturer to perform the applicable work for which the reference is made. This is synonymous with Factory-Authorized Representative.
32. Mechanical Contractor (MC): Contractor generally responsible for Division 23 work.
33. O&M Documentation: Contractor-developed documentation designed to address the needs of facilities personnel and customized for the context of the specific facility and installation. The foundation of O&M Documentation is manufacturer's literature (O&M Manuals), with additional

Contractor-developed step-by-step instructions for manual start/stop, emergency procedures, operating sequences, preventative maintenance, and other installation-specific information. O&M Documentation content is indexed/organized by equipment-type.

34. O&M Manuals: Generic reference to manufacturer-published O&M materials, which have no information specific to the facility, but may be edited or marked up to indicate specific equipment or systems installed. O&M Manuals include documents covering installation, operation, maintenance, troubleshooting guides, parts numbers, engineering and design parameters, applications manuals, and any/all information available from the manufacturer pertaining to the installed equipment or systems. Specifications should strive for this information to be submitted in electronic form whenever possible. The electronic versions of these documents can also be electronically edited to indicate equipment installed and to delete or mask-over equipment and content that is not installed on the project.
35. Opposite Season: The season opposite that when the majority of the testing occurs.
36. Owner's Project Requirements (OPR): The OPR is intended to provide the basis from which all design, construction, acceptance, and operational decisions are made. It details the functional requirements of the project, including systems subject to commissioning. The OPR defines the benchmarks and metrics by which the success of the project is ultimately judged, and evolves through each project Phase. The OPR is typically developed early in the project cycle by the Owner and the A/E and provides the user needs, requirements, goals, and metrics that are defined by the Owner to be important. The OPR criteria are referenced by and should be the foundation of the BOD narrative.
37. Party: Entity (company, corporation, etc.) legally responsible for portion of work.
38. Point-of-Contact (POC): General reference to a key individual within each Party.
39. Prefunctional: The term "Prefunctional" is synonymous with "Start-Up", but not used in these specifications. It is a modifier for checks, tests, and other activities that occur prior to and are prerequisites for Functional Performance Testing.
40. Project Phases: Phases of the project include the Construction Phase, Acceptance Phase, Warranty Phase, and Occupancy. Earlier Phases include Program Phase and Design Phase.
41. Project Officer (PO): Individual or entity directly employed by the Owner who is in charge of the design and construction coordination for the project. Alternately, the Owner may employ a separate DM to perform this function.
42. RFI: Request for Information.
43. Room Data Sheet: The Room Data Sheet is a spreadsheet or database which lists the control and occupancy requirements - including the temperature and humidity setpoints, pressurization, etc. - for each room or control zone in the facility. This list also includes the control range tolerances and the alarm ranges for the zone. Additionally, the Room Data Sheet may include occupancy schedules or lighting control parameters (typical for vivariums and some laboratories) which must be programmed for initial occupancy. This should be updated through the construction process to reflect any changes generated during construction.
44. Start-Up: Refers to the quality control procedures whereby the Contractor verifies the proper installation of a device or piece of equipment, executes the manufacturer's starting procedures, completes the 'Start-Up Checklist', energizes the device, verifies that it is in proper working order and ready for dynamic testing, and completes the 'Start-Up Tests'. Start-Up procedures are performed by the Contractor with or without a formal Cx process, although the documentation is more formalized when the Cx process is used.

45. **Start-Up Checklist:** A list of items to inspect to verify proper installation of equipment or systems by the Contractor. Checklist items simply require a 'Yes/No' or 'OK/Not' response. These include primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension checked, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). Start-Up Checklist items are one component of the Start-Up Documentation (Start-Up Tests being the other).
46. **Start-Up Documentation:** Refers to the combination of Start-Up Checklists + Start-Up Tests. The Contractor documents the Start-Up procedure by completing and submitting the Start-Up Documentation. Start-Up Documentation may be a combination of procedures prepared by the CxA, those included in the Contractor's in-house quality assurance process, and those required by the manufacturer. Regardless of the context of the checklist or format of the form used to document it, the reference to 'Start-Up Documentation' includes all of the stated checklists and tests.
47. **Start-Up Test:** This is a quality-assurance test that is required to ensure the system is ready to be placed into service. It differs from a checklist item in that it requires more than a binary (yes/no, OK/Not OK) response - an observation, measurement, or sequence of events must be documented. Start-Up Tests are one component of the Start-Up Documentation (Start-Up Checklists being the other).
48. **System Turn-Over Meeting ("Turn-Over"):** Turn-Over is a quality control milestone in which all Contractors responsible for completing the installation and start-up of a system or equipment, along with the PO and CM, meet to validate that the system or equipment is completed and operational per the contract documents and ready for Functional Performance Testing, and that all the Start-Up Documentation and nameplate data is complete and accurate. The CxA will in many cases participate in this. CM shall organize and lead the process in all cases.
49. **Systems Matrix:** A table that lists systems and equipment as individual rows (typically using the specifications sections as a guide) and columns that indicate different tasks, documentation, and work elements. The content of the cells of the matrix summarizes the requirement for system as it relates to that column. It provides an effective summary of requirements.
50. **Test:** A task, procedure or measurement that confirms capacity, functionality, accuracy, etc. Tests have a status of "Pass", "Fail", "Couldn't Test" or "Didn't Test". May refer to Start-Up or Functional Performance Tests.
51. **TAB:** Can refer to the test, adjust, and balance process or the Testing, Adjusting, and Balancing Contractor as inferred by its usage.
52. **Temporary Conditioning Plan:** A plan that summarizes the logistics, procedures and protocols for taking permanent equipment and using it to maintain conditions throughout construction. All members of the Cx Team must approve the Temporary Conditioning Plan prior to placing equipment into temporary service.
53. **Testing Agency:** An independent agency typically retained by the Contractor to perform specialized testing of systems or equipment (most commonly electrical). The Testing Agency shall be qualified and equipped to perform the testing and shall submit appropriate qualifications.
54. **Trending:** Monitoring and recording a history of parameters typically using the building automation system.
55. **Turn-Over:** See "System Turn-Over Meeting" above.

56. Vendor: Refers to the organization that sold a system or equipment to the subcontractor. This may be a branch office of the manufacturer or a value-added reseller.
57. Warranty Period: The period defined by the construction documents where elements of the facility are under contractual warranty.
58. Warranty Phase: Includes the early occupancy of the building and can continue through the contractual Warranty Period and at least into the opposite season from when the facility systems were initially tested.

[DESIGNER NOTE: section 1.4 to be edited to fit scope of project]

1.4 EQUIPMENT AND SYSTEMS TO BE COMMISSIONED

The following equipment and systems shall be commissioned by the commissioning team.

A. MECHANICAL SYSTEMS (AND ALL INTEGRAL EQUIPMENT CONTROLS)

1. Building automation systems, including linkages to remote monitoring and control sites
2. Laboratory control systems and pressurization
3. Lab HVAC systems
4. Chilled water system, chilled water pumps, piping, and associated equipment.
5. Heat recovery system, Glycol heat recovery system, associated pumps.
6. Humidification / Dehumidification systems
7. Heating hot water system, associated pumps, piping, and equipment
8. Preheat and Reheat water systems and associated pumps and piping
9. Heat exchanger, pumps, piping, condensate and associated equipment
10. Air Handling Units
11. Heat Recovery Units
12. Supply and Exhaust and other specialty fans
13. Fan Coil Units, Unit Heaters, and Ventilators
14. Variable Air and Constant Volume Air terminal units, both supply and exhaust
15. Ductwork
16. Utility metering systems
17. Refrigeration systems
18. Fire and smoke dampers
19. Smoke control systems – interfaces, egress pressurization

20. Domestic hot/cold water systems
21. Test, Adjust, and Balance of HVAC air and water systems
22. Test, Adjust, and Balance /verify Fume Hoods and bio-safety cabinets

A. PLUMBING SYSTEMS TO BE COMMISSIONED

1. Laboratory and Domestic water heating equipment
2. Laboratory vacuum equipment
3. Laboratory compressed air equipment
4. Sump pumps and sump pump controls
5. Domestic cold water (piping, pressure, balance, associated contractor tests – ie: smoke test)

B. AUTOMATION SYSTEMS

1. All integral automation equipment controls, including building automation systems, laboratory control systems, and linkages to remote monitoring and control sites; to include integrated enterprise management system (EMS) and links to fire protection and alarm systems, plumbing systems, HVAC systems, electrical systems, communication system, electronic detection and alarm systems, building automation operator workstation graphics, smoke control system, and elevators.

C. ELECTRICAL SYSTEMS

1. Controls and occupancy sensors for Lighting and Day lighting Systems
2. Electrical system from the building entrance through the main switchboard, switchgear, and to the distribution panels.
3. Metering equipment
4. Motor Control Centers, Variable Speed Drives, Motor Starters, protective devices.
5. Building lighting and lighting control – Verify sequence of operations, and luminaries for proper operation, lamping and lighting levels.
6. Emergency power system including generator set, Uninterruptible Power Supply (UPS), transfer switch, fire pump controller interface, associated equipment and testing.

D. TELECOMMUNICATION SYSTEMS

1. Intercom systems
2. Security systems
3. BDA Communication System (Consultant Test Reports)

1.5 COMMISSIONING TEAM COORDINATION

A. Members

The members of the commissioning team consist of the Commissioning Authority (CxA), the OPM, facilities personnel, the CxS, the CM, the MC, the EC, the TAB representative, the SI, the water treatment contractor, the fire protection contractor, and any other installing Subs or suppliers of equipment. In addition, representatives of the A/E team are also commissioning team members and are invited to observe critical procedures and attend Cx coordination meetings.

B. Management

The CxA is hired by the Owner and directs and coordinates the commissioning activities and reports to the OPM. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

C. Commissioning Sequence

The Cx process will be categorized into Phases as indicated below and defined under the definitions section above. Different systems and/or areas may be in a different phase at any given time in the overall construction process:

1. Design Phase
2. Construction Phase
2. Acceptance Phase
3. Warranty Period

D. Scheduling

1. Prior to submission of the baseline schedule, the CM will coordinate with the CxA to specifically include the detailed tasks involved in the Cx process in the master project schedule. CxA shall consult directly with the CM to incorporate the Cx tasks in the project schedule. The process logic and integration shall ultimately be a collaboration between CM, CxA, and subcontractors. The effort will start with CxA and CM proposing initial logic. Then subcontractors will join the discussion and work out the final details, (precedent logic and durations).
2. The Cx schedule will outline generic Cx tasks with prerequisites to each task. Contractor shall incorporate the tasks into schedule as applicable to each system. This will require a detailed track for each system and as such the scheduler must schedule and code by system as well as by area. Contractor shall collaborate with the CxA to determine impacts of project phasing as applicable. Examples of integrated tasks include:
 - a) Contractor preparation of draft Start-Up Documentation;
 - b) Contractor preparation of *Training Plan*;
 - c) Preparation of *O&M Documentation* content
 - d) Testing Agency activities;
 - e) Electrical System Start-Up
 - f) Mechanical System Start-Up (by system – ie: chilled water, hot water, air)
 - g) BAS Start-Up
 - h) Test and Balance (by system – ie: chilled water, hot water, air)
 - i) Training Events (by system – ie: chilled water, hot water, air)
 - j) Functional Performance Testing (by system – ie: chilled water, hot water, air)

1.6 SUBMITTALS

- A. The CM shall provide the CxA a list of required equipment/system submittals to the CxA. The CxA will identify submittals to be submitted to the CxA concurrent with submission to the A/E for review.
- B. All Subs, through the CM, shall submit required installation, start-up, and preventive maintenance equipment data sheets to the CxA within 45 days of equipment approval by the A/E.
- C. All Subs, through the CM, shall submit O&M data for system and equipment being commissioned under this specification. O&M data shall be submitted within 45 days of equipment approval by the A/E, but no less than 8 weeks prior to the beginning of functional testing.
- D. The CM shall submit a copy of the construction meeting minutes, updated construction schedule, RFI log, and ASI log to the CxA within seven days of each meeting or update.

1.7 COMMISSIONING COORDINATION

- A. Coordination responsibilities and management protocols relative to Cx are outlined below. Contractor shall have input in the protocols and all Parties will commit to process and scheduling obligations. The CxA will document and distribute as applicable.
 - 1. Commissioning kick-off meeting: CxA shall schedule and conduct a Cx coordination meeting near the beginning of construction. At a minimum, the following should be discussed at the meeting:
 - a) The commissioning documents (specifications and Cx Plan)
 - b) Requirements and sequence of commissioning
 - c) Responsibilities of the project stakeholders
 - d) Management protocols
 - e) Required submittals
 - f) Schedule
 - 2. Submittals and Shop Drawings: A/E shall distribute these to the CxA. CxA shall edit the project's submittal log to communicate which submittals must be forwarded to CxA.
 - 3. CxA Review Comments on Submittals/Shop Drawings: CxA will review and document comments and a copy will be made available to the A/E by the CxA. A/E shall consider and incorporate at their discretion.
 - 4. Deficiencies Identified by the CxA: When the CxA identifies a deficiency, CxA shall make a good faith assessment of responsible parties. Those parties, as well as A/E and CM shall be notified of the perceived deficiency. This communication is FOR INFORMATION ONLY and is not a directive to any party to resolve the deficiency. Contractor may accept responsibility and resolve the deficiency voluntarily. If Contractor contests either the deficiency or responsibility for that deficiency, Contractor shall respond to that deficiency indicating disagreement. If responsibility is not agreed to via the Cx dialogue, CM shall issue a work directive or RFI via the normal contractual channels to resolve the issue.
 - 5. Requests for Meetings: Request by the Contractor for a meeting with the CxA shall be routed through CM who will then determine the validity. Note that every attempt should be made to deal with Cx issues at regularly scheduled Cx Meetings.

6. Control Sequence Modifications: CxA shall make every attempt to thoroughly review the sequences during the submittal process and address any issues prior to the submittal approval. However, CxA and the contractor may incorporate minor changes to the sequence during testing when it is apparent that it improves the control of the equipment, but does not fundamentally change the sequence. Any and all changes must be thoroughly documented in the contract documents.
7. Scheduling Coordination: CxA shall consult directly with the CM to incorporate the Cx tasks in the project schedule. The process logic and integration shall ultimately be a collaboration between CM, CxA, and subcontractors. The effort will start with CxA and CM proposing initial logic. Then subcontractors will join the discussion and work out the final details, (precedent logic and durations).
8. Notification of Completion Milestones: Contractor shall notify CM at least two weeks prior to an anticipated Cx activity or milestone (such as Turn-Over). CM shall then coordinate the scheduling of the activity (as applicable) between all required parties as applicable. Notification shall be via electronic communication (ie: email) with an associated Action Item distributed to interested parties.
9. Issue Log: CxA maintains a categorized deficiency/issue log which tracks the Cx-related items for corrective action. All content of the deficiency/issue log will be made available to all parties. Contractors with an assigned issue are responsible for making corrections and reporting updates and actions for each assigned item to the CxA via an agreed upon method of communication.
10. Start-Up Checklist and Test Documents: CxA will provide initial 'generic' Start-Up Documents to the Contractor (checklists). The Contractor shall cross check these with the manufacturer-specific start-up procedures/checklists and submit both to the CxA for review and approval. The Contractor has the option of modifying the supplied generic checklists in the delivered format, or by supplementing the checklists with their own procedures/checklists. The Contractor then executes, signs, and submits the final reviewed and approved Start-Up Documentation. The CxA will review the procedures/checklists for completeness. The Start-Up Documentation is then included in the final commissioning report documents.
11. Functional Performance Test Documents: Functional Performance Tests (FPT) are prepared and completed by the CxA. They are developed during the construction phase, typically after submittal reviews are completed. CxA forwards the FPT procedures to the CM to be subsequently distributed to the Contractors for review. Contractors review and have the option to comment on the procedures. Throughout the Cx process, CxA maintains a current record of the FPTs and their results and keeps the documentation up to date and accessible for all to review progress. CxA may distribute copies of the FPTs at the completion of any significant stage of commissioning.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division contractor for the equipment being tested. For example, the mechanical or controls contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC system in Division 23. Likewise, the electrical contractor has Division 26, and Plumbing contractor has Division 22
- B. Special equipment, tools, instruments, and setup software (only available from vendor/Subs, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be provided by the Contractor and left on site, for the CxA and the test/adjust/balance (TAB) firm to use during TAB, functional testing, seasonal testing, and

deferred testing. The equipment, tools, instruments, and setup software will be returned to the vendor/Subs after successful conclusion of the commissioning effort.

- C. The controls contractor shall provide the CxA with temporary software license to be loaded on the CxA's and/or TAB firm's computer, and any necessary network connection cables, for accessing the direct digital control system field panels for system testing. If applicable, the controls contractor shall also provide a palm device with attachments, software, and cables, to check setpoint values of terminal device controllers. The controls contractor shall provide the CxA with log-on ID and password for remote connection to direct digital control system. All of the software and misc interface appurtenances provided to the CxA will be returned at the successful conclusion of the commissioning effort.
- D. All testing equipment used by the contractors shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified by the Engineer of Record in the Contract Documents. If not otherwise noted, the following minimum requirements shall apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.1°F and a resolution of +/- 0.1°F. Humidity sensors shall have a certified calibration within the past 6 months and a resolution of +/- 1%. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. Accuracy of other sensors shall be at least twice that of the instrumentation being used. All equipment shall be calibrated according to the manufacturer's recommended intervals, in addition to just after being dropped or damaged. Calibration tags shall be affixed or certificates readily available.
- E. Cx WEB-BASED COMMISSIONING TOOL (Optional)
 - 1. General: At the Owners discretion, a Web-based internet hub may be used to electronically collaborate and coordinate activities and deliverables throughout the Cx process. The tool is hosted by the CxA and shall be accessible to all parties participating in the Cx program. The tool needs to provide a common location to store Start-Up Documentation, Functional Performance Tests and results, project documents and deliverables. It also serves as a collaborative hub to facilitate, automate, and track communications between parties relating to the Cx process. The Cx web-based tool should have the capability to interface with other web-based database tools that may be used by the Construction Manager or Owner to facilitate the exchange of information.
 - 2. Participation: All general and major subcontractors participating in the Cx process shall participate in the use of the Cx web-based tool in support of the Cx process and file management capabilities.
 - 3. Requirements for Use: Options for accessing and interfacing with the Cx tool are as follows:
 - a. Hardcopy - Print, Test, and File: Using this approach, Contractors simply go online to the Cx interface using a web browser, print checklists and tests as needed, fill them out in the field, and enter the results back into the Cx database when completed.
 - b. Electronically - online in the field: The applicable documents can be accessed and filled out live and online if the Contractor has the means to access the Internet while working in the field using a local Wi-Fi network or wireless device.
 - c. Optional Database Client: If the Cx interface tool is capable, the CxA can provide the Contractor with an offline software interface tool that will allow the Contractor to download electronic test database files from the interface, work on the database files in the field electronically (but offline), and later synchronize their entries with the master database.
 - 4. Training: If requested by the Owner, the Cx Authority should include in their scope of work at least one Contractor training session given by the CxA, and shall send at least one representative to the training session.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS

The following narrative provides an overview of the commissioning tasks during construction and the general order in which they occur.

- A. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process and the draft Cx Plan is reviewed with the commissioning team members. After this meeting, the draft Cx Plan, which is initially provided prior to the scoping meeting, is then updated with the project specific communication protocols, Cx team contact information, and the preliminary commissioning schedule, which is developed during the scoping meeting.
- B. Additional meetings will be conducted as needed throughout construction. These meetings will be scheduled by the OPM, CxA and CM with necessary parties attending. The meetings will be conducted in order to plan, scope, coordinate, schedule future activities and resolve problems. In general, the commissioning meetings will be held monthly during the construction period.
- C. Equipment documentation is submitted to the CxA, concurrent with the normal submittals to the A/E, including detailed pre-startup checklists and startup procedures. Specific submittals requirements are detailed as referenced above, and in section 1.6 above.
- D. The CxA works with the CM and its Subs in developing startup plans and startup documentation formats, including providing the Subs with prefunctional checklists to be completed, during the startup process. The prefunctional checklists are developed by the CxA for the equipment listed in 1.4 above, using the A/E approved submittals.
- E. In general, the checkout and performance verification proceeds from simple to complex, from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
- F. The CxA will review shop drawings and material certifications, review reports from independent testing agencies, conduct independent on-site periodic construction observation and attend selected quality control-related and construction progress meetings.
- G. The Subs, under their own direction, execute and document the prefunctional checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed by the Subs, obtains copies of all of the startup and preliminary test documentation. This will include the CxA witnessing start-up of selected equipment.
- H. The CxA develops specific equipment and system functional performance test procedures. The CxA submits the proposed functional tests to the OPM, A/E and CM for their review and comment, and provides a copy of the proposed functional tests to the responsible Sub who shall review the tests for feasibility, safety and equipment warranty protection.
- I. O&M data is submitted to the CxA prior to execution of functional tests. The CxA reviews the documentation for completeness. The CxA also uses the documentation for reference during the functional testing.

- J. Manufacturers will perform and document all specified Factory Testing and start-up. Copies of test reports are provided to the A/E and CxA for review.
- K. The functional test procedures are executed by the contractor, under the direction of, and documented by the CxA.
- L. Items of non-compliance in material, installation or startup are corrected at the Sub's expense and the system retested.
- M. The CxA reviews, pre-approves and coordinates the training provided by the Subs and verifies that it was satisfactorily completed.
- N. Commissioning is completed before owner occupancy/use.
- O. Deferred testing is conducted, as specified in these specifications.

3.2 RESPONSIBILITIES

A. Construction Manager

- 1. Shall verify completeness of the building envelope, perimeter and interior items, which affect proper operation and control of equipment and systems.
- 2. Shall schedule and coordinate participation and cooperation of all subcontractors required for the commissioning process.
- 3. Shall incorporate commissioning tasks into the master construction schedule.
- 4. Shall be responsible for providing written responses to the CxA's submittal review comments.
- 5. Shall provide a Commissioning Supervisor (CxS) who will be responsible for communication between each individual contractor/subcontractor and the CxA. This representative shall be responsible to: coordinate meetings, plan and schedule Cx activities into the project schedule, distribute Cx documentation to responsible contractors, receive written notification from contractors that Cx issues are corrected, perform corrective actions for resolution of deficiencies, and handle required submittals to the CxA.
- 6. Review and approve the completion of the PCs, then notify the CxA that functional testing can proceed.
- 7. Ensure Installing Contractors or their Vendors provide all specialized tools or the use of specialized tools that may be required to start, check-out and functionally test equipment and systems.
- 8. Shall meet requirements of other commissioning requirements within the Project Manual.
- 9. Shall schedule and coordinate participation and cooperation of all subcontractors and vendors in owner training.

B. Subcontractors/Suppliers

- 1. Shall be responsible for providing labor, material, equipment, etc., required within the scope of their specialty to implement and facilitate the commissioning process.

2. Shall include all special tools, software, and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these contract documents in the base bid price to the contractor, except for stand-alone data-logging equipment that may be used by the CxA.
3. Shall demonstrate the operation of the equipment and systems is per the contract documents.
4. Shall assist the CM in the development of the master schedule as relates to commissioning and milestones.
5. Shall respond in writing to written submittal review comments by the CxA.
6. Shall respond in writing as to the completion or resolution of each issue in the commissioning issue log.
7. Shall meet requirements of other commissioning requirements within the Project Manual.

C. Owner

1. Schedules the participation of facilities personnel in the commissioning process in writing.
2. Advises the CxA of any changes to the building's use or occupancy.

3.3 MEETINGS

- A. Scoping Meeting: The CxA will schedule, plan, and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA within 1 week after the meeting. Information gathered from this meeting will allow the CxA to revise the Commissioning Plan to its "final" version.
- B. Commissioning Meetings: Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution, and planning issues with particular subcontractors.

3.4 START-UP, PRE-FUNCTIONAL CHECKLISTS, AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment and building systems to be commissioned, according to Section 1.4, Systems to be commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified PCs and start-up.
- B. General. Prefunctional checklists are important to ensure that the equipment and systems are completely installed and integrated with other building components and systems, hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment or assembly receives full Prefunctional checkout. No sampling strategies are used. The Prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of the equipment or subsystems of the given system.
- C. Start-up and Initial Checkout Plan. The CxA shall assist the commissioning team members responsible for start-up of any equipment in developing detailed start-up plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed. Parties responsible for Prefunctional checklists and start-up are identified in the commissioning scoping meeting

and in the checklist forms. Parties responsible for executing functional performance tests are identified in the testing requirements in Sections 07 0800, 21 1318, 22 0800, 23 0800, 25 0800, 26 0800, 27 0800, 28 0800 and any other sections where test requirements are found.

1. The CxA generates generic and representative Prefunctional checklists and procedures as required in Section 23 0800 and 26 0800. These checklists will indicate required procedures to be executed as part of start-up and initial checkout of the systems and the party responsible for their execution.
2. These generic checklists and tests are provided by the CxA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each procedure and associated forms may have more than one trade responsible for its execution.
3. The subcontractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines/fields for recording and documenting the checking and inspections of each procedure and a summary statement with an initial block/ "completed by" associated with each procedure. The responsible party marks the applicable areas in the procedures and makes initial and date lines at each test procedure.
4. The full start-up plan could consist of something as simple as:
 - a. The CxA's prefunctional checklists.
 - b. The manufacturer's standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - c. The manufacturer's normally used field checkout sheets.
 - d. The sub-contractors internally developed startup/checkout documentation (ie: a lug torque report, a DDC point verification checklist)
5. The subcontractor submits the full start-up plan to the CxA for review and approval.
6. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
7. The full start-up procedures and the approval form may be provided to the PM for review and approval, depending on management protocol.

3.5 TEMPORARY CONDITIONING

- A. Contractor shall be allowed to utilize permanent building equipment to provide temporary conditioning ONLY upon the approval of the A/E, Owner, and the CxA. Approval for such will only be given upon acceptance of a detailed plan provided by the individually involved subcontractors and compiled by the CM. The Temporary Conditioning Plan shall consider/address the following at a minimum:
 1. Indicate that the full Start-Up protocol, including development and documentation of Start-Up Documentation as required by the specification will be performed for the

temporary start-up. The Temporary Conditioning Plan shall include the Start-Up Documentation to be used, which shall be the same as those that will be used for final Start-Up.

2. Contractor shall address how equipment will be maintained in good, clean condition. Specifically address:
 - a. Temporary Filtering of Air: Air filters used for construction shall be as or more effective than those specified for permanent use. Contractor shall remove construction filters and replace with new filters prior to FPT. Filters shall be maintained and replaced at the specified final pressure drop. Contractor shall install a magnehelic gauge for visual indication of pressure drop as well as setting and adjusting the loaded filter DP switch for monitoring on the BAS.
 - b. Temporary Filtering of Water and Condensate: Construction strainers shall be used while circulating fluid during construction. Construction strainer shall be finer than that specified for final strainers.
 - c. Sealing/Filtering of Open Ducts: Address that all open ducts shall be either sealed or protected with filter media. Return or exhaust systems shall not be used during construction unless otherwise approved.
 - d. Lubrication and Maintenance: Contractor shall maintain the systems and equipment in accordance with the manufacturer's instructions. Contractor shall coordinate lubricants used with Owner's operators. Frequency of lubrication and inspection shall be as recommended by manufacturer's literature. Applicable maintenance lubrication schedules shall be included in the Plan. Draft maintenance logs shall be submitted with Plan and completed as maintenance is performed.
 - e. Operation Outside of Normal Ranges: Systems and equipment shall not be operated outside the range of specified conditions. The Temporary Conditioning Plan shall address how the Contractor will ensure that operation will not harm the equipment.
 - f. Emergency Condition Identification and Response Protocols: The Temporary Conditioning Plan shall address protocols for responding to equipment malfunctions and or harmful operation. Automatic safeties and remote enunciation shall be in place to protect people and property.

3.6 FUNCTIONAL PERFORMANCE TESTING

- A. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- B. In general, each system shall be operated through all modes of operation where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions shall also be tested. Specific modes required in this project are given in Sections 07 0800 23 0800, 25 0800, 26 0800, 28 0800 and any other sections where test requirements are found.
- C. The CxA shall review Owner-contracted, factory testing or required Owner acceptance tests which the CxA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the *Specifications*. Redundancy of testing shall be minimized.

- D. The Subs shall provide sufficient notice to the CxA regarding their completion schedule for the Prefunctional checklists and start-up of all equipment and systems. The CxA will schedule functional tests through the PM, CM, and affected subs. The CxA shall direct, witness and document the functional testing of all equipment and systems. The CxA shall generally execute most standard tests with initial participation of the affected subs.

3.7 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation

The CxA will witness and document the results of all functional performance tests using the specific functional checklist forms developed for that purpose. Prior to testing, these forms are provided to the A/E, OPM and Subs for review.

B. Non-Conformance

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues will be noted and reported to the OPM in writing.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the OPM. A test shall be aborted if any system deficiency prevents the successful completion of the test or if any participating contractor team member of which participation is specified is not present for the test.
4. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
 - a. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
 - 1) The CxA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the OPM for signature, if required. A copy of the deficiencies is provided to the CM and Subs. The Sub corrects the deficiency, then signs-off that the correction has been made, certifying that the equipment is ready to be retested and sends it back to the CxA.
 - 2) The CxA reschedules the test and the test is repeated.
 - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency shall be documented, along with the Sub's response, and a copy given to the OPM, the CM and to the Sub representative assumed to be responsible.

- 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the OPM.
 - 3) The CxA documents the resolution process.
 - 4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs-off that the correction is complete, and provides the written sign-off to the CxA. The CxA and CM shall reschedule the test, and the test is repeated.
5. Cost of Retesting
 - a. The cost for the Sub to retest a prefunctional or functional test, if they are responsible for the deficiency, shall be theirs.
 - b. The time and expenses for the CxA to direct any retesting, above one retest, required because a specific prefunctional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the CM, who may choose to recover costs from the responsible Sub.
6. The CM shall respond in writing to the CxA and OPM at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
7. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the prime contractor.

C. Failure Due to Manufacturer Defect

If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CM, the OPM, the A/E, or the CxA. In such case, the responsible Sub shall provide the Owner with the following:

1. Within one week of notification from the OPM, the Sub or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the OPM within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The OPM will determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution shall be installed by the Sub and the OPM will be allowed to test the installations for up to one week, upon which the OPM will decide whether to accept the solution.

5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
6. The time and expenses for the CxA to direct any retesting, above one retest, required because of an equipment failure, will be backcharged to the CM, who may choose to recover costs from the responsible Sub. An example would be motor failures in series powered terminal induction units. Once all motors have been replaced, prefunctionals checklists completed, and documents submitted that all repairs and corrections have been completed, the CxA will direct one retest. If any failures occur during the retest, the CxA will backcharge the CM for additional testing.

D. Approval

The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA, if necessary. The CxA recommends acceptance of each test to the OPM. The OPM gives final approval on each test.

3.8 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals.

1. The specific content and format requirements for the standard O&M manuals are detailed in Section 01 XXXX. O&M Manuals shall be in electronic form, the file format shall be Adobe Acrobat readable document. The document shall be formatted to include level 1 bookmarks that link to each main section of equipment. Special requirements for the TAB contractor and Controls Contractor are found in appropriate Division 23 Sections. Electrical requirements are located in the appropriate Division 26 Sections. Communication and Security requirements are found in appropriate Division 27 and 28 Sections.
2. A/E Contribution. The A/E will include in the beginning of the O&M manuals a separate section describing the systems including:
 - a. The design intent narrative prepared by the A/E, updated to as-built status by the A/E.
 - b. Simplified professionally drawn single line system diagrams on 8 ½" x 11" or 11" x 17" sheets. These shall include chilled water distribution system, water system, condenser water system, heating system, supply air systems, exhaust systems, and others as designated. These shall show major pieces of equipment such as pumps, heat exchangers, humidifiers, control valves, expansion tanks, coils, service valves, etc.
3. CxA Review and Approval. Prior to substantial completion, the CxA shall review the O&M manual documentation and redline as-builds *for systems that were commissioned* and list other systems documentation that the CxA should review to verify compliance with the *Specifications*. The CxA will communicate deficiencies in the manuals to the PM or A/E, as requested. Upon a successful review of the corrections, the CxA recommends approval and acceptance of these sections of the O&M manuals to the PM or A/E. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.

3.9 TRAINING OF OWNER PERSONNEL

- A. The CM shall be responsible for training coordination and scheduling and ultimately for ensuring that training is complete.
- B. The CxA will be responsible for overseeing and approving the adequacy of the training of Owner personnel for **commissioned equipment**.
 - 1. Levels of training modules to be provided:
 - a. I - Overview level: An introductory or entry level of training including general features and overview of a system or equipment with related operation procedures.
 - b. II - User level: A more in-depth level of training including specific features and functions of a system or equipment, related operation and maintenance, and interaction with other systems and equipment.
 - c. III - Support level: An advanced level of technical training for maintenance and repair support staff including classroom plus hands-on comprehensive instruction with review of components, schematics, wiring diagrams and functions of a system or equipment, and related service, troubleshooting, repair and recommended spare parts.
 - 2. Instructor capabilities shall be commensurate with level of instruction required. Instructor qualifications shall be submitted to Owner and CxA for review prior to training.
 - 3. In addition to these general requirements, the specific training requirements of Owner personnel by Subs and vendors is specified in Divisions 1, 21, 22, 23, 25, 26, 27 and 28.
 - 4. Each Sub and vendor responsible for training shall submit a written training plan to the CxA for review and approval prior to training. The plan shall include the following elements:
 - a. Equipment (included in training)
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject
 - g. Instructor name and qualifications for each subject
 - h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - 5. All training sessions shall be recorded by the contractor and backed-up on DVD or flash drive for delivery to Owner after completion of training. The recordings shall be organized by specification section.

6. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the OPM.

3.10 DEFERRED TESTING

A. Unforeseen Deferred Tests

If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the OPM, A/E and CxA. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.

B. Seasonal Testing

During the warranty period, seasonal testing shall be completed as part of this contract. Seasonal testing is intended to test the performance of systems under full load conditions that cannot be simulated during the functional testing period. For example, it is impossible to test the heating system under full load conditions in July, so the heating system would be full load tested during the winter months. The CxA will coordinate this activity. Tests will be executed, documented, and deficiencies corrected by the appropriate Subs, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing will be made by the CM and its Subs.

END OF SECTION

METAL ROOF PANEL SYSTEM WARRANTY

Owner: _____

Installer: _____

Location of Building: _____

Name of Building: _____

Roof Areas: _____

Date of Substantial Completion: _____

Know all men by these presents, that we, Installer as defined above, having installed metal panels and sheet metal work, and having accomplished certain other work on the roof areas identified above under contract between Owner and Contractor, warrant to Owner, with respect to said work that for a period of five years from date of Substantial Completion of said work, the roofing including panels, flashings and sheet metal work, shall be absolutely watertight and free from all leaks, provided however that the following are excluded from this warranty:

Defects or failures resulting from abuse by the Owner.

Defects in design involving failure of (1) structural frame, (2) load-bearing walls, and (3) foundations.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars riots or civil commotion.

We, Installer, agree that should any leaks occur in the roofing we will promptly remedy said leaks in a manner to restore the roof to a watertight condition by methods compatible to the system and acceptable under industry standards and general practice.

We, Installer, further agree that for a period of five years from date of Substantial Completion referred to above, we will make repairs at no expense to the Owner, to any defects which may develop in the work including but not limited to splits, warped panels, chalking, color change and loose flashings in a manner compatible to the system and acceptable under industry standards and general practice.

IN WITNESS WHEREOF, we have caused this instrument to be duly executed, this
_____ day of _____, 20_____.

(Installer)

WITNESS:

by _____
President

Notary Public

SINGLE PLY WARRANTY

Owner: _____

Installer: _____

Location of Building: _____

Name of Building: _____

Roof Areas: _____

Date of Substantial Completion: _____

Know all men by these presents, that we, Installer as defined above, having installed insulation, roofing, flashings and sheet metal work, and having accomplished certain other work on the roof areas identified above under contract between Owner and Contractor, warrant to Owner, with respect to said work that for a period of five (5) years from date of Substantial Completion of said work, the roofing including insulation, roofing membrane, flashings and sheet metal work, shall be absolutely watertight and free from all leaks, provided however that the following are excluded from this warranty:

Defects or failures resulting from abuse by the Owner.

Defects in design involving failure of (1) structural frame, (2) load-bearing walls, and (3) foundations.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars riots or civil commotion.

We, Installer, agree that should any leaks occur in the roofing we will promptly remedy said leaks in a manner to restore the roof to a watertight condition by methods compatible to the system and acceptable under industry standards and general practice.

We, Installer, further agree that for a period of five (5) years from date of Substantial Completion referred to above, we will make repairs at no expense to the Owner, to any defects which may develop in the work including but not limited to blisters, wrinkles, ridges, splits, warped insulation and loose flashings in a manner compatible to the system and acceptable under industry standards and general practice.

IN WITNESS WHEREOF, we have caused this instrument to be duly executed, this
_____ day of _____, 20 _____.

(Installer)

WITNESS:

by _____
President

Notary Public

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. ~~Galvanized metal~~ **Steel.**

1.2 DEFINITIONS

- A. Gloss Level: According to ASTM D 523.
 - 1. Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees,
 - 2. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
 - 3. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
 - 4. Gloss Level 5: 35 to 70 units at 60 degrees.
 - 5. Gloss Level 6: 70 to 85 units at 60 degrees.
 - 6. Gloss Level 7: More than 85 units at 60 degrees.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's certification that top coat is compatible with shop primer.

1.5 CLOSEOUT SUBMITTALS

- A. Mix Formula: For each color provided.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.7 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Final Acceptance.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- ~~A. Painting Schedule: Refer to end of Part 3 of this Section for listing of applications for each product.~~
- A. Products, General: Refer to Part 2.3 for specific products. Subject to compliance with requirements, provide the products indicated or comparable products from one of the listed manufacturers for each substrate.

2.2 PAINT, GENERAL

- A. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

~~2.3 WATER-BASED PAINTS~~

~~A. Water-Based, Exterior Light Industrial Paint (Gloss Level 5):~~

- ~~1. Benjamin Moore; Super Spec HP DTM Acrylic Semi-Gloss, P29~~
- ~~2. PPG; Pitt-Tech Plus Int/Ext Semi-Gloss DTM Industrial Enamel, 90-1210~~
- ~~3. Sherwin-Williams; Pro Industrial DTM Acrylic Semi-Gloss, B66W01151~~

~~2.4 PAINT ADDITIVES~~

~~A. Mildewcide Additive: Manufacturer's recommended broad-spectrum fungicide additive compatible with paint. Mix in accordance with manufacturer's written instructions.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.**

- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Provide field-applied topcoat to shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. **Steel Substrates (Shop-Primed):**
 - 1. **Water-Based Light Industrial Direct-to-Metal Coating System:**
 - a. **Prime Coat: Shop primed.**
 - b. **Intermediate Coat: Water-Based, Exterior Light Industrial Paint, exterior, matching topcoat.**
 - c. **Topcoat: Water-Based, Exterior Light Industrial Paint (Gloss Level 6):**

- 1) **Products:** Subject to compliance with requirements, provide one of the following:
 - a) **Benjamin Moore; Ultra Spec HP DTM Enamel Semi-Gloss, HP29.**
 - b) **PPG Paints, Pitt-Tech Plus EP DTM Acrylic Semi-Gloss, 91-1610.**
 - c) **Sherwin-Williams; Pro Industrial DTM Semi-Gloss, B66W01151.**
- B. Steel Substrates (Field-Primed):**
- 1. **Water-Based Light Industrial Direct-to-Metal Coating System:**
 - a. **Prime Coat:**
 - 1) **Products:** Subject to compliance with requirements, provide one of the following:
 - a) **Benjamin Moore (none; finish coat is self-priming).**
 - b) **PPG Paints; Pitt-Tech Plus EP Acrylic Primer/Finish, .90-19XI Series.**
 - c) **Sherwin-Williams; Pro Industrial Pro-Cryl Primer, B66W01310.**
 - b. **Intermediate Coat: Water-Based, Exterior Light Industrial Paint, exterior, matching topcoat.**
 - c. **Topcoat: Water-Based, Exterior Light Industrial Paint (Gloss Level 5):**
 - 1) **Products:** Subject to compliance with requirements, provide one of the following:
 - a) **Benjamin Moore; Ultra Spec HP DTM Enamel Semi-Gloss, HP29.**
 - b) **PPG Paints, Pitt-Tech Plus EP DTM Acrylic Semi-Gloss, 91-1610.**
 - c) **Sherwin-Williams; Pro Industrial DTM Semi-Gloss, B66W01151.**
- A. Galvanized Metal Substrates:**
- 1. **Water-Based Light Industrial Direct-to-Metal Coating System:**
 - a. **Prime Coat: Shop primed.**
 - b. **Intermediate Coat: Light industrial coating matching topecoat.**
 - c. **Topcoat: Light industrial coating, exterior, water based, direct-to-metal.**

END OF SECTION 099113