



Cottonwood Heights Parks and Recreation District Recreation Center – MEP, Weatherization and Controls RFP Request for Proposal – 209658

DECEMBER 19, 2025



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All Pages need to be completed and submitted

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All RFP Documents/Reference Drawings/Documents can be accessed via this Google Drive Link:

https://drive.google.com/drive/folders/1cyaBIO87xVIkdc-CG_zYVymOttV4sJGA?usp=sharing

SECTION 4. ATTACHMENTS

Attachment A – Prequalification Application
Attachment B – Scope of Work General Information, Inclusions, and Exclusions
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Attachment H – McKinstry Concrete Imaging Policy
Attachment I – McKinstry Sample Subcontract

Final Pricing Form

DATE: December 19th, 2025

We request pricing to provide materials, labor, tools, rentals, permits, taxes, supervision and other services required to accomplish the scopes of work for the following project:

Project Name: Cottonwood Heights Parks and Recreation District Energy Savings Project

RFP Documents/Google Drive Link:

https://drive.google.com/drive/folders/1cyaBIO87xVIkdc-CG_zYVymOttV4sJGA?usp=sharing

Building(s): **Cottonwood Heights Recreation Center**
7500 S 2700 E
Cottonwood Heights, UT 84121

SEND QUESTIONS AND PRICING TO: annieb@mckinstry.com , Annie Baker, Construction Project Engineer
landonj@mckinstry.com, Landon Jensen, Sr. Energy Engineer

| | |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| PRICING DUE: | January 23rd at 5:00PM MST |
| SITE WALK: | Wednesday January 7th Attending a McKinstry Scheduled Site Walk is a <u>Mandatory Proposal pre-requisite</u> |
| QUESTIONS DUE: | Wednesday, January 14th at 5:00 PM MST Responses will be distributed Friday January 16 th |

ESTIMATED SCHEDULE:

The following are approximate dates for this project. Be advised that McKinstry reserves the right to modify this schedule to accommodate Cottonwood Heights Parks and Recreation District’s operational usage. Final schedule is to be mutually agreed upon between McKinstry, Cottonwood Heights Parks and Recreation District and the selected Subcontractors.

Estimated Notice of Award Date: **March 2026**

Estimated Construction Start Date: **Summer 2026**

RFP BID SUBMISSION INSTRUCTIONS:

Each subcontractor is required to submit the following documents as part of their proposal:

- **Final Pricing Form** (see pages below, also available in the Google Drive)
- **Attachment C - CHPRD RFP Pricing Workbook**
- **Proposal Narrative** - at a minimum clearly outline inclusions, exclusions and assumptions of pricing
- If you have not worked with McKinstry before, complete **Attachment A – Prequalification Application** and submit the completed form **and associated documentation** with your proposal.

Final Pricing Form

PROJECT NAME: COTTONWOOD HEIGHTS PARKS AND RECREATION – RECREATION CENTER ENERGY SAVINGS PROJECT

Date: December 19th, 2025

ACKNOWLEDGEMENT:

The Respondent must complete and submit this Bid Form. This Bid Form shall be the cover page for the Respondents Proposal. DO NOT MODIFY THE FORMAT OF ANY OF THE REQUIRED ATTACHMENTS. If the Proposal has modified the Bid Form, or other Attachments, or exceeds the maximum number of pages, the Respondent will be disqualified and deemed non-responsive.

| | |
|-----------------|-------------------------------------------------------------------------------------------|
| Project Number: | 209658-002 |
| Project Name: | COTTONWOOD HEIGHTS PARKS AND RECREATION – RECREATION CENTER ENERGY SAVINGS PROJECT |

The following documents are required for this proposal:

- Final Pricing Form- Complete and return to Annie Baker/Landon Jensen with Final Pricing Workbook
- Attachment A – Prequalification Application
- Attachment B – Scope of Work General Information, Inclusions, and Exclusions
- Attachment C - CHPRD RFP Pricing Workbook
- Attachment D - Construction Standard Scope Requirements
- Attachment E - McKinstry Controls Contractor Performance Standards - February 2025
- Attachment F - Controls Commissioning Performance Standards
- Attachment G – McKinstry TAB Provider Performance Standards
- Attachment H – McKinstry Concrete Imaging Policy
- Attachment I – McKinstry Sample Subcontract
- Attachment J – McKinstry Insurance Requirements

RFP Reference Drawings/Documents Google Drive Link:

https://drive.google.com/drive/folders/1YQIcyRcaCh7_u7C-enKAfilpWmDDoe70?usp=sharing

By signing below, the Respondent acknowledges:

1. They have carefully examined all RFP Documents and Attachments and understand all instructions, requirements, specifications, terms and conditions; and that all statements, information, costs, and schedules submitted in response to the RFP are current, complete, true and accurate.
2. They have specifically reviewed the McKinstry Sample Subcontract to see if the Respondent would like to take any exceptions. Any requested exceptions shall be noted and provided with the RFP response. Exceptions to the subcontract provided after the RFP response may not be considered.
3. The undersigned accordingly submits the following Guarantee Maximum Price (GMAX) proposal.

Name of Company

Date

Printed Name of Firm Representative

Signature of Firm Representative

E-mail

Phone

Fax

Final Pricing Form

REFERENCE DOCUMENTATION:

The below documentation is included and required as part of this RFP and is available the Google Drive link:

https://drive.google.com/drive/folders/1YQlcyRcaCh7_u7C-enKAfilpWmDDoe70?usp=sharing

FINAL PRICING FORM

This final pricing form is accompanied by an .xlsx file titled Attachment C – Carbon SD MEP and Controls Pricing Workbook.

Please fill out and return the Carbon SD MEP and Controls Pricing Workbook along with this Final Pricing Form

ADDENDA ACKNOWLEDGEMENT

Respondent acknowledges receipt of the following addenda, and has incorporated the requirements of such addenda into the proposal (List all addenda issued for this project):

| No. | Date | No. | Date | No. | Date |
|-----|------|-----|------|-----|------|
| | | | | | |

CHANGES IN THE WORK / SCOPE

McKinstry and/or Owner reserves the right to have any additional work done at a guaranteed maximum price, fixed negotiated price, or separate cost plus basis, which will include the Subcontractor's profit and overhead. On a guarantee maximum price or cost-plus basis work, the Subcontractor will use 10% mark-up for overhead and 5% mark-up for profit. All changes in work which include a subcontracted portion of work to the Subcontractor (Sub of Subcontractor) shall include a copy of the sub-subcontractor's quote. Mark-up on subcontracted work will be as detailed in this paragraph.

Markup is considered to be the maximum total markup defined by McKinstry from the lowest tier subcontractor up through the Subcontractor. This shall include all overhead and profit on labor and material as applies to every subcontractor and/or supplier for a particular change in scope.

For purposes of this Contract, direct costs for Change Order work directed by McKinstry or Owner shall include direct labor, direct labor burden, associated labor taxes, material, equipment and Subcontract costs. It is expected that the subcontractor will submit a GMAX pricing for a complete system and therefore no change orders are expected as it relates to the base design and installation requirement.

All other costs are considered overhead or profit (to include but not limited to small tools with an actual purchase price less than \$500.00, insurance and B&O Taxes) and shall be included in the percentage of mark-up as set forth in this contract.

Provide within the proposal a detailed list of labor rates (fully burdened) including job title, straight time rate, overtime rate and double time rate. Identify salaried personnel on this list.

Final Pricing Form

SCHEDULE

Provide estimated schedule duration:

The crew size submitted for this scope of work and schedule is _____ crew members.

Final Pricing Form

RISK ASSESSMENT PLAN

Please prioritize the risks (list the greatest risks first). This template must be used. All cost and schedule impacts associated with these risks/solutions must be included in your base cost/schedule. You may add/delete additional rows to identify additional risks, solutions, and value added options, but do not exceed the 2-page limit.

Major Risk Items

Risk 1:

Solution:

Risk 2:

Solution:

Risk 3:

Solution:

Risk 4:

Solution:

Risk 5:

Solution:

Risk 6:

Solution:



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project, Recreation Center Controls upgrade

DOCUMENT: Controls Retrofit Scope of Work Date: 12/19/25

CONTROLS RETROFIT SCOPE REQUIREMENTS

1. General Scope of the Project

- a. The scope of work includes replacement and/or retrofit of the existing Carrier Comfort Network building automation system (BAS) to provide modern, open-protocol control and monitoring of major mechanical and ancillary systems within the recreation center.
- b. This BAS scope is intended to be flexible and modular. Final BAS points, sequences, hardware quantities and integration requirements shall be dependent on which major mechanical scopes are included or excluded from the project, including but not limited to boiler replacement, AHU multizone replacement, RTU replacement scopes referred to elsewhere in the project RFP
- c. The controls contractor shall provide a complete and operable BAS for all existing equipment that remains, and for all new equipment installed under associated mechanical scopes, without duplication of responsibility.
- d. Where mechanical equipment is replaced under separate scope, the controls contractor shall coordinate closely with the mechanical contractor to ensure seamless integration, consistent sequence of operation, and proper startup and commissioning support.
- e. Final BAS scope, points count, and sequences of operation shall be coordinated with the final mechanical scope selection. Controls pricing shall clearly identify assumptions tied to included equipment.

2. Controls Scope

- a. Building Automation System (BAS) Infrastructure
 - i. Provide a new BACnet/IP based control system with web-enabled front end.
 - ii. Integrate all new and existing control devices into a unified system.
 - iii. New CAT 6 communication cabling shall be implemented with the exception of existing i-Vu Open Link IP cabling.
 1. Existing
 - iv. Provide system architecture suitable for future expansion without proprietary limitations.
 - v. Provide graphics, alarms, trending, and scheduling functions for all major equipment.
 - vi. Migrate or replace existing control panels and field devices as required to support the new BAS
- b. Boilers & Heating System
 - i. Provide BAS control and monitoring for all boilers and associated heating system components, whether existing or newly installed under separate mechanical scopes.
 - ii. Furnish and install controllers, sensors, and actuators for:
 1. Boilers
 2. Primary and secondary pumps
 3. Isolation and control valves
 4. Ancillary heating equipment
 - iii. Implement sequencing, lead/lag operation, reset schedules, and fault monitoring as defined by McKinstry and Owner specifications.
 - iv. Optimize hot water supply temperature based on outdoor air temperature and load.
- c. Chillers
 - i. Air Cooled Chillers
 1. Provide interface to each chilled water chiller and associated pumps
 2. Implement chiller sequencing, chilled water temperature reset, and monitoring



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project, Recreation Center Controls upgrade

DOCUMENT: Controls Retrofit Scope of Work Date: 12/19/25

- of operating status, alarms, and key performance parameters.
- 3. Coordinate with manufacturer supplied controls where applicable.
- ii. Ice Rink Ammonia Chiller
 - 1. Provide BAS interface to the ammonia refrigeration control system for **monitoring and supervisory control only**, unless otherwise defined.
 - 2. Monitor compressor status, brine temperatures, condenser operation, pump status, and alarms.
 - 3. Integrate system data into BAS graphics, trending, and alarm management.
 - 4. Sequencing and life-safety controls shall remain within the ammonia system's dedicated safety controller unless explicitly defined otherwise.
- d. Air Handling Units (AHUs) & Rooftop Units (RTUs)
 - i. Provide BAS control and monitoring for all AHU and RTU's whether existing or replaced under separate mechanical scopes.
 - ii. Replace unit controllers as required to support
 - 1. Supply and return fan control
 - 2. Economizer operation
 - 3. Discharge air temperature reset
 - 4. Occupied/unoccupied scheduling
 - 5. Alarm and fault detection
 - iii. Integrate VFD, DCV sensors, temperature sensors, and humidity sensors as applicable
 - iv. Coordinate sequences of operation with AHU and RTU replacement scopes where applicable.
- e. Pool Equipment
 - i. Provide BAS control and monitoring of pool air handling and dehumidification units
 - ii. Integrate pool water heating systems with the central heating plant where applicable
 - iii. Monitor humidity, space temperature, unit status and alarms
 - iv. Provide trending and alarm notification for natatorium performances and fault conditions
- f. Terminal Equipment & Zoning
 - i. Integrate terminal units (fan coils, VAV boxes, etc.) with zone temperature sensors and scheduling.
 - ii. Provide zone temperature sensing, scheduling, and setback control.
 - iii. Provide demand-controlled ventilation in high-occupancy areas where feasible.
- g. System Integration & Graphics
 - i. Cottonwood Heights Parks and Recreation District shall have complete administrative access to all system configuration and programming.
 - ii. Develop custom graphics for all major systems and equipment.
 - iii. Configure alarm hierarchies with priority levels and remote notification capability.
 - iv. Provide trending setup for key energy and performance parameters.
 - v. Adhere to McKinstry standards for point naming, graphics, and alarm structure.
- h. TAB and Commissioning Support
 - i. Controls contractor shall support TAB activities as required, including temporary overrides, setpoint adjustments, trend setup, and verification of controls operation



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project, Recreation Center Controls upgrade

DOCUMENT: Controls Retrofit Scope of Work Date: 12/19/25

- ii. Controls Contractor shall not be responsible for performing TAB or providing TAB reports, which shall be carried by the mechanical contractor
- iii. Provide commissioning support consistent with McKinstry commissioning standards including participation in functional performance testing and issue resolution
- i. Documentation
 - i. Provide as built controls drawings to include but not limited to:
 - 1. Points list
 - 2. McKinstry supplied Network architecture diagram
 - 3. McKinstry supplied Sequence of Operation
 - ii. Provide operator training for BAS operation and troubleshooting.
 - iii. Deliver updated O&M manuals and controls documentation.

BOILER STEAM TO HOT WATER CONVERSION SCOPE REQUIREMENTS

1. General Scope of the Project
 - a. Project will convert the existing single steam boiler system at the Recreation Center into a high-efficiency hot water hydronic system composed of at least 3 smaller hydronic hot water boilers. The scope includes complete removal of the existing steam boiler and associated infrastructure, and installation of a modern hydronic heating system designed to reduce energy consumption, improve reliability, and lower maintenance costs.
2. Mechanical Scope
 - a. Demolition and Removal
 - i. Remove existing steam boiler(s), associated steam piping, steam to hot water heat exchangers, condensate return systems, and ancillary components.
 - ii. Properly dispose of all demolished materials in accordance with local codes and environmental requirements.
 - iii. Additional labor and rigging effort will be required due to the boiler's basement location and limited access, which makes material removal and equipment installation more challenging.
 - b. High Efficiency Boilers
 - i. Furnish and install high-efficiency condensing hot water boilers sized per design documents to meet facility heating load requirements.
 - ii. Boilers shall be fully packaged with code required safeties including low water cutoff, pressure relief valves, flame safeguard, and combustion controls.
 - iii. Provide factory startup, testing, and warranty registration
 - c. Piping and Hydronic Distribution
 - i. Provide and Install new primary and secondary hot water pumping system with appropriately sized pumps, valves, and specialties.
 - ii. Modify and/or replace existing piping to accommodate new hydronic distribution system.
 - iii. Insulate all new hot water piping in compliance with energy code and project specifications.
 - iv. Modify natural gas piping to serve new boilers, including new regulators, valves, and safety devices as required.
 - v. Provide new system expansion tank(s), air separator(s), and system fill assembly including backflow preventer and pressure reducing valve.
 - d. Water to Water Heat Exchangers
 - i. Provide and Install qty 3 pool heat exchangers per design drawings and connect to hydronic piping and pumping systems.
 - e. Flue and Combustion Air Systems
 - i. Install new boiler flue stacks and combustion air dampers per manufacturer's recommendations and code requirements.
 - ii. Provide motorized dampers with controls integration for combustion air management.
 - iii. Provide condensate neutralization system for all condensing boilers and route discharge to approved sanitary connection.
 - f. Controls Coordination
 - i. Provide new sensors, control valves, and sequences of operation to ensure efficient and reliable performance.
 - ii. Coordinate device locations, equipment requirements, and startup activities with McKinstry and controls subcontractor.

- iii. Mechanical contractor is not responsible for BAS programming.
 - g. Ancillary Work and Accessories
 - i. Provide chemical feed, and other hydronic accessories required for a complete system if necessary.
 - ii. Flush, clean, and treat new hydronic piping per industry standards.
 - iii. Provide strainers, thermometers, pressure gauges, and other hydronic specialties.
 - iv. Provide updated O&M manuals.
 - h. Testing, Adjusting, Balancing (TAB), and Commissioning Support
 - i. Perform startup, testing, balancing, and commissioning of the new hot water heating system
 - ii. Verify system performance aligns with design intent and energy efficiency goals.
 - iii. Provide certified TAB report and support commissioning activities led by McKinstry.
 - iv. Please refer to the Controls Commissioning Roles and Responsibilities attachment for SUBCONTRACTOR Commissioning Requirements.
3. Electrical Scope
- a. Power Distribution
 - i. Provide and install all line voltage power wiring required for boilers, pumps, combustion air equipment, and associated mechanical devices
 - ii. Provide and new disconnects, breakers, variable frequency drives, starters, and motor protection devices as required per electrical design drawings.
 - b. Controls Power and Conduit
 - i. Provide power for control panels, transformers, and field devices as required
 - ii. Provide conduit, junction boxes, raceways, grounding, and bonding for all new electrical and control wiring.
 - c. Demolition
 - i. Remove abandoned electrical equipment and wiring associated with the existing steam boiler system.
4. Controls Scope
- a. General
 - i. Provide a complete BAS/DDC control system for the new hydronic boiler plant and integrate all equipment into the building automation system.
 - b. Controls Hardware and Wiring
 - i. Furnish and install all control panels, controllers, network devices, and associated control hardware.
 - ii. Provide and install all control wiring from panels to field devices, including terminations
 - c. Field Devices and Actuation
 - i. Furnish and install temperature, pressure and flow sensors as required.
 - ii. Furnish and install actuators for control valves and combustion air dampers
 - iii. Coordinate with mechanical contractor for device installation locations.
 - d. Sequences of Operation and Programming
 - i. Adherence to the McKinstry standards naming and point convention.
 - ii. Implement Sequence of operation as defined by McK including



PROJECT: Cottonwood Heights Parks and Recreation Energy Savings Project

DOCUMENT: Boiler Steam to Hot Water Conversion Scope of Work

Date: 12/19/25

1. Boiler staging and lead/lag
 2. Outdoor air reset
 3. Pump enable and control
 4. Combustion air and safety interlocks
- iii. Implementation of setpoints and schedule as defined by Owner and McK
- e. Integration, Graphics and Alarms
 - i. Provide BAS graphics, alarms, trends and monitoring points required for operation, commissioning, and M&V.
 - ii. Fully integrate new equipment into the BAS
- f. Startup, Training, and Commissioning Support
 - i. Support system startup and functional performance testing.
 - ii. Provide operator training and updated controls documentation.



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project

DOCUMENT: Air Distribution Scope of Work Date: 12/19/25

AIR DISTRIBUTION REPLACEMENT SCOPE REQUIREMENTS

1. General Scope of the Project
 - a. The project will replace multiple aging air handling and rooftop systems serving the Recreation Center, including a multizone air handling unit, a rooftop unit serving a locker room with heat exchanger, two natatorium units serving the pool areas, and a rooftop unit serving the fitness area. The scope includes removal of existing equipment and installation of new high-efficiency HVAC systems designed to improve energy performance, occupant comfort, reliability, and maintainability.
 - b. All HVAC equipment and associated scopes shall be priced separately. Each major piece of equipment shall be provided as a standalone line item, including associated demolition, installation, controls, electrical, TAB, and commissioning support. This project includes only TBD equipment selections, and final inclusion of equipment in the project will be determined at a later date.
2. Mechanical Scope
 - a. Demolition and Removal
 - i. Remove existing multizone air handling unit, locker room rooftop unit with heat exchanger, two pool air handling units (York/DesChamps JR and PoolPak), and fitness area rooftop unit as applicable per selected scope.
 - ii. Remove associated duct connections, coils, dampers, exhaust fans, piping, condensate drains, and accessories required for equipment replacement.
 - iii. Properly dispose of all demolished materials in accordance with local codes and environmental requirements.
 - iv. Coordinate equipment removal and installation logistics considering roof access, structural limitations, and occupied facility constraints.
 - b. Equipment Replacement (As Applicable per Selected Scope)
 - i. Furnish and install new high-efficiency HVAC equipment for each selected system, including but not limited to:
 1. Multizone air handling unit
 2. Locker room rooftop unit with heat exchanger
 3. Natatorium (pool) air handling units
 4. Fitness area rooftop unit
 - ii. Each unit shall be provided with required accessories, transitions, and appurtenances for a complete and operable system.
 - iii. Provide factory startup, testing, and warranty registration for each installed unit.
 - c. Ductwork, Piping, and Accessories
 - i. Modify, replace, or extend ductwork and piping as required for each installed unit.
 - ii. Insulate all new ductwork and piping in compliance with energy code and project specifications.
 - iii. Provide condensate drain piping, traps, overflow protection, and corrosion-resistant materials where required.
 - d. Controls Coordination
 - i. Provide required control valves, dampers, sensors, safeties, and unit-mounted controls integral to the mechanical systems.
 - ii. Coordinate device locations, equipment requirements, and startup activities with McKinstry and the controls subcontractor.
 - iii. Mechanical contractor is not responsible for BAS programming.
 - e. Testing, Adjusting, Balancing (TAB), and Commissioning Support
 - i. Mechanical contractor shall furnish and carry a certified TAB contractor for all new HVAC equipment installed under this scope.
 - ii. TAB contractor shall perform pre-TAB (initial) and post-TAB (final) testing, adjusting, and balancing for all air and hydronic systems, including air handling units, rooftop units, energy recovery devices, exhaust systems, terminal devices, and pool air systems.



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project

DOCUMENT: Air Distribution Scope of Work Date: 12/19/25

- iii. TAB shall verify airflow, temperature control, humidity control, and space pressurization in accordance with design intent and applicable standards.
- iv. Mechanical contractor shall be responsible for coordination of TAB activities, resolution of deficiencies, and implementation of corrective actions identified during TAB.
- v. Provide final certified TAB reports documenting pre- and post-balancing results.
- vi. Support commissioning activities led by McKinstry, including participation in functional performance testing.
- vii. Please refer to the Controls Commissioning Roles and Responsibilities attachment for SUBCONTRACTOR Commissioning Requirements.

3. Electrical Scope

a. Power Distribution

- i. Provide and install all line voltage power wiring required for each selected HVAC unit and associated mechanical equipment.
- ii. Provide new disconnects, breakers, starters, variable frequency drives, and motor protection devices as required.
- iii. Electrical scope shall be clearly delineated by individual equipment line item.

b. Controls Power and Conduit

- i. Provide power for unit-mounted controllers, control panels, transformers, and field devices as required.
- ii. Provide conduit, junction boxes, raceways, grounding, and bonding for all new electrical and control wiring.

c. Demolition

- i. Remove abandoned electrical equipment and wiring associated with removed HVAC equipment.

4. Controls Scope

a. General

- i. Provide a complete BAS/DDC control system for all installed HVAC equipment and integrate each system into the building automation system.
- ii. Controls scope shall be priced and identified by individual equipment line item.

b. Controls Hardware and Wiring

- i. Furnish and install all control panels, controllers, network devices, and associated control hardware.
- ii. Provide and install all control wiring from panels to field devices, including terminations.

c. Field Devices and Actuation

- i. Furnish and install temperature, humidity, pressure, and airflow sensors as required.
- ii. Furnish and install actuators for dampers, valves, energy recovery devices, and natatorium humidity control.
- iii. Coordinate device installation locations with the mechanical contractor.

d. Sequences of Operation and Programming

- i. Adherence to McKinstry standards naming and point convention.
- ii. Implement sequences of operation as defined by McKinstry, including unit enable/disable, temperature and humidity control, economizer and energy recovery control, and pool space pressurization.
- iii. Implement setpoints and schedules as defined by Owner and McKinstry.

e. Integration, Graphics, and Alarms

- i. Provide BAS graphics, alarms, trends, and monitoring points required for operation, commissioning, and M&V.
- ii. Fully integrate each installed unit into the BAS.

f. Startup, TAB Support, and Commissioning Support

- i. Controls contractor shall support TAB activities as required, including temporary overrides, point adjustments, trending, and verification of control operation, consistent with support provided during commissioning.



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project

DOCUMENT: Air Distribution Scope of Work Date: 12/19/25

- ii. Controls contractor shall not be responsible for performing TAB, providing TAB reports, or achieving final balanced conditions.
- iii. Support system startup, functional performance testing, and commissioning coordination with McKinstry.
- iv. Provide operator training and updated controls documentation.



PROJECT: Cottonwood Heights Parks and Recreation Energy Savings Project

DOCUMENT: Chlorine Generators Scope of Work Date: 12/19/25

COMMERCIAL CHLORINE GENERATION SYSTEMS SCOPE REQUIREMENTS

1. General Scope of the Project
 - a. The project consists of the installation of commercial chlorine generation systems (“ChlorKing” or equivalent) at the Cottonwood Heights Parks and Recreation Center to serve the indoor and outdoor pools from separate mechanical spaces. The scope includes removal of existing chlorine feed equipment (tanks, pumps, and associated components), furnishing and installing new chlorine generation systems, electrical upgrades, startup, testing, commissioning support, and integration of available system monitoring points into the building automation system (BAS). All proposals must provide a detailed breakdown of labor, materials, equipment, and associated costs.
2. Mechanical Scope
 - a. Demolition and Removal
 - i. Remove existing Chlorine feed equipment including storage tanks, pumps, piping, and ancillary component as required.
 - ii. Properly dispose of all demolished materials in accordance with local codes and environmental requirements.
 - iii. Verify access and provide detailed plans for installation, including the proposed location within each mechanical space.
 - b. Furnishing and Installation of Chlorine Generation Systems
 - i. Supply “ChlorKing” or equivalent commercial chlorine generation systems. Properly sized to meet chemical requirements of the combined pools fed from each generator
 - ii. Provide shipping, handling, and delivery to the facility.
 - iii. Install systems according to manufacturer guidelines and industry best practices, including securing the units and connecting to pool chemical feed piping.
 - iv. Provide all necessary support, mounting, and minor modifications required for proper installation.
 - v. Include startup, functional testing, and training for operations staff.
 - c. Ancillary Work and documentation
 - i. Provide updated O&M manuals, wiring diagrams, and operational instructions.
 - ii. Include any necessary chemical feed accessories, flow monitoring devices, or alarms supplied with the ChlorKing systems.
 - iii. Flush and verify new piping connections to ensure proper operation.
 - d. Testing, Startup, and Commissioning Support
 - i. Perform startup and functional testing of each chlorine generation system in accordance with manufacturer requirements.
 - ii. Verify system performance aligns with design intent and fully replaces the existing chlorine feed equipment.
 - iii. Coordinate and support commissioning activities led by McKinstry, including participation in functional performance testing.
 - iv. Provide training to facility staff on safe operation and routine maintenance of the chlorine generation systems.
 - v. Provide startup reports, checklists, and documentation as required.
3. Electrical Scope
 - a. Power Distribution
 - i. Provide and install all line voltage wiring required for the chlorine generation systems.
 - ii. Provide and install 100A breakers in the existing MCC and MDP as required



- iii. Provide and install step down transformers to meet voltage requirements of chlorine generators
- b. Conduit and Circuitry
 - i. Provide and install conduit, circuits, junction boxed, grounding, and bonding for all new electrical wiring serving the chlorine generation systems.
 - ii. Remove abandoned electrical equipment and wiring associated with the existing chlorine feed systems if applicable.
- c. Controls Power
 - i. Provide power to chlorine generator control panels, field devices, and system monitors as required by the manufacturer.
 - ii. Perform startup and testing of new Chlorine Generation Systems.
 - iii. Verify system performance aligns with design intent and completely replaces the need for the old Chlorine systems.
- 4. Controls Scope
 - a. General
 - i. Controls scope is limited to monitoring and alarming only. Process control of generators shall remain under the control of the manufacturer provided controls system.
 - ii. Controls subcontractor shall support commissioning activities but shall not be responsible for overall system startup or performance of the chlorine generation equipment.
 - b. Controls Hardware and Wiring
 - i. Provide and install all required control wiring, conduit, and terminations between the chlorine generation systems and the BAS interface points.
 - ii. Coordinate interface requirements with the installation subcontractor and McKinstry.
 - c. BAS Integration Points
 - i. Integrate Available Chlorine generator points into the BAS including, but not limited to:
 - 1. System run/status
 - 2. Common fault/alarm
 - 3. Enable/disable status
 - 4. Production rate if available
 - ii. Provide alarms and monitoring points necessary to support operations, troubleshooting, and commissioning.
 - d. Graphics, alarms and Documentation
 - i. Provide BAS graphics, alarm points, and trend capabilities for all integrated points.
 - ii. Include points list in control documentation.



PROJECT: Cottonwood Heights Parks and Recreation District Energy Savings Project

DOCUMENT: Building Envelope Improvements and Weatherization Date: 12/19/25

1. BUILDING ENVELOPE IMPROVEMENTS AND WEATHERIZATION

2. General Scope of the Project

- a. The project includes building envelope improvements and weatherization at the Recreation Center to reduce air leakage, improve insulation performance, enhance occupant comfort, and lower energy consumption. Work will focus on upgrades to walls, roof areas, windows, doors, and related air sealing components.

3. Mechanical

a. Demolition and Removal

- i. Remove existing damaged or ineffective insulation, sealants, and weatherization materials as required to perform the work.
- ii. Dispose of all removed materials in accordance with applicable codes and regulations.
- iii. Protect adjacent finishes and coordinate work to minimize disruption to facility operations.

b. Insulation Improvements

- i. Furnish and install new or supplemental insulation at exterior walls, roof assemblies, and other identified areas to meet current energy code requirements.
- ii. Repair or improve air and vapor barriers where accessible to ensure a continuous thermal envelope.
- iii. Seal penetrations through walls and roof assemblies.

c. Windows, Doors, and Openings

- i. Furnish and install door sweeps on all exterior doors.
- ii. Install new weatherstripping, gaskets, and seals at exterior openings.
- iii. Seal joints and transitions around windows and doors to reduce air and water infiltration.

d. Air Sealing and Weatherization

- i. Perform air sealing at leakage locations including joints, seams, penetrations, and transitions.
- ii. Use appropriate sealants, foams, and gaskets compatible with existing construction.
- iii. Improve continuity of the building air barrier.

e. Moisture Control

- i. Improve flashing, sealants, and drainage details where deficiencies are identified.
- ii. Coordinate envelop improvements to prevent moisture and condensation issues.

f. Ancillary Work

- i. Patch and restore interior and exterior finishes affected by the work.
- ii. Coordinate with existing mechanical and electrical systems at envelope penetrations.
- iii. Provide basic maintenance and warranty documentation for installed materials.

g. Testing and Verification

- i. Conduct visual inspections and testing, as required, to verify proper installation and performance of envelope improvements.
- ii. Confirm work meets project energy efficiency goals and applicable codes.



PROJECT: Cottonwood Heights Parks and Recreation Department,
Recreation Center, LED Lighting Retrofit

DOCUMENT: LED Lighting Retrofit

Date: 12/19/25

LED RETROFIT SCOPE REQUIREMENTS

1. General Conditions:

- a. This project will retrofit approximately 160,000 square feet of the Recreation Center with new energy-efficient LED lighting. Certain parts of the facility have been previously retrofitted to LED lamps. These fixtures would not be within the scope of this project. The retrofit is intended to reduce energy consumption and enhance user comfort. The scope includes full replacement of existing fluorescent lamps by direct wiring LED replacements. It also includes replacement of all Compact Fluorescent Tube (CFL) lamps. Where applicable it also includes integration into the existing battery system.
- b. SUBCONTRACTOR to include in proposal
 - i. SUBCONTRACTOR to verify lighting counts, lamp and fixture types, and access conditions for the facility.
 - ii. SUBCONTRACTOR to provide pricing based on the reference document provided in the google drive, accessible by this link:
https://drive.google.com/drive/folders/1cyaBIO87xVIkdc-CG_zYVymOttV4sJGA?usp=sharing
 - iii. SUBCONTRACTOR furnishes and installs: Equivalent LED lamps for all non-LED lamps throughout the facility, power packs, and necessary wiring.
 - iv. SUBCONTRACTOR will provide all labor, site supervision, lifts, ladders, scaffold & access equipment to complete the lighting retrofit.
 - v. SUBCONTRACTOR to modify branch wiring, circuits, and panels as required for new LED fixtures.
 - vi. SUBCONTRACTOR to ensure all electrical work complies with NEC and local building codes.
 - vii. SUBCONTRACTOR will replace only broken or damaged existing sockets/tombstones and/or those broken during install. Please provide price to replace 10% of linear fluorescent sockets/tombstones (labor & material).
 - viii. Lenses will not be replaced unless scope noted or broken during installation. Subcontractor shall perform a dry wipe down of all lenses that are in the scope of work areas. Please provide budget allowance to replace 10% of lenses (labor & material).
 - ix. SUBCONTRACTOR to replace existing BBU/EM ballasts as identified in the scope. Please provide budget allowance to replace an additional 10 BBU's.
 - x. Certified payroll and prevailing wages will NOT be required.
 - xi. SUBCONTRACTOR will perform M&V 80/20 requirements, testing, and analysis. Include light meter readings and pictures. 200 total kW readings with light meter reading. (volts, amps, watts, power factor, and foot candles)
 - xii. SUBCONTRACTOR will supply on site or off site storage container(s) for materials and recyclables as close as practical or permitted to the primary job site.
 - xiii. SUBCONTRACTOR to handle and be responsible for all materials including material deliveries to storage location and biweekly inventory reporting. Biweekly material Inventory reporting will require subcontractor to utilize McKinstry provided material tracking sheet and submit back to McKinstry construction team every other Friday for the duration of the project.
 - xiv. SUBCONTRACTOR to include pricing for material and labor for all 0-10V low voltage wiring. Must be plenum rated 0-10V low voltage.
 - xv. Properly recycle or dispose of removed lamps, ballasts, and fixtures in accordance with all environmental regulations (including hazardous material disposal for mercury-containing lamps).



PROJECT: Cottonwood Heights Parks and Recreation Department,
Recreation Center, LED Lighting Retrofit

DOCUMENT: LED Lighting Retrofit

Date: 12/19/25

- xvi. Provide additional high-visibility security lighting in blind spots or areas identified by facility staff. Please provide cost and labor of installation of 10 new security fixtures.

- 2. Commissioning and Verification
 - a. SUBCONTRACTOR to:
 - i. Ensure lighting system aligns with energy savings goals, security requirements, and facility use patterns.
 - ii. Verify lighting levels meet design intent and applicable standards (e.g., IES).
 - iii. Deliver O&M manuals, warranty information, and as-built drawings.

 - 3. This Scope of Work is intended to be turn-key. SUBCONTRACTOR shall inform McKinstry, in writing and before entering into a Subcontract Agreement, of any exclusions to this turn-key approach to allow McKinstry time to coordinate and budget for any gaps in the Scope of Work necessary for a complete installation. SUBCONTRACTOR pricing shall be a guaranteed maximum (GMAX) price, change orders will not be allowed for work described in this scope.

McKinstry Subcontractor Prequalification

Please complete all requested information

Pre-qualification Application

| | |
|--------------------------------------------|--|
| Company Name: | |
| Trade Name (DBA): | |
| Address Line 1: | |
| Address Line 2: | |
| City and State: | |
| Vendor Contact Name: | |
| Vendor Contact Email: | |
| Vendor Contact Phone: | |
| Business ID #, Tax ID or Federal ID/SS #: | |
| Qualifications/License to provide Service: | |
| (State) Contractors License #: | |
| (State) Business License #: | |

SAFETY AND HEALTH PERFORMANCE

I have attached a copy of the following:

| | |
|--|--------------------------------------------------------------------------------------------|
| | Letter from your Workers Compensation Insurance Provider of your EMR Ratings past 3 years. |
| | Copies of your OSHA 300-A logs for the past 3 years |
| | Copies of any OSHA Citations for the past 3 year |

Name / Title of who is responsible for safety at your company?

Name: _____

Email: _____

Phone: _____

Does your company have a written safety program?

Yes _____

No _____

INSURANCE & BONDING

I have attached a copy of the following:

| | |
|--|------------------------------------------------------------------------------------------------|
| | Current copy of Liability Insurance Certificate |
| | COI w/ evidence of workers compensation coverage (Unless located and performing work in Texas) |
| | Letter from Bonding Company/Surety (statement of bonding capacity) |
| | Current W9 form *(must be the most recent version of W9) |

McKinstry Subcontractor Prequalification

ORGANIZATION & WORK HISTORY

| | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------|-------------|
| Principle Owner #1: | | Years With Company: | |
| Principle Owner #2: | | Years With Company: | |
| Principle Owner #3: | | Years With Company: | |
| How many years has your organization been in business under the current firm name? | | | |
| Under what other or former names has your firm operated?: | | | |
| Is your firm majority owned or controlled by any other organization? If yes, provide organization: | | | |
| Form of Business: <input type="checkbox"/> Sole Owner <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation | | | |
| Date Founded: _____ | | | |
| State of Incorporation if applicable: _____ | | | |
| What type of staff do you normally employ? <input type="checkbox"/> Union <input type="checkbox"/> Non-Union <input type="checkbox"/> Leased/Temp | | | |
| Average number of employees for last 3 years: | Year _____ | Year _____ | Year _____ |
| | Avg # _____ | Avg # _____ | Avg # _____ |
| Gross Revenue for the Past Three Years: | Year _____ | Year _____ | Year _____ |
| | \$ _____ | \$ _____ | \$ _____ |
| Largest individual project value in past 3 years: | | Average individual project value in last 3 years: | |
| Name: _____ | | Name: _____ | |
| Contract Value: _____ | | Contract Value: _____ | |

| | | |
|----------------------|------------|------------|
| Desired project size | Maximum \$ | Minimum \$ |
|----------------------|------------|------------|

Major current jobs in construction

| Customer/location | Type of Work | Size \$ | Client contact |
|-------------------|--------------|---------|----------------|
| | | | |
| | | | |

McKinstry Subcontractor Prequalification

Major projects past 3 years:

| Customer/location | Type of Work | Size \$ | Client contact |
|-------------------|--------------|---------|----------------|
| | | | |
| | | | |

Are there any judgments, claims or suits pending or outstanding against your company?

- Yes, please attach details No

Are you now or have you ever been involved in any bankruptcy or reorganization proceedings?

- Yes, please attach details No

Has your firm ever had a claim against a bond on which your firm stood as principle?

- Yes, please attach details No

Has your firm ever been denied a bond?

- Yes, please attach details No

REFERENCES

Provide a minimum of three references that can provide information on your company’s experience on projects of similar size and scope of work:

| | | | | |
|---------|--|--|-------|--|
| Name | | | Title | |
| Company | | | Phone | |
| Email | | | | |

| | | | |
|---------|--|-------|--|
| Name | | Title | |
| Company | | Phone | |
| Email | | | |

| | | | |
|---------|--|-------|--|
| Name | | Title | |
| Company | | Phone | |
| Email | | | |

McKinstry Subcontractor Prequalification

DIVERSE BUSINESS PARTICIPATION

Is your business a certified diverse owned supplier? (Yes/No) "Certified" means currently certified by an authorized certifying body. "Owned" means at least fifty-one percent (51%) of the business?

Yes No

If yes, please indicate your certification(s):

| | | | |
|--------------------------|-----------------------------------|--------------------------|--------------------------------|
| <input type="checkbox"/> | Black American Owned | <input type="checkbox"/> | Woman Owned |
| <input type="checkbox"/> | Hispanic American Owned | <input type="checkbox"/> | Service-Disabled Veteran Owned |
| <input type="checkbox"/> | Alaska Native Owned | <input type="checkbox"/> | Veteran Owned |
| <input type="checkbox"/> | Native American Owned | <input type="checkbox"/> | Disability Owned |
| <input type="checkbox"/> | Subcontinent Asian American Owned | <input type="checkbox"/> | Small Disadvantaged Business |
| <input type="checkbox"/> | Minority Owned | <input type="checkbox"/> | HubZone |
| <input type="checkbox"/> | LGBTQ Owned | <input type="checkbox"/> | |

List agencies, institutions, or organizations which have certified your firm as a diverse business:

| Agency Name | Contact Person | Phone | Approval Date | Certification Number |
|-------------|----------------|-------|---------------|----------------------|
| | | | | |
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|-----------------------------|--|
| Report Completed By: | |
| Name: | |
| Title: | |
| Date: | |

McKinstry Subcontractor Prequalification

| Number | Date | Incorporated Changes | Point of Contact |
|--------|------------|-------------------------------------------|-------------------|
| 1.0 | 11-30-2016 | Initial Release | Jason Engelbrecht |
| 1.1 | 02-22-2020 | Released As Is | Mark Brewster |
| 2.0 | 6-18-2021 | New Fields, and converted to fillable pdf | Britin Lindberg |

Scope of Work General Information, Inclusions, and Exclusions

ALL SCOPES OF WORK INCLUDE

1. General Requirements
 - A. Site altitude: Equipment shall be sized and rated for specified performance at site altitude of:
 - 1) 4,500' ASL
 - B. Supplemental Documentation: The following documents support this Scope of Work, and shall be considered part of the Subcontractors' requirements. Where discrepancies exist among referenced documents, the more stringent shall apply.
 - 1) Owner's Construction Design Guidelines and Specifications (to be issued prior to pricing deadline)
 - 2) McKinstry's Specifications and Standards (as applicable) for:
 - (i) Controls
 - (ii) Lighting
 - (iii) TAB
 - (iv) Construction Standards
 - 3) Codes
 - (i) 2021 International Building Code
 - (ii) 2021 International Fire Code
 - (iii) 2021 International Plumbing Code
 - (iv) 2021 International Mechanical Code
 - (v) 2021 International Fuel Gas Code
 - (vi) 2021 International Energy Conservation Code
 - (vii) 2023 National Electric Code
 - 4) Industry Standards (Latest edition, unless noted otherwise)
 - (i) NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
 - (ii) SMACNA HVAC Duct Construction Standards, Metal and Flexible
 - (iii) National Fire Protection Association Standards (NFPA)
 - 5) Reference Drawings and Documentation (Available via the Google Drive link below)
 - (i) https://drive.google.com/drive/folders/1cyaBIO87xVikdc-CG_zYVymOttV4sJGA?usp=sharing
 - C. Subcontractors shall pull required permits for their respective discipline(s).
 - 1) Permit drawings will be provided by McKinstry.
 - D. Subcontractors shall be responsible for equipment, materials, accessories, insulation and other associated requirements called for in their respective scopes of work.
 - E. Before submitting a proposal on the work specified herein, each bidder is required to conduct a site visit and/or review the existing systems associated with their discipline's scopes of work to familiarize themselves with all existing conditions, identify limitations, and field verify dimensions for use in submitting offer and completion of work. No extra compensation will be allowed because of the Subcontractor's misunderstanding regarding the amount of work involved or because of his/her lack of knowledge of any existing conditions.
 - F. This Scope of Work is intended to be turn-key. SUBCONTRACTOR shall inform McKinstry, in writing and before entering into a Subcontract Agreement, of any exclusions to this turn-key approach to allow McKinstry time to coordinate and budget for any gaps in the Scope of Work necessary for a complete installation. SUBCONTRACTOR pricing shall be a guaranteed maximum (GMAX) price, change orders will not be allowed for work described in this scope
2. General mechanical requirements
 - A. Mechanical contractor shall survey the existing conditions to determine there's adequate space if available for the installation of all new HVAC equipment. If existing space or capacity is insufficient to meet the requirements of the scope, Subcontractor shall immediately notify McKinstry.
 - ~~B.~~ MC shall offer to deliver all demo'd HVAC equipment to the owner prior to disposal
3. General electrical requirements
 - A. Electrical Subcontractor shall survey existing facility drawings and power distribution system to determine available space and capacity to support this scope of work. If existing space or capacity is insufficient to meet the requirements of the scope, Subcontractor shall immediately notify McKinstry.
 - B. For power circuits indicated as being removed, Subcontractor shall remove conductors back to the associated panel, and shall remove associated starters, disconnects, and other devices. Conduit shall be cut back to within 3" of room penetration.

Scope of Work General

Information, Inclusions, and Exclusions

- C. For new power circuits, Subcontractor shall furnish and install overcurrent protection, conduit conductors, starter, disconnect, and related accessories.
 - D. Where power circuits indicated as being removed meet the requirements for new power circuits, existing components may be reused where in compliance with current NEC.
 - E. Unless otherwise specified, similar loads may be combined on a common circuit as permitted by current NEC.
 - F. Electrical panels and disconnects serving mechanical equipment shall comply with the service clearance requirements of the NEC. Provide remote mounted panels and disconnects where required by the NEC.
4. General Controls requirements
- A. Controls Subcontractor shall survey existing facility controls as-builts and installed system to determine available controller capacity to support this scope of work. Include all necessary equipment, software, graphics and programming upgrades.
 - B. For proposed control points, Subcontractor shall furnish and install devices, conduit, conductors, and related accessories.
 - C. Controls Contractor shall offer to deliver all demo'd controls equipment to the owner prior to disposal.

GENERAL CLARIFICATIONS AND EXCLUSIONS

- 1. Replacement of any equipment or system except those components specified herein is excluded. Assume existing equipment to remain is functioning per latest as-builts drawings and manufacturer specifications.
- 2. Assume shift work:
 - a. All work outside normal business hours to be coordinated with Cottonwood Heights Parks and Recreation Department.
- 3. Hazardous material abatement except what is mentioned in this Scope of Work is excluded.
- 4. Excludes building code upgrades for equipment not directly replaced or repaired.
- 5. If SUBCONTRACTOR's direct actions, or lack thereof result in delays, in-part or in-whole, to the Project Construction Schedule (after initial lead times are confirmed), SUBCONTRACTOR shall be responsible for temporary heating, cooling or ventilation air, as necessary to not disturb normal operations of the District's facilities. Otherwise, temporary heating, cooling or ventilation air is excluded.
- 6. Life safety, access control, and security systems are excluded. Existing EMCS interfaces with life safety devices shall be maintained.

VALUE ENGINEERING AND ALTERNATES

- 1. SUBCONTRACTOR shall follow the scope of work intent included herein and scope delivered shall reflect this design intent. Any recommended or requested deviation shall be specifically called out for review/approval in SUBCONTRACTOR's proposal and shall be presented as an alternate.
- 2. SUBCONTRACTOR may propose deviation from this scope of work to reduce installation cost or improve the result to the Owner. However, such alternates must be specifically called out in the Subcontract documents along with the associated cost or value benefit. Unless specific alternates are called out, SUBCONTRACTOR's scope of work proposed is presumed to be compliant with this scope and associated standards. Base scope of work shall not deviate from the drawings provided, specifications, standards, and this Scope of Work.
- 3. Alternates are allowed with submittals for approval if deviation from design drawings and specifications permit alternates.



Construction Standard Scope Requirements

GENERAL

- 1) SUBCONTRACTOR will furnish and install the scopes of work in accordance with all current federal, state and local codes, publications and standards including, but not limited to IBC 2021, ANSI, NFPA, NEC, and OSHA.
- 2) SUBCONTRACTOR will furnish all labor, supervision, material, equipment, tools, hoisting, scaffolding, freight, unloading, traffic control, taxes, parking, material and labor escalation, overhead, clean-up, trash removal and other miscellaneous costs in order to provide a complete and working system.
- 3) SUBCONTRACTOR shall not proceed with any change order work until receipt of approval by McKinstry.
- 4) SUBCONTRACTOR to provide all necessary costs for inspections, permits, licenses, plan checks, connection fees, etc. for the SUBCONTRACTOR's scope of work as required by authority having jurisdiction.

| Conditional Requirement | Notes |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Payment & Performance Bond | Bond value shall be equivalent to the Subcontract Price. Bond shall be modified to the new Subcontract Price if Change Orders are issued. |
| Insurance | Requirements in Subcontract. SUBCONTRACTOR must submit Certificate of Insurance to subinsurance@mckinstry.com . |
| Safety | SUBCONTRACTOR is responsible for compliance with all safety requirements, and for the ultimate safety of its employees, lower tier subcontractors, agents, and others under its direction or control and will implement and follow all best practices designed to ensure the safety of all people on and around Subcontractor's work area. See Safety section in this document for more details |

SCHEDULE

- 1) SUBCONTRACTOR acknowledges that McKinstry has employed other contractors to work on the project.
- 2) SUBCONTRACTOR will coordinate with other contractors so the work can proceed in an orderly, productive, and continuous operation. Due to the nature of the work, multiple move-ins may be required, and SUBCONTRACTOR shall include these in the cost of work.
- 3) SUBCONTRACTOR acknowledges weather conditions will not be an excusable delay unless Contractor so recognizes that the conditions are unsafe, or the weather is so severe that the working conditions are unacceptable. In the event of a weather delay, Subcontractor will be required to make up schedule on Saturdays at no additional cost.
- 4) Prior to construction a pull planning session will be held to fine tune scheduling. SUBCONTRACTOR and a field representative will be required to attend and participate in this planning session
- 5) SUBCONTRACTOR is liable for repercussions related to the SUBCONTRACTOR's failure to coordinate schedule and/or meet agreed upon durations and completion dates.
- 6) Should work facilities be closed due to owner request, work will not occur and the schedule will be moved out the number of weather days at no additional cost.



Construction Standard Scope Requirements

SUBMITTALS, DOCUMENTS & PROJECT MANAGEMENT

- 1) SUBCONTRACTOR competent person(s) to maintain constant communication with McKinstry during active construction at each site.
- 2) SUBCONTRACTOR shall use Procore or other McKinstry approved alternative for all QA/QC, issue tracking and resolution.
 - a) QA/QC Software – McKinstry will utilize Procore, or an equivalent software, to track deficiency items. Subcontractor will receive an invitation to this software. Subcontractor shall utilize the software to provide weekly updates to items until they are complete. Subcontractor shall provide detailed descriptions of progress and photo evidence of completion.
 - b) All QC Inspections/Items must be documented
- 3) SUBCONTRACTOR shall provide submittals for ALL material SUBCONTRACTOR plans to use on the project no later than **10** business days after receipt of subcontract. This includes coordination drawings as requested and as-built drawings as requested.
- 4) SUBCONTRACTOR will acknowledge receipt of any information requests and questions within 24 hours.
- 5) SUBCONTRACTOR needs to respond to contractor request for inspection notice and be on site within 24 hours of notice.
- 6) SUBCONTRACTOR must provide daily signed logs for all employees on site indicating the trade work and hours performed by individual employees.
- 7) Test reports, field observation reports and field notes provided to contractor as required.
- 8) When submitting change orders:
 - a) SUBCONTRACTOR generated RFIs (Request for Information) are required to note any associated cost impacts.
 - b) For any McKinstry generated RFIs resulting in cost impacts, SUBCONTRACTOR will notify McKinstry within (5) business days of receiving the RFI.
 - c) For any drawing revisions resulting in cost impacts, SUBCONTRACTOR will notify McKinstry within (5) business days of receiving drawings.
- 9) SUBCONTRACTOR must be able to provide up two (2) hard copies and a complete electronic copy of their IOM manuals that include product cut sheets of each unique piece of equipment.
 - a) Included in the IOM manuals must be details on product warranties and procedures for warranty claims along with all additional documentation outlined in the closeout requirements of this subcontract.
 - b) Warranty must be a minimum of one year for all installed equipment and labor beginning on the date of substantial completion. Warranty shall include all labor and materials to execute warranty work.

LICENSES

- 1) SUBCONTRACTOR shall have all appropriate licenses to conduct work in the municipality, county, and state of project sites.



Construction Standard Scope Requirements

SUPERVISION & EMPLOYEES

- 1) SUBCONTRACTOR will provide the appropriate supervision in both the field and office to maintain and execute the project scope of work
- 2) SUBCONTRACTOR must always have a competent person(s) onsite at each active jobsite. If SUBCONTRACTOR hires a third tier, SUBCONTRACTOR to provide competent person supervision of third tier work.

COORDINATION, MATERIAL HANDLING & SITE ACCESS

- 1) SUBCONTRACTOR shall coordinate and is responsible for any road closures or traffic control required for installation.
- 2) SUBCONTRACTOR should expect any facility shutdown to be during off peak hours and include accordingly in bid. SUBCONTRACTOR must provide written **Method of Procedures** for facility shutdown **at least (2) weeks in advance** of the shutdown for McKinstry and Owner's approval.
- 3) SUBCONTRACTOR to provide a **site laydown plan** for approval by McKinstry and the Owner **no later than (2) weeks prior to mobilization.**
- 4) SUBCONTRACTOR shall coordinate and verify equipment and device locations with McKinstry prior to rough-in.
- 5) If needed, SUBCONTRACTOR is to provide temporary lighting, task lighting, and weather protection as necessary to complete their scope of work.
- 6) SUBCONTRACTOR shall provide any temporary utilities required for construction site, including backup power during facility shutdowns if necessary.
- 7) SUBCONTRACTOR shall be responsible for receiving, delivering, unloading, and storing all material required for the scope of work covered under this Agreement.
- 8) SUBCONTRACTOR shall coordinate all equipment and material deliveries, storage and installation with the McKinstry Superintendent. SUBCONTRACTOR shall coordinate deliveries of materials at least seven (7) days in advance.
- 9) This SUBCONTRACTOR is solely responsible for the security of the materials and equipment for this scope of work throughout the life of the project, including loss from damage, theft, or vandalism. Materials are required to be in weather-tight storage at least 6 inches off the ground.
- 10) SUBCONTRACTOR will assume responsibility for ANY McKinstry procured materials at two handoff points specified in the Material Scope Responsibility Matrix:
 - o Delivered to the jobsite: Ownership of the materials shall begin after McKinstry inspects the materials on the shipping vehicle. Once SUBCONTRACTOR assumes ownership of the equipment the SUBCONTRACTOR is responsible for securing (including fencing or Conex), storing, unloading, moving, lifting, and craning, all equipment and material in secure areas at the site as required to complete contracted scope of services.
 - o Delivered to warehouse or other designated secure storage facility: At SUBCONTRACTOR's preference, provisions for secure offsite storage of materials and associated transport may be arranged at SUBCONTRACTOR's expense and subject to McKinstry approval. Ownership of the materials shall likewise begin after McKinstry inspects the materials on the shipping vehicle at site of secure storage. Once SUBCONTRACTOR assumes ownership of the equipment /



Construction Standard Scope Requirements

materials, the SUBCONTRACTOR is responsible for securing (including fencing or Conex), storing, unloading, moving, transporting, lifting, and craning, as required to complete contracted scope of services.

- 11) All materials supplied by SUBCONTRACTOR will be new and in an unused condition, unless approved by McKinstry.
- 12) SUBCONTRACTOR responsible for all turnover of attic stock.
- 13) SUBCONTRACTOR is responsible for properly documenting all equipment damaged in shipping. SUBCONTRACTOR to notify McKinstry of any materials found to be damaged during delivery to site. Pictures of damage are required and McKinstry to be notified immediately.
- 14) SUBCONTRACTOR responsible for coordinating recycling of damaged materials as a result of SUBCONTRACTOR's negligence.
- 15) SUBCONTRACTOR is responsible for daily mobilization of crew in a safe and inobtrusive manner.
- 16) SUBCONTRACTOR must be able to provide recycling certificates/receipts for applicable material disposed of from site

SYSTEMS INSTALLATION

- 1) SUBCONTRACTOR must provide any required locates (public and private) necessary for areas that will be impacted by their scope of work.
- 2) SUBCONTRACTOR to provide all necessary penetrations, as required, for a complete working system.
- 3) SUBCONTRACTOR to provide all waterproofing, caulking, damp proofing, etc. for penetrations created to complete the work including all roof penetrations and repair.
- 4) SUBCONTRACTOR to provide and install all necessary framing, hangars, inserts, suspension systems, backing/blocking, bracing, sleeves, fasteners, caulking, fire caulking for a complete system.
- 5) SUBCONTRACTOR shall furnish all hoisting facilities for SUBCONTRACTOR's material, equipment, and personnel. Provide all vertical and horizontal movement of materials, including forklift, crane (as qualified), lifts, scaffolding, etc. as required for unloading, transport and distribution for work under this scope.

CORE DRILLING AND CUTTING

- 1) The SUBCONTRACTOR is responsible for maintaining fire ratings at all penetrations required for this scope of work.
- 2) All materials shall be installed in a manner that meets the material Manufacturer's recommendation. All penetrations in designated assemblies are to be U.L. rated to meet applicable codes. The sealing of penetrations shall be in accordance with local codes and must meet sound attenuation requirements as well as aesthetic requirements.
- 3) All contractors will need to provide a plan to address concrete imaging if drilling, coring, cutting is greater than one-inch depth. Our goal is to prevent injury to personnel or buildings caused by hitting electrical conduit, post-tension cables, rebar, and other utilities hidden inside the concrete.



Construction Standard Scope Requirements

LAYOUT

- 1) SUBCONTRACTOR is responsible for field verification of materials and all field measurements prior to installation or submittal of shop drawings. Field verification, as noted on the drawings, includes field measurements, general fitment and verifying substrate/surface is adequate before installation.
- 2) SUBCONTRACTOR shall coordinate and verify equipment and device locations with McKinstry prior to rough-in.

PROTECTION OF WORK AND PROPERTY & REMEDIAL WORK

- 1) SUBCONTRACTOR shall protect all existing finish work and roof surfaces from damage during mobilization, installation, and demobilization.
- 2) SUBCONTRACTOR shall notify McKinstry of any expected damage to the existing conditions due to this scope of work. Given such knowledge of potential damage, if McKinstry does not direct work to proceed, SUBCONTRACTOR shall be responsible for any damage to the existing conditions. If McKinstry is not alerted of such potential damage and SUBCONTRACTOR damages existing conditions, SUBCONTRACTOR shall be responsible for this damage to the existing conditions.
- 3) SUBCONTRACTOR is responsible for restoring site areas to conditions equal to or better than pre-existing conditions. SUBCONTRACTOR is responsible for documenting pre-existing facility conditions and shall notify McKinstry immediately of any damage to the existing facilities found prior to mobilization. Any damage not presented to McKinstry prior to mobilization becomes the repair and financial responsibility of the SUBCONTRACTOR. Any disputes on restoration quality without proof of pre-existing conditions becomes the repair and financial responsibility of the SUBCONTRACTOR.
- 4) SUBCONTRACTOR shall provide, install and maintain all material and equipment for temporary protection of existing facilities and surrounding work. Protected surfaces include, but are not limited to roofing, ceilings, walls, floors, doors, windows, landscaping, sidewalks, finishes and pavement. Floor coverings not scheduled for removal will be protected with a minimum of 1/2" plywood or similar hard board with taped seams.
- 5) SUBCONTRACTOR shall remove and properly dispose of waste generated by this scope of work on a daily basis.
- 6) SUBCONTRACTOR shall take all necessary measures to prevent tracking of mud onto surrounding streets and driveways. Any major cleaning as a direct result of this scope of work is the responsibility of the SUBCONTRACTOR.
- 7) SUBCONTRACTOR to provide an excavation, trenching, and/or directional bore plan to McKinstry at least (2) weeks prior to work if applicable.
- 8) SUBCONTRACTOR is responsible for any patching, painting, and repair of existing surfaces damaged by SUBCONTRACTOR'S work.
- 9) SUBCONTRACTOR is responsible for at their expense, repairing any damaged underground utilities or obstructions caused by excavating, trenching, or directional boring ground.
- 10) SUBCONTRACTOR is not responsible for relocation of abandoned utilities, hidden or buried structures, hazardous waste, debris, or contaminated soils



Construction Standard Scope Requirements

HAZARDOUS MATERIALS

- 1) If SUBCONTRACTOR disturbs an area that is suspected to be asbestos, SUBCONTRACTOR shall seal off the area, post hazard signs for the area, and contact McKinstry.
- 2) SUBCONTRACTOR is not responsible for abatement or disposal of hazardous soils.
- 3) SUBCONTRACTOR is responsible for the disposal of non-ACM hazardous materials per state and federal regulations and requirements.

SAFETY

- 1) SUBCONTRACTOR is responsible for the safety of all direct and subcontract personnel performing work, and for the safety of their work and all others in the areas of the site being worked on.
- 2) SUBCONTRACTOR shall meet all safety standards required by McKinstry, OSHA, applicable law, and shall create a site-specific safety plan for the Project. SUBCONTRACTOR shall complete McKinstry safety training prior to start of work.
- 3) If applicable, SUBCONTRACTOR to provide a Crane Pick Plan no later than (2) weeks prior to planned craning operations for McKinstry and Owner's approval. **Please see the checklist below for all items required to be submitted for crane pick plans:**
 - Crane Lift Plan
 - 3D Ariel Map showing the crane location w/ the swing
 - Crane Make / Model Spec Sheet
 - Crane Load Chart
 - Current Annual Crane and Equipment Inspection Sheets
 - Current Crane Certificate of Insurance
 - Crane Operator Qualification for Model of Crane (NCCCO certification)
 - Qualified Rigger Current Rigging Card
 - Traffic Control plan (if applicable)
 - Any applicable permits, such as road closure permits
 - Any applicable FAA notifications
- 4) SUBCONTRACTOR is responsible for providing temporary safety fall protection systems relevant to their scope of work.
 - Fall protection or prevention is required if work is done 15' or less from an edge per OSHA 1926.501(b)(1) and 1926.501(b)(10). A plan must be in place to protect workers from falls 6' or greater when installing guardrail systems.
 - SUBCONTRACTOR shall abide by the McKinstry Leading-Edge safety protocol at all times, which prohibits activity within 15 feet of a leading edge unless proper fall protection and/or railings are in use.
- 5) SUBCONTRACTOR is responsible for providing all barricades, secured containers, safety signage and other forms of protection as required to protect personnel and general public from injury during construction.
- 6) SUBCONTRACTOR is responsible for dust partitions in all occupied buildings, as appropriate.
- 7) McKinstry follows the most up to date NFPA 70E guidelines, particularly in relation to the Control of Hazardous Energy. If applicable to SUBCONTRACTORS work, SUBCONTRACTOR shall have the most up-to-date NFPA 70E training and adhere to all NFPA 70E requirements while performing work. Depending on the nature of the work, Methods of Procedure may be required for approval.



Construction Standard Scope Requirements

- 8) In the event existing ladders and/or roof access does not meet current OSHA requirements, SUBCONTRACTOR shall provide ladders. Roof access plans shall be included in the Site-Specific Safety Plan (SSSP) provided and approved by McKinstry before mobilization.
- 9) A silica control plan must be submitted for all work with silica per OSHA 1926.1153 Table 1.

MCKINSTRY CONTROLS CONTRACTOR PERFORMANCE STANDARDS

Revised February 2025

Relative to commissioning and project closeout, this document serves to clarify McKinstry’s performance expectations of the following points:

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The following defines and describes the minimum acceptable performance Controls Contractors are required to adhere to on all McKinstry projects. If an Owner does not have a point naming convention, the McKinstry Point Naming Convention shall be used. Please ask your McKinstry representative for the most up to date version of the Point Naming Convention.

1. Communication

- a) McKinstry requires Controls Contractors to adhere to communication in accordance with the provisions of the Prime and Subcontract Agreements around questions, comments, clarifications, or concerns, during pre-construction, construction, closeout, commissioning and warranty. This includes but is not limited to:
 - i) Promptly returning phone calls and e-mails within 24 hours.
 - ii) Timely response to or delivery of RFIs, punch lists, and observation logs within one (1) week.
 - iii) Attend and participate in all coordination / start-up meetings.
 - iv) In buildings with existing controls systems, if the Controls Contractor finds an existing condition/deficiency, the Controls Contractor shall notify McKinstry immediately, no later than 24 hours after the discovery.
 - v) Response to commissioning deficiencies shall occur in the project specific software, such as Cx Alloy.
 - vi) Acknowledgment of communications shall be made by the Controls Contractor within one business day of initial notification and shall include a resolution and planned date of resolution.

- b) Email is the preferred means of recordable communication. Unless otherwise directed, emails will carbon copy the appointed McKinstry Project Engineer, Project/Construction manager, and McKinstry's commissioning lead(s).
- c) Dissemination of project specific information to other trades without McKinstry's consent shall not be allowed without the written consent of McKinstry's Project/Construction Manager.
- d) Any changes, decisions, etc. must be properly documented in accordance with the Prime and Subcontract Agreements. Verbal interpretations, clarifications, conversations, etc., are non-binding without proper documentation.
- e) RFIs are to address individual requests only with a proposed solution. Multiple issues or incomplete RFIs will be rejected. Report any discrepancies, conflicts, inadequate conditions, or omissions related to project documentation to the McKinstry project team through an RFI. RFIs shall be written and submitted in the project specific software, such as Procore. RFIs shall include, but not be limited to, the following:
 - i) Referenced Drawing
 - ii) Referenced Specification Number/Section
 - iii) Contact Person
 - iv) Request and Proposed Solution
 - v) RFI answers are for clarification only and do not authorize additional work or change orders.

2. Personnel and Support

- a) The Controls Contractor is responsible for providing adequate, qualified personnel for the purpose of providing a complete control installation within the constraints of the project schedule. Controls Contractor shall submit in writing their proposed project team and qualifications adhering to i) through vi) below to McKinstry for approval three (3) weeks prior to mobilizing on the job site.
 - i) The Controls Contractor shall have a minimum of five (5) years of demonstrated technical expertise with building automation system operation, maintenance, and service. The Controls Contractor must also provide documented proof of servicing installations of similar or greater size and complexity as well as provide documented proof of servicing the proposed devices for a minimum of one (1) year.
 - ii) The Controls Contractor Program Manager shall have a minimum of three (3) years of experience with DDC system installation and must have experience with the installation of the proposed devices on a minimum of two (2) projects of similar or greater size and complexity.
 - iii) The Controls Contractor Programmer(s) and Lead Installation Technician shall have a minimum of three (3) years of experience with DDC system installation and programming and must have experience with the installation and programming of the proposed devices for a minimum of two (2) years.
 - iv) The Controls Contractor Project Manager and Programmer(s) must supply proof of successfully completing the most advanced training offered by the manufacturer of the proposed devices to proficiently install, program, and commission the proposed devices.
 - v) The Controls Contractor Lead Installation Technician must supply proof of successfully completing training offered by the manufacturer of the proposed devices to proficiently install the proposed devices.
 - vi) Integration Contractor Personnel Requirements:
 - (1) The Integration Contractor shall have a minimum of five (5) years of demonstrated technical expertise with building automation system integration. The Integration Contractor must also provide documented proof of servicing installations of similar or greater size and complexity as well as provide documented proof of servicing the proposed devices for a minimum of one (1) year.
 - (2) The Integration Contractor Program Manager shall have a minimum of three (3) years of experience with BMS integration and must have experience on a minimum of two (2) projects

- utilizing the proposed devices for projects of similar or greater size and complexity.
- (3) The Integration Contractor Programmer(s) shall have a minimum of three (3) years of experience with BMS integration, programming, and graphical user interface generation and must have a minimum of two (2) years' experience providing integration services for the proposed devices.
 - (4) The Integration Contractor Project Manager and Programmer(s) must supply proof of successfully completing the most advanced training offered by the manufacturer of the proposed devices to proficiently integrate, program, and generate graphics for the proposed devices.
- b) The Controls Contractor is expected to perform all work outlined in the scope of work as well as Pre-functional Testing and Functional Performance Testing. More details on the testing process are outlined in Section 8 – Functional Testing
 - c) Support is defined as providing personnel meeting McKinstry's qualification requirements above in 2.a.i) through 2.a.vi) for the task at hand. For example, during functional performance testing, the support person provided by the Controls Contractor shall be a programming-capable engineer, familiar with the system being tested and shall be present alongside the test crew to make necessary changes needed to correct deficiencies found during the testing process.
 - d) In addition to the specific work to be performed by the Controls Contractor, the Controls Contractor shall anticipate supporting all peripheral functions, including but not limited to:
 - i) Equipment start-up
 - ii) Testing, adjusting and balancing (TAB) activities
 - iii) Owner training
 - iv) Warranty, hot/cold call support, etc.
 - e) McKinstry reserves the right to have the Controls Contractor remove and replace incompetent or ineffective personnel. The Owner reserves the right to make the final determination of the qualifications of any Contractor's employee(s), as well as the right to have the Contractor's employee(s) removed from the project at Owner's sole discretion. The Owner and/or McKinstry will provide written notice to Contractor citing the circumstances for Contractor's employee(s) and the Contractor will replace any removed employee with qualified staff meeting McKinstry's requirements above within three (3) business days with no impact to project schedule.
 - f) Controls Contractor will supply McKinstry with any proprietary software, cables, dongles/security keys, etc. at no cost to McKinstry for the duration of the commissioning effort.
 - g) If the Controls Contractor is unable to provide software, cables, etc. that can be loaded onto McKinstry-owned hardware, the Controls Contractor will either loan McKinstry pre-configured computers/interface tools or supply Controls Contractor support with the appropriate devices for the duration of the commissioning effort at no additional expense to McKinstry.
 - h) If the Controls Contractor is unable to supply experienced support personnel, Controls Contractor shall be responsible for schedule cost impacts subject to reimbursement, in accordance with the Prime and Subcontract Agreements.

3. Electrical Subcontractor

- a) The Controls Contractor is completely responsible for all sub-tier trades required to complete the Controls Work, including Controls Contractor's electrical subcontractor, and will be held accountable for any issues relating to:
 - i) Scope
 - ii) Schedule
 - iii) Material delivery or storage
 - iv) Coordination with various trades

- v) Workmanship
- vi) Staffing
- vii) Back charges
- viii) Site Specific Safety

4. Quality Assurance

- a) Coordinate all related network infrastructure changes with McKinstry. Any changes to network components or infrastructure without prior authorization from McKinstry/the Owner is not permitted.
- b) Materials and equipment will be the catalogued products of manufacturers who regularly engage in production and installation of building automation systems. Materials and equipment will be the manufacturer's latest design that complies with the specification requirements.
- c) All hardware, software, components, and accessories must be:
 - i) New from the factory
 - ii) In production and not a legacy product
 - iii) Supported by the manufacturer
 - iv) Free of defects
 - v) Provided by the same manufacturer for each product type throughout the duration of the project

5. Submittals

- a) Submittals must be reviewed by McKinstry, the Owner, the Design Professionals, and/or an Owner's Representative for conformity with the design intent. Execution of work will not be performed until the related submittals have been reviewed for conformity with the design intent, and the Contractor has responded to all comments to the satisfaction of the Owner, the Design Professional and/or the Owner's Representative.
- b) Contractor is required to provide their submittals in a timely manner to allow for timely review, resubmittal as needed, and final review before proceeding with work, in accordance with the project schedule. Failure to submit in timely manner does not alleviate Contractor from meeting the project schedule unless they receive approval of schedule change by the Owner, in accordance with the Prime and Subcontract Agreements.
- c) The submittal schedule shall be as follows unless otherwise directed by McKinstry and/or the Owner:
 - i) The first submittal package shall consist of Hardware and Shop Drawings and shall be submitted with a schedule established by McKinstry in project related bid documents.
 - ii) The second submittal package shall consist of the Controls Contractor's proposed project team and their qualifications that conform to 2.a.i) through 2.a.vi) above.
 - iii) The third submittal package shall consist of Programming and Graphics and shall be submitted no less than 30 days before software installation and system integration.
 - iv) The fourth submittal shall consist of BAS Controls Pre-Functional Test (PFT) Procedures and Blanks Forms and shall be submitted no less than 30 days prior to performing Functional Testing for the McKinstry Commissioning Agent.
 - v) The fifth submittal package shall consist of training materials and shall be submitted no less than 14 days prior to conducting the first training class.
- d) Submission and Resubmission Procedure:
 - i) All documents shall be in a word searchable format.
 - ii) Submittals shall be submitted electronically through the project specific software, such as Procore.
 - iii) When making corrections:
 - (1) Revise the initial submittal to resolve review comments and corrections.
 - (2) Indicate any changes that have been made other than those requested.
 - (3) Clearly identify resubmittal by original submittal number and revision number.

- iv) Resubmit revised submittals until no exceptions are taken.
- v) Once submittals are accepted with no exceptions taken, provide the following:
 - (1) Complete submittal of all accepted drawings and products in a single electronic file.
 - (2) Electronic copies for coordination with other trades.
- e) Submittal Package for Hardware and Shop Drawings:
 - i) Hardware:
 - (1) Do not submit products that are not used even if included in specifications.
 - (2) Include a summary table of contents listing for each device submitted for this project. The table shall include:
 - (a) Location of device within the submittal package (page number or tab)
 - (b) Device tag noted within this specification or the drawing set.
 - (c) Whether the device is per specification or a substitution.
 - (d) Manufacturer
 - (e) Model
 - (f) Device Accuracy (if applicable)
 - (3) The submittal shall include:
 - (a) Manufacturer's description
 - (b) Manufacturer's performance and technical data
 - (c) Product specification sheets
 - (d) Installation instructions
 - (e) PICS statement, BIBB, and BTL listing documents for all BACnet devices
 - (4) Manufacturer datasheets that contain a series of components must clearly indicate the specific component that is applicable to this project.
 - (5) Each submitted piece of manufacturer literature will clearly reference the specification or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements.
 - ii) Shop Drawings
 - (1) General Shop Drawing Format:
 - (a) Sheets shall be consecutively numbered.
 - (b) Each sheet shall have a title indicating the type of information included and the mechanical/electrical system controlled.
 - (c) Table of Contents listing sheet titles and sheet numbers.
 - (d) Legend and list of abbreviations.
 - (e) All schematics, diagrams, and floorplans listed below.
 - (2) System architecture one-line diagram indicating schematic location of all field devices, workstations, gateways, switches, etc. The following information shall also be noted on the system architecture one-line diagram:
 - (a) Network ID for each individual network
 - (b) Device IDs for each device
 - (c) DHCP configuration for IP devices
 - (d) Previous device in daisy chain installation
 - (e) Hosted Network Information
 - (3) Schematic flow diagrams for each air, hydronic, and steam system that clearly indicate fans, coils, valves, dampers, pumps, heat exchanging equipment and control devices.
 - (4) Schematic flow diagrams will reflect schematics provided on the project drawings set with respect to layout and location of control points.
 - (5) All physical points on the schematic flow diagram shall be indicated with point naming matching the Owner's standard, descriptors, and point addresses identified as listed in the point summary table. Each physical point shall be labeled with their appropriate range.
 - (6) Device layout for each unique device requiring the following information:

- (a) Device layout with enclosure information, enclosure ID, device name, IP address, Device ID, and manufacturer make and model number.
 - (b) Connection to all peripheral equipment with point naming matching the Owner's standard, wiring layouts, and bill of material.
 - (c) Location of installation for each device and expansion module including panel numbers.
 - (d) Power wiring including power source location, electrical panel number, and breaker number.
 - (e) Communication wiring including the previous and next device if daisy chain configuration, and switch/port information if IP device.
 - (f) All electrical wiring diagrams shall be included. Provide both ladder logic type diagrams for motor starter, control, and safety circuits and detailed digital interface panel point termination diagrams with all wire numbers and terminal block numbers identified. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- (7) The bill of materials provided with each device layout shall include all materials and equipment, including:
- (a) Device tags as indicated in the schematic and actual field labeling. Tags shall be used as indicated in these specifications where applicable.
 - (b) Description.
 - (c) Proposed manufacturers make and model.
 - (d) Range.
 - (e) Quantity.
- (8) Valve sheet providing valve and actuator information, including:
- (a) Pipe and valve size
 - (b) Cv
 - (c) Design flow
 - (d) Target pressure drop
 - (e) Proposed manufacturers make and model
 - (f) Close off rating
 - (g) Normal position of fail-safe actuators
- (9) Floorplans noting proposed field device installation locations and thermostat locations.
- (10) Initial Sequence of Operations
- (a) The Controls Contractor Lead Programmer(s) shall review the Sequence of Operations for constructability prior to providing the submittal to McKinstry.
 - (b) Control sequences cannot be a direct duplication of design sequence and should include any proposed changes, additional details and clarifications from the subcontractor.
- f) Submittal Package for Controls Contractor Project Team and Qualifications
- i) Please see Personnel and Support Section 2.a.i) through 2.a.vi) for more details.
- g) Submittal Package for Programming and Graphics
- i) A detailed description of point naming convention conforming to the Owner's standard to be used for all software and hardware points, integrated with existing database convention.
 - ii) A list of all hardware and software points identifying their full text names, device addresses and descriptions.
 - iii) Control logic program listings consistent with the submitted Sequences of Operation for all proposed equipment for this project. Control logic shall be annotated to describe how it accomplishes their respective Sequences of Operation and shall be sufficient to allow an operator to relate each program component to their corresponding portions of their respective Sequences of Operation.
 - iv) Include an updated written Sequences of Operation that are updated to reflect any suggested changes

made by the Contractor to clarify or improve the sequences and provide additional details or clarifications to reflect the actual programmed sequences. New Sequences of Operation shall be fully consistent with the graphical programming.

- (1) Include control settings, setpoints, throttling ranges, reset schedules, adjustable parameters and limits.
 - (2) Submit one complete set of programming and operating manuals for all digital controllers concurrently with control logic documentation.
- v) Graphics screens for all required graphics.
- vi) List of points that will be trended.
- h) Submittal Package for BAS Controls Pre-Functional Test (PFT) Procedures and Blanks Forms
- i) The BAS PFTs shall include the following installation and pre-functional checks, and point-to-point tests, as described below (i.e., the procedures shall include more than just point-to-point tests).
 - (1) Installation verification of the control input and output points (sensors, actuators, relays, etc.) to verify all points have been installed per the design and the physical installation of each point has been verified.
 - (2) Checks of the BAS program setup/configuration parameters (i.e., point type, and range / scale) to verify the BAS parameters match the physical sensor/device parameters.
 - (a) The contractor forms shall include columns for the checking and documenting the BAS program point type and range/scale parameters (and any other applicable parameters), and columns for checking and documenting the actual sensor/device point type and range/scale (and any other applicable parameters). Both sets of columns are required to document the BAS parameters and the actual sensor/device parameters match.
 - (i) For example, for a differential pressure analog input point, checking and documenting the BAS point type configuration is AI, DPT, 0 to 5 in w.c., 4 to 20 mA, etc., and checking and documenting the actual sensor/device type and range/scale is a DPT, 0 to 5 in w.c., 4 to 20 mA, etc. For this example, the checks confirm the DPT input range in the BAS is indeed 0 to 5 in. (same as the actual DPT) and not 0 to 10 in.
 - (ii) For example, for a valve actuator analog output point, checking and documenting the BAS point type configuration is AO, proportional 0 to 100% open, 0 to 10 VDC, and documenting the actual valve type and range/scale is a modulating valve actuator, proportional 0 to 10 VDC, etc. For this example, the checks confirm the valve actuator output range in the BAS is indeed 0 to 10 VDC (same as the actual valve actuator) and not 2 to 10 VDC.
 - (3) Point-to-point tests to verify the BAS input values/reading and output commands at the system graphics matches the actual sensor/device physical reading, operation, or position, and/or to verify the accuracy of any input readings (temperatures, flow rates, etc.).
 - (a) The BAS Contractor shall provide written procedures as to how they are going test each point type (AO, AI, BO, BI). See below 3.c. through 3.e. for the minimum requirements to be included in the procedures for testing analog inputs and outputs. Any additional requirements per the design specifications shall also be included in the submitted procedures.
 - (b) The forms shall include columns for the documenting the BAS input readings or output commands (at the BAS graphics), and documenting the actual physical reading, operation, or position, to verify they match or are within acceptable tolerances.
 - (c) For analog input (AI) sensors/transmitters that are factory calibrated (no field calibration is required per the Specifications), all sensor readings on the BAS graphics shall be recorded on the forms and shall be verified as follows:

- (i) If the sensor/transmitter has a local readout, then also record and verify the actual sensor/transmitter reading matches the BAS reading.
- (ii) If the sensor/transmitter does not have a local readout, then verify the BAS reading is within the expected range (based on the operating condition and/or compared to other sensors measuring the same condition) OR verify the BAS reading based on a comparison measurement using a hand-held sensor of equal accuracy (as required per the design specifications).
- (iii) Sensor readings that are questionable, outside the expected range shall be checked by the BAS Trade Contractor using a hand-held sensor of equal accuracy.
- (d) For analog input sensors that require field calibration, follow the manufacturer requirements for calibration and record the calibration results in the PFT forms, including any readings using a hand-held sensor or measurement device of equal accuracy.
- (e) For analog output (AO) points (e.g., actuators and VFD speeds), the points shall be physically checked to verify the commanded versus actual position or speed as follows:
 - (i) the commanded full (100%) open position / speed,
 - (ii) commanded half (50%) open position / speed and
 - (iii) commanded fully closed position (0% open) / 0% speed.
- (f) For all terminal units (including lab controls), also include the following:
 - (i) The point-to-point tests are to include disconnecting the sensor / thermostat or adjusting the local thermostat setpoint adjustment to verify it's connected to and controlling the correct terminal unit.
 - (ii) Commanding the supply airflow damper / valve to both fully closed and fully open and recording and verifying the airflow readings (i.e., no airflow when closed and near or greater than the design/max airflow when fully open).
 - (iii) Commanding the reheat coil valve to both fully closed and fully open and recording the unit discharge air temperature (DAT) reading and verifying the DAT readings for both commands (i.e., the DAT is the same as the AHU when the valve is closed, and the DAT is near the design DAT when fully open).
- (4) Checks to verify all the network integration points to the BAS via network interface communications (e.g., BACnet, Modbus, etc.), including both read only and writable points.
- (5) Checks to verify all the control sequence programming, graphics, trend logs and network communications, including verification that all point values and adjustable setpoints are properly displayed on the system graphics and the sequence of operations programming including alarms is completed per the current sequence of operation.
- i) Submittal for Training
 - i) See Owner Training section below for specific details on what to include in this submittal.

6. Project Schedule

- a) All work is to be performed in conjunction with the project schedule, with minimal occupant disruption. Unless otherwise noted, work shall be done during normal business hours. When working in occupied spaces, Subcontractor may enter spaces at a maximum three (3) times to complete their work (wire pulls, terminations, programming, point-to-point, final commissioning, etc.). Any additional access into occupied spaces must be submitted via written request and approved by McKinstry at least three (3) days in advance of access.
- b) Controls Contractor adherence to the performance standards outlined in this document will result in an efficient and timely final validation of the controls system. Any deviation from this performance standard must be communicated to McKinstry immediately for impacts on cost and schedule.

7. Installation

- a) Ease of access to installed sensors and actuators shall be considered for future maintenance.
- b) Exposed wire in occupied areas must be approved by the Owner and shall be in conduit or a raceway. Use of wire mold for exposed wire must be approved by the Owner. Otherwise, assume all wiring should be out of site in occupied areas, supported by structural members and at a minimum of every ten (10) ft.
- c) All programming shall be properly commented for future changes and review. At a minimum each block of code shall include a header comment saying what the block is controlling and a quick expected sequence of operation.
- d) The Contractor will always maintain red lined copies of as-built drawings on site.
- e) Following ASHRAE Guideline 36, the speed analog output (AO) sent to VFDs shall be configured such that 0% speed corresponds to 0 Hz, and 100% speed corresponds to maximum speed configured in the VFD. This will avoid operator confusion, as the speed command point (and speed feedback point, if used) for VFDs are configured so a speed of 0% corresponds to 0 Hz, and 100% corresponds to maximum speed set in the VFD, not necessarily 60 Hz. The maximum speed may be limited below 60 Hz to protect equipment, or it may be above 60 Hz for direct drive equipment. Drives are often configured such that a 0% speed signal corresponds to the minimum speed programmed into the VFD, but that causes the speed AO value and the actual speed to deviate from one another (and thus is not allowed).
- f) Labeling
 - i) Label each controller with the equipment served, device ID (if BACnet), and IP address if it's an IP controller.
 - ii) Label all input wires per the project specification requirements – if no project-specific labeling requirements have been defined, the following is the minimum labeling standard: All wires and cables shall be identified with type labels or wire tag at each end.
 - iii) Wire designators at controllers shall describe the device termination point and function. (i.e. – AC-1_SAT or EF-1_Status, AC-1_OSA Dmpr, etc.). The intent is that the wiring tags in the control panels clearly describe the device/service that each wire provides. Labeling shall match the As-Built drawings – update each to match each other at project completion.
 - iv) Label thermostats with the device(s) they control.
 - v) At project completion, update the construction drawings to 'as-built' conditions and after the drawing content/accuracy are approved, provide a laminated print or in a plastic sleeve (min. size: 11"x17") of each panel's terminations/systems attached to the inside cover or door of each enclosure
 - vi) Verify that cable labeling is complete at each end of each cable and properly identifies the termination/device at the opposite end – include the labeling information on the point-to-point documentation report.
 - vii) Labeling of the ceiling grid to identify VAVs, VVTs etc. shall be discussed and agreed upon by the Owner and McKinstry.

8. Functional Testing

- a) Completion of the BAS Controls Pre-Functional Tests (PFTs)
 - i) The BAS Trade Contractor shall complete the PFTs for all systems and equipment (no sampling allowed).
 - ii) The BAS Trade Contractor shall document the completion of the PFT tasks on the approved PFT forms submitted to McKinstry through project specific software, such as Cx Alloy.
 - iii) The McKinstry Cx Team will review the completed PFT forms.
 - iv) McKinstry will also conduct various field observations and reviews of the PFTs.
 - v) The BAS Trade Contractor shall resolve any PFT issues or results deemed unacceptable by McKinstry.
- b) BAS Controls PFT Field Back-Check Verifications and Programming & Graphics Review (prior to Cx FPTs)
 - i) The BAS Trade Contractor shall support commissioning by participating in the BAS PFT Field Back-check

Verifications, in which the BAS Trade Contractor reviews and demonstrates specified results to McKinstry, after completing and submitting the BAS PFT forms, and prior to the Cx FPTs.

- (1) The BAS PFT Field Back-check Verifications shall include field review of the control system sensor / device installations and live readings, and field demonstrations (back-check) of the PFTs performed by the Trade Contractors and witnessed by McKinstry, for an approximate sample, to be selected by McKinstry for each major system. Please ask McKinstry what the sampling percentage should be for this project.
 - (2) Any Cx issues reported by McKinstry shall be reviewed and addressed by the BAS and Mechanical Trade Contractors, and if required, the PFT forms shall be revised and resubmitted, prior to performing any FPTs.
- ii) Prior to conducting the FPTs, the BAS Trade Contractor shall meet with McKinstry to review the programmed sequences of operation and sample system graphics with McKinstry.
- (1) The lead programmer from the BAS Trade Contractor shall be in attendance.
 - (2) The intent of this requirement is to reduce field testing time by reviewing with McKinstry the actual programmed sequence logic and graphics relative to the approved submittal, sequences and FPT forms, to confirm the actual programming and graphics prior to field testing, and to allow for any changes and adjustments.
- c) Cx Functional Performance Tests (FPTs)
- i) The BAS Trade Contractor shall execute the FPTs, with the FPTs witnessed by McKinstry, unless otherwise stated by McKinstry.
 - ii) The BAS Trade Contractor is responsible for ensuring all systems are installed, operating and performing per the requirements of the contract and design documents, and are ready for the FPTs.
 - (1) Prior to conducting the FPTs, the BAS Trade Contractor shall place the systems and controls into the operating modes intended for testing. Check all control system safety cutouts, alarms, and interlocks with smoke control and fire-life safety during each mode of operation prior to functional testing. Ensure all systems are operating and performing per the requirements of the contract, design and submittal documents, and have been pre-tested per the FPTs, and are ready for the McKinstry witnessed FPTs.
 - (2) The BAS Trade Contractor shall provide any necessary control system global or system level commands and setpoint adjustments necessary to conduct the testing as called out in the FPT procedures.
 - (3) The FPTs shall be conducted onsite by the BAS Trade Contractor's lead programmer for the project who programmed the sequences of operation and configured the graphics. Conducting the FPTs offsite (remotely) shall only be approved by McKinstry.
 - iii) A percent sampling approach may be used for executing the FPTs of identical systems and equipment. The approximate system sampling rates for the manual (direct observation) FPTs will be defined in the Cx Plan.
 - iv) The acceptance criteria for the FPT sampling shall be zero, meaning, any FPTs that do not pass shall require the Trade Contractor to resolve the issue for all applicable systems and equipment (even those specifically not in the original sample) and new sample rates selected for a re-test executed by the Trade Contractor and witnessed by McKinstry Cx. McKinstry Cx shall deem the FPTs acceptable after all FPTs, including re-tests, have passed and resolution of all issues completed.
 - v) McKinstry will document the results of all FPTs on the associated FPT forms created by McKinstry, unless indicated otherwise on the FPTs.
 - vi) If McKinstry finds that a significant percentage of equipment is indicated as ready for commissioning yet doesn't pass the FPTs, McKinstry reserves the right to back charge Controls Contractor for additional labor and travel to complete commissioning.

9. System Usability (GUI)

- a) The intent of a graphical user interface is to provide an easy-to-use window into the system components. As such, the user-interface should have the ability to manipulate the final control devices and all adjustable setpoints directly from the graphics.
 - i) For example, if there is a chilled water valve being controlled by the BMS system, the operator shall be able to click on the valve, or obvious control link to allow the position to be manually set, locked in place, or released back to automatic control, as required.
- b) When a point has been overridden from automatic mode, this state shall be readily displayed or indicated on the system graphic schematic screen without having to drill deep into the controller hardware level of access screens. All overrides shall have a pop-up screen that requires the user to select various times for the override (1 hour, 2 hours, etc.) and has an option for a permanent override.
- c) Access Control: When possible, and with the Owner's consent, provide a minimum of three (3) access levels:
 - i) Read Only – Ability to review the system operation only. No ability to make system modifications.
 - ii) Operator – Ability to manipulate the system (setpoints, trends, schedules, etc.) for the purposes of day-to-day system operations.
 - iii) Full Control – Ability to modify any component or element within the system
- d) Alarm Graphics Interlocking.
 - i) Specific high/low setpoints and requirements should be provided in the project points list and coordinated with McKinstry and facility Owner prior to control system startup.
 - ii) Verify requirements for alarm definitions, routing, priorities, etc. before the initiation of PFTs. Submit required information early enough in the process so that the lack of information does not impact the commissioning and/or checkout process.
 - iii) Verify all alarm signals from device initiation through all required notification components. (Workstation, text message, e-mail, local annunciation, etc.)
- e) System Scheduling:
 - i) System schedules shall be set up by the control contractor as outlined below.
 - ii) Schedule requirements must meet the design intent/Owner requirements. If not clearly defined in the design intent/Owner requirements, for each start/stop point or terminal unit, provide, at a minimum, a scheduler with eight-day types (M, Tu, W, Th, F, Sa, Su, H), a minimum of four start/stop schedules each day type, 30 holidays each year and ten (10) multiple-day special event schedules each year.
 - iii) Scheduling may be required to be different for different parts of the building and the Controls Contractor shall accommodate these varying schedules.
- f) Graphics:
 - i) One graphic shall be created for unique equipment. If something needs to be changed, it should be changed once and retroactively applied to all like equipment.
 - ii) As part of each graphic screen page, provide a menu for switching to associated system screen pages to minimize the amount of menu switching required. (Typically, via key buttons or 'Forward/Back' buttons)
 - iii) Provide one graphic screen for each air handling system and associated exhaust fans, zone pumps, etc. in schematic format. (Custom-built for each project)
 - iv) Provide at least one graphic screen for each heating or cooling water system in schematic format, more if the systems are complicated. (Custom-built for each project)
 - v) Provide one graphic screen for each floor plan (scaled to fit the screen), displaying all zone space temperatures with same display access to each zone controller graphic, and a unique background color for each air handling system (area served) to facilitate easy understanding of the zoning. If a floorplan cannot fit on a single page, it shall be broken into reasonable sections that are approved by McKinstry and the Owner. All units shall have the equipment name and zone served displayed.
 - vi) Provide dynamic display graphics, to indicate status feedback (i.e., fans spin, and dampers actuate for all control output devices, VAV boxes and hydronic heat pump zones.) If the dynamic graphic is used to indicate command, it should be clearly labeled on the graphic that it is a command value not actual

status.

- vii) All graphics will be properly labeled including units and spelling. Unused and unnecessary points will be removed from the graphics.
 - viii) Include a terminal unit report/summary page of damper position, space temperature, heat command, discharge air temperature, fan status, primary air temperature, space set point, etc. The summary page shall be in sections by system.
 - ix) A direct link to the as-builts with as-built Sequence of Operations shall be included on the main graphics page.
 - x) For retrofit projects, in the navigation tree, all obsolete points shall be deleted.
- g) Setpoints and Variables
- i) All sequence setpoints and variables used in the sequence of operation shall be adjustable to the appropriate user from the GUI. Key variables, such as important time delays or offsets shall not be adjustable only in underlying code. All sensor points, set points, and reset logic points shall be displayed.

10. Data Trending

- a) Unless otherwise specifically indicated on controls points lists in the scope of work document, all controls points necessary for execution of approved sequences of operation shall have trending established.
 - i) Analog (AI, AO and software AV points) control points shall be set up to be trended at least as frequently as every five (5) minutes.
 - ii) Binary (both BI and BO) control points shall be set up to be trended as a change of value.
 - iii) Programming Submittal shall include points to be trended for review and approval by McKinstry and Owner.
- b) Automation system historians shall be enabled. Building automation systems shall have the capability of trending and storing all points necessary for execution of the approved sequence of operation for a minimum of one year at the required frequency.
- c) A trend log that shows all trended points for a piece of equipment overlaid on one page shall be available for each piece of equipment.
- d) Controls Contractor shall also include all hardware, software, labor and programming necessary to push trended data from the building automation system to McKinstry's servers at the frequency specified on a project-by-project basis. If no data push frequency is established elsewhere in these scope of work documents, the frequency shall be daily.
- e) Trend Reports: Establish trend reports of system points as requested by McKinstry. Trend reports shall be transmitted as .csv or Excel files.

11. Punch list / Deficiency Resolution

- a) If deficiencies are discovered and deemed the responsibility of the Controls Contractor, McKinstry will notify the Controls Contractor through project specific software, such as Cx Alloy. Within one business day of deficiency notification, the Controls Contractor must resolve or provide the earliest possible time and date the deficiency can and will be resolved. The Controls Contractor shall update and closeout the deficiency within the project specific software, such as Cx Alloy.
- b) Control deficiencies discovered during McKinstry's commissioning process that results in the need for McKinstry to retest, are subject to cost impacts.

12. Owner Training

- a) The Controls Contractor is responsible to provide Owner training on their installed system. A training agenda shall be provided by the Controls Contractor and shall be approved by McKinstry and the Owner prior to training. Owner facility staff attending training sessions "sign off" on attendance sheets and "sign off" on thoroughness of training sessions. Controls Contractor shall supply electronic copies of Training Session attendance sheets and signed Owner Acceptance of Training sheets to McKinstry.
- b) The training must be performed by qualified individuals familiar with the specifics of the project for a sufficient duration, a minimum of eight (8) hours that may need to be delivered over multiple sessions, to ensure that facility staff has all the information needed to optimally operate, maintain and replace the commissioned features and systems.
- c) Training will not be scheduled until all integrated systems and GUI components are completed, functional, and all commissioning has been completed.
- d) If device integration coincides with other subsystem installation, Owner training for subsystems may be completed in parallel with training mentioned within this specification.
- e) Provide a factory-trained instructor or representative to give full instructions to designated personnel in the operation, maintenance, and programming of each piece of equipment or system. Instructors shall be thoroughly familiar with all aspects of the subject matter. The Contractor will provide all equipment and material required for classroom training.
- f) Proposed training instructor qualifications will be provided to the Owner and subject to approval by the Owner.
- g) Training will include classroom instruction and hands-on field instruction.
- h) All training is subject to be recorded by the Owner for internal use.
- i) Minimum requirements for classroom instruction are the following:
 - i) Review of project record documentation
 - ii) Maintenance procedures and schedules
 - iii) Any pertinent safety requirements
 - iv) Operator control functions
 - v) GUI navigation, including:
 - (1) Login/logout procedures, password setup, and audit log reporting
 - (2) Menu navigation and broad overview of the various functions and features
 - vi) Explanation of controller backup procedures
 - vii) Explanation of procedures to restore any database. Scenarios to explain include:
 - (1) Corrupted database restoration
 - (2) Restoration of database in a new controller
 - viii) Sequence of Operations review
 - ix) A detailed review of programming, trending, and alarm database management.
 - x) Training manuals will be provided and include screen captures with detailed instructional annotation for each step required to complete all portions of the training.
 - xi) Additional topics can be requested by the Owner in advance of the training sessions. Each additional topic will require the Contractor to prepare and submit training manuals with the same level of detail as described above.
- j) Minimum requirements for field instruction:
 - i) Walkthrough of the project to locate integrated components
 - ii) Demonstration of operation from Supervisor to integrated equipment

13. Completion Deliverables

- a) For project closeout, the Controls Contractor will be required to provide the following documentation electronically as well as in paper format if requested:
 - i) Product data, shop drawings, control logic documentation, sequence of operation, hardware manuals, software manuals, installation guides or manuals, maintenance instructions and spare parts lists.

- ii) As-built versions of the submittal data.
- iii) Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point
- b) At project completion, ensure that any computer hardware or software necessary for accessing/operating the control system, is permanently installed and functional at the Owner's user interface, and has the appropriate licensing to allow for full functionality of the system at project turnover. The licensing start date shall be the date of substantial completion, which is determined by the Owner. This shall be at no additional cost to the project. All hardware, software, and license(s) will become the property of the system Owner.
- c) At substantial completion, ensure that the version of any installed software is the most-current available from the control manufacturer for the system installed at the project. This shall be at no additional cost to the project.

14. Ownership of Proprietary Material

- a) Project specific software and all related documentation will become the property of the Owner. This includes, but is not limited to, the following:
 - i) Graphical Templates
 - ii) Project Record Drawings
 - iii) Station Databases
 - iv) Custom Logic

15. Warranty

- a) Warranty documentation will be submitted for acceptance to McKinstry within 14 days after signed substantial completion from the Owner.
- b) Vendor specific warranty information will be provided as part of the Contractor warranty documentation. Any manufacturer's warranty that exceeds the established project warranty will be extended to the Owner and documented in a Warranty Spreadsheet. McKinstry will provide the Warranty Spreadsheet template upon project substantial completion.
- c) The warranty start date will be the date of substantial completion, determined by the Owner. Please refer to the Standard Scope Requirements for the warranty duration.
- d) Device failures during the warranty period will be adjusted, repaired, or replaced with no additional cost to the Owner or McKinstry.
- e) Any standard troubleshooting or routine maintenance completed by the Owner will not void any warranty or incur any additional costs.
- f) Contractor will respond during normal business hours within 24 hours of a warranty service request.
- g) All corrective software modifications made during the warranty period will be updated on all project documentation and updated software files will be provided to the Owner for record purposes.
- h) Software fixes and firmware updates will be covered throughout the warranty duration with no additional cost to the Owner or McKinstry. With approval of the Owner and assurance that no existing equipment connections will be adversely affected, patches and updates will be applied within 72 hours of becoming available from the manufacturer.
- i) Expiration of the warranty period does not relieve the Contractor of the responsibility to:
 - j) Correct all deficiencies identified during the warranty period
 - k) Fulfill all specified obligations during the warranty period
 - l) The Contractor will not be required to warranty reused devices, except those that have been rebuilt or repaired. Reused devices must demonstrate they are in operable condition at the time of substantial completion.
- m) Parts, labor, and travel will be included during the warranty duration.

Special Terms and Conditions Controls

Subcontractor is a control provider. Relative to commissioning and project closeout, this document serves to clarify control provider's performance obligations under this Subcontract on various points including: Scope and Sequence Clarifications; Schedule; Communication; Manpower and Support; System Start-Up; Point to Point / Basic Function Testing; Sequence of Operation Verification; Device Calibration; Test Instrumentation; Electrical lower tier subcontractors; Punch lists / Deficiency Resolution; Training; O&M Manuals; and Deliverables. The following defines and describes some of the performance levels performance control providers are required to comply with, but the following is not all inclusive. Unless otherwise specified elsewhere in this Subcontract:

1. Scope and Sequence Clarifications

- a) All control provider questions, comments, clarifications or concerns during the closeout and commissioning process must be communicated without hesitation. Email is the preferred means of recordable communication. Unless otherwise directed, emails will carbon copy the appointed McKinstry project/construction manager, McKinstry mechanical or electrical designer and McKinstry's commissioning lead(s).
- b) Dissemination of project specific information to other trades without McKinstry's consent should be avoided.

2. Schedule

- a) All work is to be performed in conjunction with applicable construction schedules. Completion of controls must also be accomplished with sufficient time remaining for McKinstry commissioning to complete the verification process before the end date of the project.
- b) Control provider adherence to the performance standards outlined in this document, will result in an efficient and timely final validation of the controls system. Any deviation from this performance standard must be communicated to McKinstry immediately for impacts on cost and schedule.

3. Communication

- a) McKinstry requires control providers to adhere to an appropriate level of communication as determined by the specific project. This includes but is not limited to:
 - i) Promptly returning phone calls and e-mails.
 - ii) Timely response to or delivery of RFI's, punch lists, and observation logs.
 - iii) Attend and participate in any required coordination / start-up meetings.
 - iv) Acknowledgment of aforementioned communications shall be made by the control provider within one business day of initial notification and shall include a resolution or planned date of resolution.

4. Manpower and Support

- a) The control provider is responsible for providing adequate, qualified manpower for the purpose of providing a complete control installation within the constraints of the project schedule.
- b) Support is defined as providing experienced personnel for the task at hand. For example, during functional performance testing, the support person provided by the control provider shall be a programming-capable engineer, familiar with the system being tested and shall be present alongside the test crew to make necessary changes needed to correct deficiencies found during the testing process.
- c) At a minimum the control provider shall anticipate supporting all peripheral functions including but not limited to:
 - i) Equipment start-up,
 - ii) Testing, adjusting and balancing' (TAB) activities,
 - iii) McKinstry point to point, functional performance , and integrated system testing
 - iv) Customer training, etc.
- d) McKinstry reserves the right to have the control provider remove and replace incompetent or ineffective personnel.

- e) Control provider will supply McKinstry with any proprietary software, cables, dongles/security keys, at no cost to McKinstry for the duration of the commissioning effort needed to commissioning and validate the system.
- f) If the control provider is unable to provide software, cables, etc. that can be loaded onto McKinstry-owned hardware, the control provider will either loan McKinstry pre-configured computers/interface tools or supply control provider manpower with the appropriate devices for the duration of the commissioning effort at no additional expense to McKinstry.
- g) If the control provider is unable to supply experienced support personnel McKinstry will evaluate the schedule cost impacts subject to reimbursement from the control provider.

5. System Start Up

- a) Clearly document start-up and checkout results according to manufacturer's written instructions and the contract documents.
- b) Control provider submits compiled electronic copies of start-up and checkout results and certifies that start up and checkout procedures have been completed according to the contract documents and product manufacturer's instructions. This electronic document package is to be submitted to the Commissioning Lead(s).

6. Point-to-Point / Basic Function Testing

- a) A documented, comprehensive point to point and basic function testing in the field is required on all installations. Factory calibration and bench tests are not acceptable alternates to on site field-testing.
- b) Point-to-point (or calibration verification) scope of work consists of testing from all end field devices (any device that provides an input signal to, or receives an output signal from the control hardware) through proper input/output to the graphic and operator interface. Testing must be complete, detailed and documented on approved point to point verification forms. Point-to-point should be performed with a separate device from the installation sensor – “ringing out a sensor” alone is not an acceptable level point-to-point testing. Point-to-point testing forms will include all point database requirements (i.e. alarm priority, paging, email, device range, etc.).
- c) Submittal of the control provider's forms for approval must take place 3 weeks prior to commencement of field testing. The point-to-point report summary documentation must include the signature of the test technicians and date completed. The technician's signature certifies that the system has been tested and is fully ready for the commissioning lead's performance verification testing.
- d) Point-to-point testing and documentation for McKinstry projects will include, but not be limited to, the following criteria:
 - i) Field device and functionality.
 - (1) Verify all field devices installed are properly sized or ranged for anticipated operating range. Devices are adjusted for correct position, orientation and full range.
 - (2) All zone devices that are installed on perimeter walls, or on any spaces that are at risk of being influenced by conditions other than the space being measured, shall be installed with a proper thermal insulation (typically fiberglass batt insulation) to allow the sensor to properly read the space conditions. If spray foam insulation is used, care must be taken to protect the wiring to allow for replacement, if necessary. Any sensors found to be influenced during commissioning will be corrected or relocated, as necessary at no cost to McKinstry or others.
 - ii) Conductor integrity.
 - (1) Test all wiring continuity from field devices to correct input/output terminals.
 - iii) Conductor termination.
 - (1) Verify all device wire terminations are per the submittal package
 - (2) Verify all input/output wire terminations are correct
 - (3) Verify field devices communicate to the operator interface (final user graphics pages as well as any 'hardware device' pages)
 - (4) Label all input wires per the project specification requirements – if no project-specific labeling requirements have been defined, the following is the minimum labeling standard:
 - (a) All wires and cables shall be identified with permanent markers or wire tag at each end.

- (b) Wire designators at controllers shall describe the device termination point and function. (i.e. – AC-1_SAT or EF-1_Status, AC-1_OSA Dmpr, etc.). The intent is that the wiring tags in the control panels clearly describe the device/service that each wire provides. Labeling shall be identical to the labeling shown on the As-Built drawings – update each to match each other at project completion.
 - (c) Wire designators at devices shall describe the control panel, controller number and terminal numbers that the device is wired to.
 - (d) Label all input and output field devices as they are labeled or defined on the control diagram installation drawings.
 - (e) At project completion, update the construction drawings to ‘as-built’ conditions and after the drawing content/accuracy are approved, provide a laminated print (min. size: 11”x17”) of each panel’s terminations/systems attached to the inside cover or door of each controller.
- (5) Verify that cable labeling is complete at each end of each cable and properly identifies the termination/device at the opposite end – include the labeling information on the point-to-point documentation report.
- iv) Command to output.
- (1) Test linear-scaling calibration of every analog output point. For points that have custom scaling, verify that the value on the graphics page (0-100%, etc.) match the scaling input of the field device (for example, some valves reach 100% design flow GPM at a lower analog input signal). Detail these values on the point-to-point checkout documentation.
- v) Alarm Graphics Interlocking.
- (1) Specific high/low setpoints and requirements should be provided in the project points list and coordinated with McKinstry and facility owner prior to control system startup.
 - (2) Verify requirements for alarm definitions, routing, priorities, etc. before the initiation of system checkout. Submit required information early enough in the process so that the lack of information does not impact the commissioning and/or checkout process.
 - (3) Verify all alarm signals from device initiation through all required notification components. (Work station, pager, e-mail, local annunciation, etc.)
- vi) Device Calibration.
- (1) Document device calibration per the table listed under device calibration. Document both the field reading/condition and the value represented on the graphical interface.
- e) System Usability (GUI)
- i) The intent of a graphical user interface is to provide an easy-to-use window into the system components. As such, the user-interface should have the ability to manipulate the final control devices and all adjustable setpoints directly from the graphics.
 - (1) For example, if there is a chilled water valve being controlled by the BMS system, the operator shall be able to click on the valve, value or obvious control link to allow the position to be manually set, locked in place, or released back to automatic control, as required.
 - ii) When a point has been overridden from automatic mode, this state shall be readily displayed or indicated on the system graphic schematic screen without having to drill deep into the controller hardware level of access screens.
 - iii) Access Control: When possible and with the Customer’s consent, provide programmed minimum (3) access levels:
 - (1) Read Only – Ability to review the system operation only. No ability to make system modifications.
 - (2) Operator – Ability to manipulate the system (setpoints, trends, schedules, etc.) for the purposes of day to day system operations.
 - (3) Full Control – Ability to modify any component or element within the system.
 - iv) Trend Reports: Establish trend reports system points as requested by McKinstry. Trend reports shall be transmitted as

*. *.csv or Excel files.

v) Scheduling:

- (1) For each start/stop point, provide, at a minimum, a scheduler with eight day types (M, Tu, W, Th, F, Sa, Su, H), a minimum of four start/stop schedules each day type, 30 holidays each year and 10 multiple-day special event schedules each year.
- (2) System schedules shall be set up by the control provider as directed by McKinstry for a minimum of 36 months from project completion. Schedule reports or screen shots shall be provided as a part of the control provider's closeout package.

vi) Colorgraphics:

- (1) All colorgraphic templates shall be submitted for review by the owner, engineer, and McKinstry commissioning lead 3 weeks prior to system start up.
- (2) As part of each colorgraphic screen page, provide a menu for switching to associated system screen pages to minimize the amount of menu switching required. (Typically via key buttons or 'Forward/Back' buttons)
- (3) Provide one colorgraphic screen for each air handling system and associated exhaust fans, zone pumps, etc. in schematic format. (Custom-built for each project)
- (4) Provide at least one colorgraphic screen for each heating or cooling water system in schematic format, more if the systems are complicated. (Custom-built for each project)
- (5) Provide one colorgraphic screen for each floor plan (scaled to fit the screen), displaying all zone space temperatures with same display access to each zone controller graphic, and a unique background color for each air handling system (area served) to facilitate easy understanding of the zoning.
- (6) Provide dynamic display graphics, to indicate status feedback (i.e., fans spin and dampers actuate for all control output devices, VAV boxes and hydronic heat pump zones.) If the dynamic graphic is used to indicate command, it should be clearly labeled on the graphic that it is a command value not actual status.
- (7) All graphics will be properly labeled including units and spelling. Unused and unnecessary points will be removed from the graphics.

7. Sequence of Operation Verification

- a) Comprehensive sequence of operation verification is required on every installation or modification to a control system by the control provider.
- b) Test and documents shall include all logic and control sequence statements for accomplishing each specific control function as detailed in the approved sequence of operation.
- c) Submittal of the control provider's forms for approval must take place 3 weeks prior to commencement of field testing. The verification documentation must include the signature of the test technicians and date completed. The technician's signature certifies that the system has been tested and is fully ready for the commissioning agent's performance verification testing.

8. Device Calibration

- a) All devices are to be field verified for calibration. Verification must be done at or close to normal operating conditions. For example, do not verify calibration of a chilled water supply temperature sensor when the water temperature is at 78°.
- b) Unless otherwise specified, calibrate per the following criteria:

| | |
|-------------------------------------------------|---------------------|
| Air Temperature - Unitary (SAT, RAT, MAT, etc.) | ±1 deg F |
| Fluid Temperature (CHW, CW, HW) | ±1 deg F |
| Air Flow Rate | ±5% (of full-scale) |
| Liquid Flow Rate | ±5% (of full-scale) |
| Differential Pressure | ±3% (of full-scale) |
| Gage Pressure | ±5% (of full-scale) |
| Relative Humidity | ±2% RH |
| CO Monitor | ±5% mid range |
| CO2 Monitor | ±5% mid range |
| Refrigerant Monitor | ±5% at 50 PPM |

Note: Accepted calibration tolerances will vary according to measured medium and application of sensors. The Tolerances listed are standard accepted criteria.

9. Test Instrumentation

- a) All field calibration must be done with high quality instrumentation. Test instrumentation selected for calibrating field devices shall be suitable for application.
- b) Instruments need to display a current (within 12-month) calibration sticker. Calibration facility shall use NIST-traceable reference instruments in their calibration process.
- c) Associated instrument calibration certificates need to be available within 24 hours of request for copy.

10. Electrical Lower Tier Subcontractors

- a) The control provider is completely responsible for its electrical lower tier subcontractors and will be held accountable for any issues relating to:
 - i) Scope
 - ii) Schedule
 - iii) Material delivery or storage
 - iv) Coordination with various trades
 - v) Workmanship
 - vi) Manpower
 - vii) Back charges
 - viii) Site Specific Safety

11. Punch List / Deficiency Resolution

- a) If deficiencies are discovered and deemed the responsibility of the control provider, McKinstry will notify the control provider.
- b) Within one business day of deficiency notification, the control provider must resolve or provide the earliest possible time and date the deficiency can and will be resolved.
- c) McKinstry's commissioning team will begin control system point verification after the control provider's point-to-point testing and documentation is completed and provided to McKinstry. Control deficiencies discovered during McKinstry's commissioning process that results in the need for McKinstry to retest, are subject to cost impacts.
- d) McKinstry's commissioning team will begin control system functional performance testing after the control provider's

sequence of operation verification testing and documentation is completed and provided to McKinstry. Control deficiencies discovered during McKinstry's commissioning process that results in the need for McKinstry to retest, are subject to cost impacts.

12. Training

- a) The control provider is responsible to provide owner training on their installed system. A training agenda will be created by McKinstry with input from the control provider. Owner facility staff attending training sessions "sign off" on attendance sheets and "sign off" on thoroughness of training sessions. Control provider shall supply electronic copies of Training Session attendance sheets and signed Owner Acceptance of Training sheets to McKinstry.
- b) The training must be performed by qualified individuals familiar with the specifics of the project for a sufficient duration to ensure that facility staff has all the information needed to optimally operate, maintain and replace the commissioned features and systems.

13. O&M Manuals

- a) Control provider submits electronic copies of O&M Manuals to McKinstry for compiling into a single electronic document. Design Engineer and Commissioning Agent or McKinstry Construction Manager approves test procedures.

14. Deliverables

- a) In addition to the project operation and maintenance manual requirements the control provider will be required to provide the following documentation:
 - i) Completed Point-to-Point documentation prior the commencement of McKinstry's commissioning team back check.
 - ii) Completed sequence of operation verification documents prior to the commencement of McKinstry's commissioning team functional performance testing.
 - iii) System schedule reports or screen shots.
 - iv) Hard and electronic copy of the project specific as-built programming.
 - v) Hard and electronic copy of the as-built sequence of operation.
 - vi) Hard and electronic copy of the as-built systems points list including all alarm setpoints.
- b) At project completion, ensure that any computer hardware or software necessary for accessing/operating the control system, is permanently installed and functional at the owner's user interface, and has the appropriate licensing to allow for full functionality of the system at project turnover. All hardware, software, and license(s) will become the property of the system owner.
- c) At project completion, ensure that the version of any installed software is the most-current available from the control manufacturer for the system installed at the project (Do not knowingly provide outdated software when newer versions are available.)

McKinstry TAB Provider Performance Standards
Revised 01/14/08

Relative to commissioning and project closeout, this document serves to clarify McKinstry's performance expectations of the following points:

1. Scope
2. Schedule
3. Communication
4. Manpower and Support
5. Test Instrumentation
6. Subcontractors / Sub-tier contractors
7. Punch lists / Deficiency Resolution
8. Reporting

The following defines and describes the minimum acceptable performance TAB providers are required to adhere to on all McKinstry projects.

1) Scope Clarifications

- a) All questions, comments, clarifications or concerns the TAB provider has through the balancing, closeout and commissioning process need to be communicated directly to McKinstry without hesitation. E-mail is the preferred means of recordable communication. Unless otherwise directed, emails will cc the appointed McKinstry project manager, McKinstry mechanical designer and McKinstry's commissioning lead.
- b) TAB provider is responsible for thoroughly understanding the project. Drawing review and a complete assessment of site conditions are required. The TAB provider is required to provide feedback regarding damper / valve installations needed to meet all design requirements prior to executing field work on the project. Additional balancing components (i.e. Dampers, Valves etc.) identified after installations are substantially complete may be subject to cost impacts to the subcontractor.
- c) The TAB provider will assign a project manager / lead person as McKinstry's single point of contact for this project.
- d) Dissemination of project specific information to other trades without McKinstry's consent should be avoided.

2) Schedule

- a) All work is to be in conjunction with applicable construction schedules. Completion of TAB activities must also be accomplished with sufficient time remaining for the commissioning team to complete the verification process as required to meet the project schedule.

Any deviation from this performance standard needs to be communicated to McKinstry immediately and will be evaluated for cost and schedule impacts.

3) Communication

- a) McKinstry requires TAB providers to adhere to an appropriate level of communication as determined by the specific project. This includes but is not limited to:
 - i) Promptly returning phone calls, e-mails, or pages
 - ii) Timely response to or delivery of RFI's or punchlists

- iii) Attend and participate in any required coordination / start-up / commissioning meetings.

4) Manpower and Support

- a) The TAB provider is responsible for providing adequate, qualified manpower for the purpose of completing systems verifications and the final TAB report.
- b) TAB provider shall support all peripheral functions including equipment start-up, test and balance activities, commissioning, owner training, etc. 'Support' is defined as providing the required personnel for the task at hand. For example, during functional performance testing, the TAB provider may be asked to provide a project lead engineer, familiar with the system being tested, to be present alongside the commissioning team to make changes needed to correct deficiencies found during the testing process or demonstrate/verify values.
- c) McKinstry reserves the right to have the TAB provider remove and replace incompetent or ineffective personnel.

5) Test Instrumentation

- a) All field calibration must be done with high quality instrumentation. Test instrumentation selected for calibrating field devices shall be suitable for application.
- b) Instruments need to display a current (12-month) NIST traceable calibration sticker or adhere to NEBB calibration standards.
- c) Associated instrument calibration certificates need to be available within 24 hours of request for copy.

6) Subcontractors

- a) The TAB provider is completely responsible for their subcontractors and will be held accountable for any issues relating to:
 - i) Scope
 - ii) Schedule
 - iii) Parts
 - iv) Coordination with various trades
 - v) Workmanship
 - vi) Manpower
 - vii) Back charges

7) Punch list / Deficiency resolution

- a) If deficiencies are discovered and deemed the responsibility of the TAB provider, McKinstry will notify the TAB provider.
- b) Within one business day of deficiency notification, the TAB provider must resolve or provide the earliest possible time and date the deficiency will be resolved. In either case, the deficiency must be resolved within 5 working days unless otherwise approved by McKinstry.
- c) McKinstry's commissioning intent is to begin TAB verification after the TAB provider's field documentation is complete. Deficiencies discovered during McKinstry's commissioning process that result in the need for McKinstry to retest, are subject to possible back charges to the subcontractor.

8) Reporting

- a) A preliminary TAB report may be required (subject to local jurisdictional requirements) to be turned over at the time of final inspections.
- b) All TAB documentation (completed or partial) shall be available within 24 hours shall a request be made by McKinstry.
- c) The Final TAB report shall be submitted in both hard copy and electronic format.

1. Overview.

The Concrete Imaging Policy guides site personnel conducting any type of concrete imaging to prevent any potential injury from cutting, coring, or drilling. McKinstry believes the safety of employees is paramount, and no one should be exposed to hazardous environments without the completion of thorough planning and risk mitigation activities. This policy intends to prevent injury to workers and avoid property damage to building structure and to prevent exposure to any other potentially buried hazards. Imaging is required before any cutting, coring, or drilling is conducted as specified in this policy.

2. Purpose.

The purpose of the Concrete Imaging Policy is to provide direction for a consistent and standard practice for imaging of concrete surfaces prior to any cutting, drilling, coring, or demo activities. Our goal is to prevent injury to personnel or buildings caused by hitting electrical conduit, post-tension cables, rebar, and other utilities hidden inside the concrete.

3. Scope.

The scope of the Concrete Imaging Policy applies to all personnel subject to the McKinstry site-specific safety plan. Imaging is required if drilling, coring, cutting is greater than one-inch depth.

4. References.

- 4.1 Concrete Imaging Assessment Form, February, 2020

5. Definitions.

- 5.1 **Coring** is any round penetration that completely removes material from a wall or deck to facilitate the passage of MEP infrastructure from one space to the next.
- 5.2 **Drilling** is the use of battery-operated or electric drills or roto hammers to provide voids for mechanical or chemically fastened anchors.
- 5.3 **Ground Penetrating Radar (GPR)** scanning is a non-destructive method to view subsurface conditions. A geophysical method that uses radar pulses to image the subsurface.
- 5.4 **Imaging** is the process of producing an image using either a GPR or X-Ray.
- 5.5 **Saw Cutting** is the removal of material from a wall or deck using a walk-behind saw, handheld saw, a chainsaw with a specialized chain or circular saw with a specialized blade.
- 5.6 **X-Ray** is a non-destructive method of imaging with the main differences from GPR is the need for access to both sides of the surface and the requirement to have the area cleared of all site personnel.

6. Responsibilities.

- 6.1 **Field Leadership** is responsible for the implementation of this process. Delegation of assigned tasks to other employees on-site is not prohibited. However, the completion of the Concrete Imaging Assessment form and informing the GC/Owner of the schedule for concrete imaging is the ultimate responsibility of field leadership. Field Leadership is responsible for notifying the subcontractor of the location for the GPR scan or X-Ray using the Concrete Imaging Assessment form. Field Leadership will use the form to coordinate all pre and post imaging tasks.
- 6.2 **Project Manager, Construction Manager, or Project Team** are responsible for reviewing the completed Concrete Imaging Assessment form. They are responsible for approving any work outside the guaranteed area given by the subcontractor.

7. Concrete Imaging Policy

- 7.1 An image is not required if drilling depth is one inch or less. A shoulder bit or a depth stop is required to stop any user from drilling further than one inch. This applies to drilling either from the top or bottom of a surface.
- 7.2 Concrete imaging is conducted prior to concrete cutting, coring, or drilling activities to prevent injury to workers and avoid accidental damage to the building structure.
- 7.3 Scanning activities should be planned well in advance of on-site work, to allow for any adjustment to schedule and communication of the findings of the imaging.
- 7.4 All relevant sections of the Concrete Imaging Assessment form should be completed prior to the activity of any imaging and will provide direction on how to prepare and arrange for imaging on your project.
- 7.5 Any owner, customer, or contract imaging requirements should be clarified and agreed upon before any imaging activity.
- 7.6 Before the task of x-ray, notification should go out to all site personnel to ensure safety. Do not assume all site personnel is aware of radiation concerns. Any necessary signage will be posted as appropriate for potential hazards.
- 7.7 McKinstry recommends the use of a company that assumes liability for their work. The Concrete Imaging Assessment form includes preferred contractors at the bottom of the document. The decision of the subcontractor used should be made through coordination between field leadership and the project team.
- 7.8 Concrete imaging must locate electrical conduit, post-tension cables, piping, rebar, and other utilities that could be buried inside the concrete. Once imaging is complete, locations of utilities are marked on the concrete and a clear area will be marked where it is safe to proceed.
 - 7.8.1 If a guaranteed area is not marked out, the field leadership or their delegate will obtain approval to proceed from the Project Manager.
 - 7.8.2 When scanning is not sufficient, and it is still unclear what is in the concrete, an X-ray will be scheduled.
- 7.9 Once scanning or x-ray activities are completed, the trade crews can drill, core, or cut three inches away from post-tension cables, two inches away from conduits, and one inch from rebar.
- 7.10 Any concrete drilling, cutting, demo activities not in compliance with this policy will be corrected immediately, to include a hazardous observation reported via the McKinstry hotline, (866) 772-3108.

8. Revision History.

The Concrete Imaging Policy is a controlled document and will be updated in the future. Table 1 contains the list of changes for this document and the current revision.

Table 1. Revision History for this document

| Number | Date | Incorporated Changes | Point of Contact |
|--------|---------------|----------------------|------------------|
| 1.0 | February 2020 | Initial Release | Michael Cleek |
| | | | |
| | | | |

Subcontract #: _

General Terms and Conditions

Construction

1. Performance of Work

Subcontractor shall furnish all services, labor, equipment, materials, supplies, freight, packaging, hardware, fasteners, fixtures, tools, layout, engineering, value engineering, detailing, equipment, scaffolds, hoisting, administration, supervision, transportation, warehousing, storage and other facilities, permits, and all other items and services necessary for the proper and complete performance and acceptance of the Work. Subcontractor shall confine operations to areas permitted by license, permit, order, regulation, ordinance, code, statute, and/or policy; not unreasonably affect other use of or operations at the Property; perform the Work to completion diligently, expeditiously and with adequate forces; use its best efforts to coordinate the design, sequence, timing, and delivery of Work in order to prevent delay in the orderly and sequential delivery of work by other entities on the Project; return the Property to its former condition prior to completion of the Work; and comply with all reasonable directives issued by McKinstry from time to time. Subcontractor shall perform the Work with a standard of care that is at least equivalent to the standard of care ordinarily used by members of the Subcontractor's trade or profession under similar conditions in the same locality as the Project, or as required under this Subcontract, or as required under the Prime Contract, or as required by law, whichever standard of care is greater. Subcontractor accepts the totality of conditions that may impact the Work, including but not limited to the nature and location of the Work and unknown site conditions that may be encountered in the performance of the Work, and the Subcontract price accounts for these issues. Subcontractor is responsible for on-time completion of the Work, and shall bear all costs of ensuring such completion.

2. Subcontract Price

For full and complete performance of the Work, and subject to the provisions of this Subcontract and the Prime Contract, McKinstry shall pay Subcontractor the Subcontract price ("Price"). The Price includes but is not limited to, all applicable wages, fringe benefit costs, material costs, equipment costs, delivery and distribution costs, storage costs, taxes, insurance costs, permit and license fees, royalties, home and field office overhead and general and administrative costs and all other amounts necessary to complete the Work, irrespective of when the Work is performed, or when such costs are incurred or billed.

3. Compliance with Law

Subcontractor shall comply with applicable law, license, permit, order, regulation, ordinance, code, statute and any other legal requirement related to the Work. Subcontractor shall obtain and maintain all licenses and permits pertaining to activities engaged in by Subcontractor, including without limitation licenses and permits required to perform the Work except to the extent actually obtained and maintained by McKinstry. If Subcontractor fails to comply with any law, license, permit, order, regulation, ordinance, code, statute and/or any other legal requirement, Subcontractor shall bear any and all associated costs, shall be responsible for any penalties incurred, and shall indemnify McKinstry and Customer for damages caused by Subcontractor's failure. Subcontractor shall pay all taxes, tariffs, and public charges of every kind related to the Work including, but not limited to, amounts associated with services, labor, equipment, materials, and supplies. Subcontractor shall comply with all prevailing wage requirements applicable to the Work, including the Davis-Bacon Act and state laws commonly called little Davis-Bacon laws, and McKinstry may send related information to Subcontractor under separate cover. If this Subcontract is for work on a federal project, there may be certain FAR, DFAR, DEAR and other federal law requirements that apply to the Work, and Subcontractor agrees that it is fully aware of all such requirements and that it shall fully comply with all such requirements. Subcontractor is notified that it may be subject to the provisions of: 41 CFR Section 60-300.5(a); 41 CFR Section 60-741.5(a); 41 CFR Section 60-1.4(a) and (c); 41 CFR Section 60-1.7(a); 48 CFR Section 52.222-54(e); and 29 CFR Part 471, Appendix A to Subpart A with respect to affirmative action program and posting requirements. **McKinstry and Subcontractor shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, protected veteran status or disability.**

4. Independent Contractor

Subcontractor is an independent contractor and is not an agent of McKinstry or Customer. McKinstry and Customer shall in no way be liable as an employer to or on account of any of the employees of Subcontractor.

5. Subcontractor's Employees

Subcontractor shall comply with every license, permit, order, regulation, ordinance, code, statute, and any other legal requirement related to Subcontractor's employees, including but not limited to wage rates, hours of labor, and employee labor protections. Subcontractor shall establish and enforce procedures and practices to ensure equal employment opportunity in recruiting, hiring, training, upgrading, promotions, transfers, layoffs, recalls, termination, compensation, working conditions, benefits, and privileges, among other things.

6. Insurance

Subcontractor shall submit insurance documentation in compliance with the insurance exhibit attached to this Subcontract, if any, prior to starting Work.

7. Bonds

Subcontractor shall obtain and maintain performance and/or payment bonds, or other bonds, if and as directed by McKinstry.

8. Safety

Subcontractor shall comply with the safety exhibit attached to this Subcontract, if any.

9. Professional Conduct

Subcontractor shall at all times strictly enforce a professional, drug-free, harassment-free, and profanity-free workplace, including compliance with related policies, including reasonable dress codes, as directed by McKinstry. Subcontractor shall immediately remove from the Work and any Project site any person who is non-compliant with the foregoing requirements. McKinstry shall have sole discretion to determine whether Subcontractor is in compliance with the foregoing requirements, and shall have sole discretion to require immediate removal of any person for non-compliance.

10. Lower Tier Subcontractors

Subcontract #: _

Subcontractor shall not further subcontract any part of the Work without McKinstry's prior written consent. McKinstry's consent for Subcontractor to use a lower tier subcontractor shall not create any contractual relationship between any lower tier subcontractor and McKinstry. Subcontractor shall require lower tier subcontractors to agree to and comply with this Subcontract and the flow down provisions of this Subcontract. Subcontractor is entirely and ultimately responsible for compliance with the provisions of this Subcontract and for any part of Work that is performed by a lower tier subcontractor.

11. Borrowed Equipment

As consideration for the use of McKinstry equipment if permitted by the McKinstry site superintendent, Subcontractor agrees that McKinstry makes no representation or warranty regarding the condition or suitability of equipment for any intended use; assumes full and complete responsibility for the use of the equipment; will ensure that only a competent user will be permitted to use the equipment and only after fully inspecting the equipment; shall not modify the equipment; and shall be responsible for all claims, demands, lawsuits, losses, expenses and/or liabilities that arise from its use of the equipment. McKinstry has no obligation to let Subcontractor use McKinstry equipment.

12. Acceptance of Work

McKinstry shall in its sole reasonable discretion determine whether the Work and any part of the Work complies with Subcontractor's obligations under this Subcontract.

13. Payments

Subcontractor shall submit to McKinstry applications for payment and releases at such reasonable times as to enable McKinstry to timely apply for and obtain payment from Customer. Each application for payment and release shall be in the form of the exhibit attached to this Subcontract. By applying for payment, Subcontractor covenants that there are no Claims that have not been presented to McKinstry prior to the date of the payment application, and that any unpresented Claims are waived and released. McKinstry shall withhold retainage from each payment in an amount as provided for in this Subcontract. McKinstry may backcharge Subcontractor for deficiencies in the Work or any other work with McKinstry, or for Subcontractor's non-compliance with any of its other obligations under this Subcontract or any other subcontract or purchase order with McKinstry. This is a pay-when-paid Subcontract. Subcontractor will be paid for the portion of Work completed by Subcontractor after McKinstry is paid by Customer for that portion of the Work. Prior to receipt of such payment by McKinstry, Subcontractor and its lower tier subcontractors and vendors shall not take any action against any payment bond related to such payment, and Subcontractor will defend and indemnify McKinstry for any such action taken by any of them. If Subcontractor fails to comply with any obligation under this Subcontract, including but not limited to insurance obligations, McKinstry may withhold payment until Subcontractor complies with such obligation. All payments received by Subcontractor shall be held in trust in favor of Subcontractor's lower tier subcontractors, vendors, laborers, materialmen, governmental authorities and all others who are legally entitled to claim a lien on the Property or against any retainage or bond. Upon request from McKinstry, Subcontractor shall promptly provide a statement in writing setting forth what amounts, if any, are due or payable to lower tier subcontractors, vendors, laborers, materialmen, and others for labor, fringes, taxes, materials, equipment or supplies in connection with, or arising out of the Work and McKinstry may withhold from any payment, partial or final, otherwise due under this Subcontract, such sums as McKinstry reasonably may determine are necessary to secure and protect McKinstry, Customer, or the Property from liens and claims that may be asserted against them. If McKinstry determines that Subcontractor is obligated to pay, and has failed or may fail to pay, an entity to whom Subcontractor is obligated in connection with the Work, then McKinstry may deduct the amount of the obligation from payments made to Subcontractor. McKinstry reserves the right to pay Subcontractor and its lower tier subcontractors via joint check. Subcontractor shall make no assignment of any payments otherwise due under this Subcontract without the express written acceptance of any assignee to the provisions of this paragraph and this Subcontract, and prior approval by McKinstry of the assignment. Payments to Subcontractor are advances and are subject to adjustment by McKinstry at any time prior to final payment for errors, overpayment, or McKinstry's good faith determination that the remaining balance of payments owed may be insufficient to ensure completion of Work covered by this Subcontract or to pay lien, retention, or bond claims.

14. Warranties

Subcontractor warrants to McKinstry and Customer that: the Work will conform to the requirements set forth in this Subcontract; shall be of a high grade, nature, and quality and free from defects; and will not infringe on any copyright, patent, trade secret, or other proprietary right held by any third party. Subcontractor warrants the Work, including materials and labor, for 1 year from final completion unless otherwise provided elsewhere in this Subcontract, and Subcontractor will correct all deficient aspects of the Work during the warranty period at its sole expense. Subcontractor will transfer all manufacturers' warranties to McKinstry.

15. Confidentiality

McKinstry may disclose to Subcontractor, orally or in writing, or Subcontractor may otherwise obtain, through observation or otherwise, confidential and proprietary information ("Confidential Information"). Confidential Information shall mean all information, unless specifically identified by McKinstry as non-confidential, regardless of how communicated or stored, concerning McKinstry, Customer, the Project, the Prime Contract, or the Work, including, without limitation, confidential or proprietary information, trade secrets, data, drafts, documents, communications, plans, know-how, negative know-how, formulas, improvements, designs, estimates, calculations, test results, specimens, schematics, drawings, tracings, studies, specifications, surveys, facilities, photographs, documentation, software, equipment, processes, programs, reports, orders, maps, models, agreements, ideas, methods, discoveries, inventions, patents, concepts, research, development, and business and financial information. Confidential Information shall not include that information defined as Confidential Information above that: (a) has been made public voluntarily by the Party to whom such information belongs; (b) Subcontractor has received, or later receives, separately from a source not under an obligation of confidentiality; (c) has otherwise become publicly available without violation of any obligation of confidentiality or other obligation to the Party to whom such information belongs or under law; or (d) Subcontractor has independently developed. Subcontractor acknowledges and agrees that disclosure of the Confidential Information would severely affect McKinstry and provide the recipient of the Confidential Information with a substantial and unfair competitive advantage. Subcontractor shall: (i) hold Confidential Information in strict confidence and not disclose Confidential Information to third parties other than those lower tier subcontractors that (a) require disclosure for performance of their obligations on the Work, and (b) have agreed in writing to be bound by the requirements of this Subcontract; (ii) protect, and cause all lower tier subcontractors to protect all Confidential Information from disclosure; and (iii) use Confidential Information only in furtherance of the Work. These covenants shall survive in perpetuity.

16. Publicity

Subcontractor shall not publish or use in any advertising, marketing, sales or other promotional material any reference to McKinstry, Customer, the Project, or this Subcontract, including trademarks, logos, or copyrighted material.

17. Records

Subcontract #: _

Subcontractor shall retain one set of copies of documents and other information that substantiate Subcontractor's work on, and billings for, the Work ("Records"). Subcontractor shall make Records available for inspection and/or audit by McKinstry at a reasonable location during normal business hours, for a period equal to the statute of repose, or statute of limitation, of the state where the Work is performed, whichever is later. If an inspection and/or audit of the Records discloses an overpayment to Subcontractor, then Subcontractor shall refund the overpayment. If an overpayment is attributable to overbilling by Subcontractor, then Subcontractor shall also reimburse McKinstry for the reasonable costs of the inspection and/or audit.

18. Intellectual Property

Subcontractor retains all right, title, and interest in intellectual property that it developed prior to and outside of this Subcontract, but grants to McKinstry an unconditional, unlimited, perpetual, fully paid, worldwide, irrevocable, transferrable license to use any such information and material to the extent that it is incorporated into the Work. Plans, designs, specifications, drawings, materials, exhibits, reports, memoranda, studies, discoveries, formulae, ideas, improvements, inventions, methods, models, processes, techniques, findings, conclusions, recommendations, diagrams, specifications, data, databases, documents, pamphlets, advertisements, books, magazines, surveys, computer programs, software, software code, usage data, films, tapes, sound reproductions, patent rights, copyrights and other intellectual products, information, and materials created by Subcontractor in the performance of the Work (collectively the "Intellectual Property") are "work made for hire". McKinstry owns all right, title, and interest in and to all Intellectual Property created by Subcontractor in the performance of the Work. To the extent any of Subcontractor's rights in the Intellectual Property are not "work made for hire", or are not subject to assignment hereunder, including without limitation any moral rights, Subcontractor hereby irrevocably and unconditionally waives all enforcement of such rights and transfers all right, title, and interest in the Work to McKinstry. If the Prime Contract requires McKinstry to comply with specific intellectual property requirements, whether express or implied, this Subcontract is modified so that McKinstry will be able to comply with the requirements of the Prime Contract.

19. Liens

To the fullest extent allowed by law, Subcontractor shall not pursue or maintain any mechanic's lien, equitable lien, payment or performance bond claim, lis pendens, or UCC filing (individually and collectively "Lien") without first pursuing to completion all dispute resolution procedures provided for in this Subcontract. If Subcontractor proceeds contrary to the foregoing sentence, Subcontractor will cause any such Lien to be satisfied, removed, released, dismissed, and discharged within 5 business days after written demand from Customer or McKinstry or longer if required by law. Subcontractor shall bear all reasonable attorneys' fees, costs, and expenses incurred by McKinstry or Customer related to investigating, resisting, releasing, or settling any such matter, and such amount may be deducted by McKinstry from funds otherwise due to Subcontractor. To the fullest extent allowed by law, Subcontractor subordinates its Lien rights to all construction financing and permanent financing related to the Work and/or Project.

20. Limitation of Liability

NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY CONSEQUENTIAL, INDIRECT, SPECIAL, INCIDENTAL, EXEMPLARY, OR SIMILAR, DAMAGES OR LOSSES, INCLUDING LOSS OF PROFITS, ARISING OUT OF OR RELATING TO THIS SUBCONTRACT, WHETHER BASED IN CONTRACT OR TORT OR ANY OTHER THEORY, EVEN IF A PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, EXCEPT TO THE EXTENT THAT THE PRIME CONTRACT IMPOSES LIABILITY FOR SUCH DAMAGES.

21. Indemnification

Each party shall indemnify, defend, and hold harmless the other party and its members, directors, officers, agents, employees, and affiliated entities against actions and damages including loss, liability, expense, and attorneys' fees awarded by a court of competent jurisdiction, for third party claims for damages caused by the indemnitor or by entities for which the indemnitor is responsible, in connection with the Work, but only to the extent of the fault of the indemnitor and/or the entities for which the indemnitor is responsible; provided, however, that if the Prime Contract imposes a greater obligation than such greater obligation shall apply. Such obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this section. In claims against any person or entity indemnified under this section by an employee of subcontractor or anyone directly or indirectly employed by subcontractor or anyone for whose acts subcontractor may be liable, subcontractor's indemnification obligation under this section shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts. By signing this subcontract, subcontractor specifically and expressly waives any immunity that may be granted it under industrial insurance and/or workers compensation laws. The parties acknowledge that the foregoing waiver of limitation was mutually negotiated. The foregoing indemnification obligations shall survive termination, expiration, and/or full performance of the Work and/or this Subcontract and shall not be limited by any amount or type of insurance coverage. Subcontractor waives all defenses based on statutes of limitation or repose to the extent necessary to give effect to the foregoing obligations.

22. Claims

Subcontractor may request payment for an amount Subcontractor believes is due to it, or for additional time to perform, under this Subcontract ("Claim") only pursuant to the following procedure. Within five (5) days after the occurrence giving rise to the Claim, or within enough time for McKinstry to reasonably process and submit the Claim request to Customer pursuant to the requirements of the Prime Contract, whichever is sooner, but in no case more than fifteen (15) days after the occurrence giving rise to the Claim, Subcontractor shall provide McKinstry with a written and signed statement of claim ("Statement of Claim") which shall describe with particularity the occurrence giving rise to the Claim, detailed and specific identification of all factual information, contractual provisions, calculations of all components and subcomponents upon which the Claim is based, the reasons why the Claim should be accepted, and Subcontractor's requested resolution. McKinstry shall determine whether to accept or reject the Claim, at its sole discretion, and shall have no obligation to accept a Claim that arises from events, circumstances, acts, or omissions for which McKinstry is not responsible. Subcontractor's failure to comply with the requirements of the Prime Contract, this Subcontract, or the foregoing provisions of this paragraph, shall be an absolute bar to Subcontractor's Claim.

23. Change Orders

The Scope of Work, Price, and time for performance may be changed pursuant to a written instrument signed by an authorized signer of each party ("Change Order"). McKinstry may propose a Change Order at any time without regard to the following provisions of this paragraph and Subcontractor shall respond to such proposal within three (3) days. Subcontractor may propose a Change Order only pursuant to the following procedure. Within five (5) days after the occurrence giving rise to the Claim, or within enough time for McKinstry to reasonably process and submit the Claim request to Customer pursuant to the requirements of the Prime Contract, whichever is sooner, but in no case more than fifteen (15) days after the occurrence giving rise to the Claim, Subcontractor shall provide McKinstry with a written and signed proposed Change Order which shall describe changes in the Scope of Work, Price, or time for performance proposed by Subcontractor. McKinstry may accept or reject such proposal at its sole discretion. Subcontractor's

Subcontract #: _

failure to comply with the requirements of the Prime Contract, this Subcontract, or the foregoing provisions of this paragraph, shall be an absolute bar to Subcontractor's Change Order request.

24. Change Directives

The Scope of Work and time for performance may be changed pursuant to a written instrument signed by an authorized signer of McKinstry ("Change Directive"). Subcontractor, upon receipt of the Change Directive, shall perform the work as directed in the Change Directive. Subcontractor shall give written notice to McKinstry of any request for an increase in Price or time to perform that work within five (5) days after receipt of the Change Directive. Subcontractor's failure to give timely notice of such claim shall be an absolute bar to such claim. Otherwise, after receipt of the claim from Subcontractor, McKinstry and Subcontractor will attempt to reasonably adjust the Price or time to perform and they shall memorialize the resolution via a Change Order signed by an authorized signer of each party. Subcontractor shall not be required to comply with a Change Directive if compliance would impose a significant and unreasonable burden on Subcontractor.

25. Takeover

If McKinstry, after consultation with Subcontractor, determines that Subcontractor will be reasonably unable to comply with any material obligation under this Subcontract, including but not limited to performing Work that is not acceptable, falling behind schedule, failure to pay vendors or lower tier subcontractors, violation of law, or in case of termination, then McKinstry shall have the right to take over the Work upon three (3) days written notice to Subcontractor and Subcontractor's failure within that time to clearly demonstrate its ability to comply with such obligation under this Subcontract. In such case, McKinstry shall have the right to complete the Work at the cost and expense of Subcontractor, including the cost to McKinstry of completing the Work in conformity with this Subcontract, reasonable overhead and profit, and costs incurred under the terms of the Prime Contract including delay costs, and without prejudice to any other rights and remedies available to McKinstry.

26. Termination

A) Either Party may terminate this Agreement for material breach by the other Party. Termination is in addition to any other remedies that may be available to the non-breaching Party. B) Additionally, McKinstry may terminate this Subcontract for its convenience and without cause. Upon receiving such notice, Subcontractor shall, unless the notice directs otherwise: (i) immediately discontinue the Work on the date specified in the notice; (ii) place no further orders for, including but not limited to, services, labor, equipment, materials, or supplies; (iii) if required by the notice, make every reasonable effort to procure cancellation of all existing orders or contracts upon terms satisfactory to McKinstry, or at the option of McKinstry, give McKinstry the right to assume Subcontractor's rights and obligations under such orders or contracts, and (iv) do only such work as may be necessary to preserve and protect the Work already in progress and to protect material and equipment on the job-site or in transit thereto. Upon such termination for convenience at McKinstry's election, Subcontractor will be entitled to payment for only: (a) the reasonable cost of the Work completed in conformity with this Subcontract; plus (b) such other costs actually incurred by Subcontractor as are permitted by the Prime Contract and approved by Customer and McKinstry; plus (c) pro-rated overhead and profit in the amount allowed in Prime Contract, or this Subcontract, whichever is lower, less (d) the amount of any payments made to Subcontractor prior to the date of the termination of this Subcontract, less (e) any costs incurred by McKinstry as a result of any breach by Subcontractor prior to termination. Subcontractor will not be entitled to any claim or lien against McKinstry or Customer for any additional compensation or damages in the event of such termination and payment, and Subcontractor waives any such claims, including loss of anticipated profit. The provisions of this Subcontract, which expressly, or by their nature, survive final acceptance of the Work, will remain in full force and effect after any termination pursuant to this section. C) Additionally, McKinstry may terminate this Subcontract or suspend the Work for the same reasons Customer may terminate or suspend McKinstry under the Prime Contract. If the Prime Contract is terminated for the convenience of Customer, the termination settlement under this Subcontract shall be as provided in the Prime Contract. Subcontractor shall not be entitled to receive any greater amount than McKinstry may on behalf of Subcontractor recover from Customer for such termination. Subcontractor shall cooperate by timely providing a termination for convenience cost proposal, if requested by McKinstry.

27. Disputes

Except for breaches of the confidentiality or intellectual property provisions of this Subcontract, or as required under the Prime Contract, the Parties agree that the following process will be used to resolve any dispute between them. First, the Parties will attempt to negotiate a resolution. If a dispute remains unresolved more than thirty (30) calendar days after the commencement of negotiation and the Parties have not mutually agreed to extend the negotiation period, then the Parties shall submit the dispute to mediation. In mediation, the Parties shall mutually select a mediator, the cost of the mediator and other administrative costs shall be shared equally by the Parties, and each Party shall be responsible for its own costs and expenses. If any dispute remains unresolved more than sixty (60) calendar days after the commencement of mediation, and the Parties have not mutually agreed to extend the mediation period, then the dispute shall be resolved through binding arbitration. In binding arbitration, the Parties shall mutually select an arbitrator, the rulings and determinations of the arbitrator will be final and binding on the parties subject to any exceptions provided by applicable law, the arbitrator shall provide a written reasoned opinion in support of the arbitration award, and the non-prevailing Party shall reimburse the prevailing Party for all of its reasonable attorneys' fees, costs, and expenses. The Construction Industry Arbitration Rules and Mediation Procedures of the American Arbitration Association shall apply to all mediation and arbitration proceedings. All negotiation, mediation, and arbitration proceedings and outcomes shall be treated as Confidential Information.

28. Non-Solicitation

Subcontractor shall not, so long as Subcontractor is engaged by McKinstry and for twelve (12) months after such engagement ends, directly or indirectly solicit or recruit any employee of McKinstry to leave his or her employment with McKinstry. The foregoing sentence does not apply if the McKinstry employee approaches Subcontractor of his or her own accord. Also, Subcontractor shall not directly or indirectly solicit or accept business from Customer or any of Customer's affiliates for specific work, a specific project, or a specific job, that was introduced to Subcontractor by McKinstry.

29. Choice of Law, Venue

The validity, interpretation, and performance of this Subcontract shall be governed exclusively in accordance with and by the laws of the state in which the Work is performed. The venue for resolving any dispute shall be the county in which the Work is performed.

30. Flow Down

The Prime Contract is incorporated herein by reference. Subcontractor assumes toward McKinstry all obligations and responsibilities that McKinstry assumes toward Customer under the Prime Contract to the extent related to the Work. McKinstry assumes toward Subcontractor all obligations and responsibilities which Customer assumes toward McKinstry under the Prime Contract to the extent related to the Work. The Prime Contract has been made available, and remains available to Subcontractor, subject to redactions that McKinstry may make to it. The Prime Contract is Confidential

Subcontract #: _

Information. If a dispute arises between McKinstry and Customer, Subcontractor shall cooperate with McKinstry in resolving such dispute to the extent of Subcontractor's Work. Subcontractor waives any applicable statutes of limitation and/or statutes of repose that would otherwise bar McKinstry from pursuing an action against Subcontractor to the extent Customer is not barred from pursuing such action against McKinstry. It is expressly understood and agreed that as to any and all claims asserted by Subcontractor against McKinstry arising from the actions or fault of Customer, McKinstry shall not be liable to Subcontractor for any greater amount than Customer is liable to McKinstry for the Work, less any markups or costs incurred by McKinstry. In case of conflict between the terms of this Subcontract and the Prime Contract, the Prime Contract controls.

31. Force Majeure

Neither Subcontractor nor McKinstry shall be considered in breach of this Subcontract to the extent that the Party's performance is prevented by an event or events that are beyond the control of such Party, including but not limited to acts of God, fire, earthquake, flood, storm, war, rebellion, revolution, insurrection, riot, strike, nuclear contamination, and/or acts or threats of terrorism ("Force Majeure") unless performance is required under the Prime Contract. Notwithstanding the foregoing, if Subcontractor has contracted to perform emergency-related Work, including but not limited to, business continuity or crisis management Work, Subcontractor shall not be excused from performance due to a Force Majeure event within the scope of the Work.

32. Notice

Any notice from Subcontractor to McKinstry shall be delivered by hand or certified mail to the McKinstry project manager and to Attn: General Counsel, McKinstry, 5005 3rd Ave S, Seattle, WA 98134. Any notice from McKinstry to Subcontractor shall be delivered to Subcontractor's designated contact person, or to any location where Subcontractor regularly conducts business.

33. Non-Exclusivity

This Subcontract is non-exclusive. McKinstry may contract with other Subcontractors for the same or similar work.

34. Assignment

Subcontractor may not assign or transfer its rights and/or obligations under this Subcontract without prior written consent of McKinstry. Any change of fifty percent (50%) or more of the ownership of Subcontractor shall constitute an assignment by Subcontractor hereunder.

35. No Waiver

No waiver of a breach, failure of any condition, or any right or remedy contained in or granted by the provisions of this Subcontract shall be effective unless it is in writing and signed by the Party waiving the breach, failure, right, or remedy. No waiver of any breach, failure, right, or remedy shall be deemed a waiver of any other breach, failure, right, or remedy, whether or not similar, nor shall any waiver constitute a continuing waiver.

36. No Third Party Beneficiaries

There are no third party beneficiaries under this Subcontract or any portion thereof.

37. Severability, Survival

If any portion of this Subcontract shall be held invalid in whole or in part under any law, rule, regulation, or order, then such portion shall remain in effect only to the extent permitted, and the remaining portions of the Subcontract shall remain in full force and effect. Any invalid portions shall be substituted with an interpretation that most accurately reflects the Parties' intentions.

38. Time of Essence

Time is of the essence in the performance and completion of the Work.

39. EPAct

Unless otherwise specified in this Contract, McKinstry is solely entitled to claim tax benefits available under section 179D of the Internal Revenue Code (EPAct) or its successor. Subcontractor agrees to promptly execute any inspection, certification and/or calculation documents prepared by McKinstry connected with tax related benefits related to the Work.

40. Waiver of Subrogation

The Parties waive all rights against each other for damages and losses to the extent covered by insurance.

41. Order of Precedence

The provisions contained in the documents that are part of this Subcontract are intended to be consistent, and shall be interpreted as such to the fullest extent possible. Except for provisions included in the scope of work or in an addendum to this Subcontract, in the event that there is any inconsistency or conflict among any of the provisions of this Subcontract, Subcontractor will comply with the provision that imposes the most stringent obligation on Subcontractor. Notwithstanding the foregoing sentence, any legal terms and conditions provided by Subcontractor to McKinstry, including those contained in proposal documents provided by Subcontractor, shall be ignored, disregarded, and of no force and effect.

42. Amendment

Except as otherwise provided in these General Terms and Conditions, this Subcontract may not be amended except pursuant to a written amendment signed by an authorized McKinstry signer.

43. Headings

The headings in this Subcontract are for purposes of reference only and shall not limit or define the meaning of the provisions under such headings.

44. Neutral Interpretation

This Subcontract shall not be interpreted or construed for or against either Party, but shall be interpreted and construed in a neutral manner.

45. Complete Agreement

This Subcontract embodies the entire agreement between the Parties and supersedes all prior negotiations, bid proposals, agreements and understandings related to the subject matter of this Subcontract. This Subcontract governs any work performed pursuant to a letter of intent, notice to proceed, or similar written agreement prior to this Subcontract being executed.

Insurance

Instructions:

Please provide these instructions to your insurance broker, risk manager, or other insurance specialist for processing. Common issues are identified by yellow and red notations within this exhibit – please ensure your COI matches these items. Required insurance documentation must be sent to subinsurance@mckinstry.com prior to starting Work. Direct any questions to your McKinstry project manager, or to subinsurance@mckinstry.com.

1. Certificate of Insurance

Subcontractor must submit evidence of insurance coverages on ACORD form Certificate of Insurance and include all required endorsements. Insurance must apply to all subcontracts, projects and work performed by Subcontractor, and should not be project-specific.

2. Certificate Holder

Each of the following three names shall be listed as certificate holders: "McKinstry, McKinstry Co., LLC, McKinstry Essention, LLC". Do not reference a specific project.

3. Minimum Coverages (M)

Minimum coverages are required as follows. Minimum coverages can be met through a combination of primary, umbrella, and excess policies.

| Commercial General Liability | Limits |
|----------------------------------------------------------------|------------------|
| Coverage must be occurrence form only | |
| Combined single limit each occurrence | \$2,000,000 |
| Personal and advertising injury | \$1,000,000 |
| General aggregate (applies per "Project") | \$2,000,000 |
| Products and completed operations aggregate | \$2,000,000 |
| | |
| Automobile Bodily Injury and Property Damage Liability | |
| Coverage must apply to owned, non-owned, and hired automobiles | |
| Combined single limit each accident | \$2,000,000 |
| | |
| Worker's Compensation | |
| State mandatory coverage | Statutory Amount |
| Employers liability each accident | \$1,000,000 |
| Employers liability disease each employee | \$1,000,000 |
| Employers liability disease policy limit | \$1,000,000 |

| Professional Liability | |
|-------------------------------------------------------------------------------------------|------------------------------|
| <i>If work does NOT involve design, consulting, or professional services</i> | <i>Coverage Not Required</i> |
| If work involves design by an architect or engineer related to structure, per claim; | \$2,000,000 |
| If work involves any other design, consulting, or professional services, per claim | \$1,000,000 |
| | |
| Pollution Liability | |
| <i>If work does NOT involve existing insulated mechanical work or hazardous materials</i> | <i>Coverage Not Required</i> |
| If work involves existing insulated mechanical work; | \$2,000,000 |
| If work involves hazardous materials | \$5,000,000 |

4. Description of Operations and Required Endorsements

The following endorsements must be provided to McKinstry and must be referenced on the Certificate of Insurance:

A. Ongoing Operations Additional Insured Endorsement

"McKinstry, each Customer of McKinstry, and any other party as required by contract, and all of their affiliates, directors, officers, and employees" are additional insureds under all policies for which this endorsement is available, including CGL. Additional insured status must not be limited to comparative fault or vicarious liability unless explicitly restricted to such limitation by applicable law. Additional insured status must be for both ongoing and completed operations. All of the foregoing also apply to the Completed Operations Additional Insured Endorsement.

B. Completed Operations Additional Insured Endorsement

C. Primary and Non-Contributory Endorsement

All of Subcontractor's Coverage must be primary and noncontributory. Any other insurance maintained by McKinstry or Customer shall be excess and not contributing insurance with Subcontractor's insurance.

D. Waiver of Subrogation Endorsement

All insurance coverage, whether such insurance is required hereunder or not, must waive all rights against McKinstry and Customer for damages or losses to the extent covered by Subcontractor's insurance. Subcontractor hereby waives such subrogation rights.

Subcontract #: _

5. All Operations

Coverage must cover anything arising from all operations, and all Subcontracts, and all work, onsite and offsite.

6. Property, Tools, & Equipment

Subcontractor is responsible for providing insurance for its own property, tools and equipment whether owned, rented, leased or borrowed and shall hold McKinstry harmless and defend and indemnify McKinstry for any loss to such property, tools and equipment.

7. Deductibles

No deductible or self-insured retention may be in excess of \$25,000 without prior written approval from McKinstry. Subcontractor is responsible for payment of all deductibles and self-insured retentions for claims under Subcontractor's insurance policies, and other insurance policies to the extent of the fault of Subcontractor, regardless of the identity of the insured party.

8. OCIP/CCIP/Wrap Policies

If an owner controlled insurance program, contractor controlled insurance program, or other type of wrap-up program applies to the project or work, then coverage provided under such program will take precedence over these insurance requirements, but only to the extent coverage is provided under such program.

9. Duration

The insurance required under this Subcontract shall remain in full force and effect during the duration of the Subcontract plus warranty period, the time period defined in the applicable statute of repose, or the time period defined in the applicable statute of limitation, whichever is longer.

10. Notice of Cancellation and Expiration

Subcontractor shall not permit any lapse in insurance coverage. Should any of the above described policies be cancelled before the expiration date thereof, notice will be delivered to McKinstry in accordance with the policy provisions. McKinstry has no duty to monitor or act on the status of subcontractor's insurance, including such dates.

11. Rating of Insurer

Subcontractor's insurers shall maintain a minimum "Bests Rating" of A-VIII.

12. Lower Tier Subcontractors

Subcontractor shall ensure that its lower tier subcontractors maintain insurance consistent with these insurance requirements.

13. Example Certificate of Insurance

The attached example Certificate of Insurance illustrates typical content in a typical Certificate of Insurance and is included here for convenience only. Nothing contained in the attached example Certificate of Insurance changes or modifies any requirements of this Subcontract. Subcontractor's actual Certificate of Insurance and all endorsements must comply with the requirements of this Subcontract.

14. Other

Subcontractor, at its own expense, shall at a minimum maintain the insurance that is required herein for each Subcontract, Master Subcontract, Master Subcontract Order, and all Work ("Subcontract"), including all of the following requirements, unless the Prime Contract imposes broader requirements, in which case those broader requirements shall prevail. For purposes of the insurance requirements in this exhibit and any defense, indemnity, and hold harmless obligations of Subcontractor, "McKinstry" shall mean McKinstry Co., LLC, McKinstry Essention, LLC, and all predecessor, successor, affiliated and related entities and their respective members, directors, officers and employees, and "Customer" shall mean any entity for whom McKinstry works under a written contract, including a Prime Contract. McKinstry's acceptance of any document from Subcontractor that does not meet these requirements shall not constitute an approval or agreement that Subcontractor's insurance requirements have been fulfilled or waived. McKinstry reserves the right to make a final determination as to whether Subcontractor is in compliance with insurance requirements, and whether additional insurance coverage or higher limits will be required. Additional insurance coverage or higher limits may be required if the scope of work, price, or other factors change. The above minimum coverages can be met through a combination of primary, umbrella, and excess policies. McKinstry and each Customer of McKinstry are entitled to the full benefit of higher limits that Subcontractor may carry for any required coverages and all such coverage shall be subject to vertical exhaustion before any other primary, umbrella, excess or any other insurance of McKinstry or Customer will be triggered.



Subcontract #: _

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 10 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

| Name Of Additional Insured Person(s) Or Organization(s): | Location(s) Of Covered Operations |
|-------------------------------------------------------------|-----------------------------------|
| McKinstry, McKinstry Co., LLC, McKinstry Essention, LLC | Per written contract or agreement |

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

Subcontract #: _

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 37 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

| Name Of Additional Insured Person(s) Or Organization(s): | Location And Description Of Completed Operations |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| McKinstry, McKinstry Co., LLC, McKinstry Essention, LLC | Per written contract or agreement |
| Information required to complete this Schedule, if not shown above, will be shown in the Declarations. | |

Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

Subcontract #: _

PLEASE FORWARD TO YOUR ACCOUNTING DEPARTMENT

SEND ALL INVOICES TO:

- **Email** all invoices to subinvoices@mckinstry.com no later than the 15th of each month in order for invoice amounts to be included in McKinstry's payment request to our Client.
- If you do not have scanning capabilities, please mail to:
McKinstry
Attn: Accounts Payable
P.O. Box 24567
Seattle, WA 98124-0567

INVOICES MUST INCLUDE:

1. An invoice number
2. An invoice date
3. McKinstry Subcontract number

ALL INVOICES MUST BE ACCOMPANIED BY:

1. Pay Request – See attached form.
2. Lien Release – See attached form.

Failure to send all three documents may result in a delay of payment.

WE MUST HAVE THE FOLLOWING DOCUMENTS ON FILE PRIOR TO PAYMENT:

1. A signed Subcontract
2. Proof of proper insurance

RETENTION:

If your Subcontract designates a withholding of retention, please ensure that you include that retention withholding on every invoice submitted. When you have completed all work, you must submit the included Retention Release form to your McKinstry Point of Contact per project in order for retention to be released.

Invoices submitted 120 days or more after completion of work will not be processed for payment.

Subcontract #: _

Subcontractor
Pay Request

From: _____

Submit To:
subinvoices@mckinstry.com

Pay Request No: _____
Invoice No: _____
Date: _____
Project Name: _____
Subcontract #: _____

Period: From _____ To _____

| | Amount | Complete to Date % | \$ |
|----------------------------------------------------------|--------|-----------------------|----|
| Original Subcontract Amount: | | | |
| Change Orders Issued To Date Thru Change Order _____: | | | |
| New Change Orders (list separately): | | | |
| Change Order _____ | | | |
| Change Order _____ | | | |
| Change Order _____ | | | |
| Change Order _____ | | | |
| Subcontract To Date: | | | |
| Less Work Previously Invoiced: | | | |

TOTALS THIS REQUEST

Gross Amount Due This Request:

Net Amount Due This Request:

Subcontract #: _

Release

Subcontractor Name

Subcontract Number

Subcontractor Address

Project Name

Subcontractor Contact Name

Project Address

Subcontractor Contact Phone Number

McKinstry Contact

CONDITIONAL RELEASE

Subcontractor should execute this release if it has not yet received the payment(s) specified below.

Subcontractor does hereby acknowledge that upon receipt by Subcontractor of payment(s) from McKinstry

- in the sum of \$ _____, and/or
- per the attached schedule of values

and if payment is by check when the check has been properly endorsed and has been paid by the bank upon which it was drawn, this document shall become effective to release any and all claims, rights of lien, and Miller Act claims which Subcontractor and its vendors, suppliers and sub-subcontractors have on the project to which the payment relates, including for labor, services, materials, and equipment, through the date that this release is signed. Subcontractor agrees that by accepting and in consideration for the above sum, Subcontractor will defend and hold McKinstry and Client harmless from any claims for payment from Subcontractor's vendors, suppliers and sub-subcontractors and that the duty to defend shall include reimbursement for all costs and attorney fees incurred by counsel selected by McKinstry in connection with such defense. Before any recipient of this document relies on it, the party should verify evidence of payment to the undersigned.

I CERTIFY, REPRESENT AND WARRANT THAT I HAVE THE AUTHORITY TO BIND SUBCONTRACTOR TO THIS RELEASE.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE ABOVE ARE TRUE AND CORRECT STATEMENTS.

For Subcontractor:

Signature

Printed Name

Title

Date

UNCONDITIONAL RELEASE

Subcontractor should execute this release if it has received the payment(s) specified below.

Subcontractor does hereby acknowledge that Subcontractor has received payment(s) from McKinstry

- in the sum of \$ _____, and/or
- per the attached schedule of values

Subcontractor does hereby release any and all claims, rights of lien, and Miller Act claims which Subcontractor and its vendors, suppliers and sub-subcontractors have on the above project to which the payment relates, including for labor, services, materials, and equipment, through the date that this release is signed. Subcontractor agrees that by accepting and in consideration for the above sum, Subcontractor will defend and hold McKinstry and Client harmless from any claims for payment from Subcontractor's vendors, suppliers and sub-subcontractors and that the duty to defend shall include reimbursement for all costs and attorney fees incurred by counsel selected by McKinstry in connection with such defense.

I CERTIFY, REPRESENT AND WARRANT THAT I HAVE THE AUTHORITY TO BIND SUBCONTRACTOR TO THIS RELEASE.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE ABOVE ARE TRUE AND CORRECT STATEMENTS.

For Subcontractor:

Signature

Printed Name

Title

Date

Subcontract #: _

RETENTION RELEASE

Retention will not be released until your McKinstry Project Manager receives this form completed

Subcontractor Information:

Subcontractor Name

Subcontractor Address

Subcontractor City, State, Zip Code

Subcontract Number (located on your subcontract and/or subcontract change order)

Equal Employment Opportunity

Subcontractor will comply with all legal requirements related to equal employment opportunity and non-segregated facilities, including compliance with Executive Order No. 11246, the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, Section 503 of the Rehabilitation Act of 1973, as amended, the Americans With Disabilities act, Public Law 101 – 336, as amended, Executive Order 13201, and all other applicable federal, state, and local laws and regulations.

During the performance of this Subcontract, the Subcontractor agrees as follows:

1. The Subcontractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The Subcontractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Subcontractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
2. The Subcontractor will, in all solicitations or advertisements for employees placed by or on behalf of the Subcontractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.
3. The Subcontractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Subcontractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Subcontractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The Subcontractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

Subcontract #: _

6. In the event of the Subcontractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the Subcontractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7. The Subcontractor will include the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of Sept. 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Subcontractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the Subcontractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Subcontractor may request the United States to enter into such litigation to protect the interests of the United States.

Compliance with 41 CFR 60-300.5(a). Subcontractor shall abide by the requirements of 41 CFR 60-300.5(a). This regulation prohibits discrimination against qualified protected veterans, and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans.

Bonds

1. Performance Bond

Subcontractor shall obtain a performance bond in an amount equal to the Subcontract Price ("Price"). If the Price increases as a result of change orders or other modifications to the Subcontract, Subcontractor shall obtain a revised or new performance bond in an amount equal to the new Price.

2. Payment Bond

Subcontractor shall obtain a payment bond in an amount equal to the Subcontract ("Price"). If the Price increases as a result of change orders or other modifications to the Subcontract, Subcontractor shall obtain a revised or new payment bond in an amount equal to the new Price.

3. Surety

McKinstry reserves the right to approve or reject a surety selected by Subcontractor in connection with the above referenced bonds.

4. Documentation

Subcontractor shall promptly furnish an original of the above referenced bonds to McKinstry.

Safety

1. General

Subcontractor is responsible for the safety of its own personnel, and the safety of all persons who may be at risk as a result of Subcontractor's work. In case of conflict between any contract requirements, laws, rules, regulations, policies, practices, standards or related obligations, the most stringent will apply. The cost to correct any safety issues caused by Subcontractor's failure to comply with this subcontract will be borne by Subcontractor. Any violation of the provisions of the numbered paragraphs within this safety exhibit could result in the permanent banning of Subcontractor personnel from the jobsite and/or termination of Subcontract.

2. Definitions

Job Hazard Analysis (JHA): An analysis of a work task to identify the sequence of basic steps, potential hazard(s) involved with each step and recommended corrective action necessary to mitigate the hazard.

Site Specific Safety Plan (SSSP): Subcontractor's overall project safety plan that identifies the requirements and process for execution of work in accordance with McKinstry's Safety Program requirements.

Point of Contact (POC): Person(s) authorized to supervise and make decisions on behalf of McKinstry in the course of managing the Project.

Pre-task Plan (PTP): Daily planning tool used to identify potential hazards of the work task and then describe the method to mitigate the hazards.

3. Safety Requirements

1. At a minimum of two weeks prior to the start of Subcontractor's work, Subcontractor will provide a written SSSP and JHA in McKinstry's format associated with its specific scopes of work. Subcontractor may use its own SSSP or JHA only after receiving written approval from the McKinstry regional safety director.

Subcontract #: _

2. SSSP must include a Fall Protection Work Plan.
3. Subcontractor will attend a pre-construction meeting with the McKinstry project team for review and approval of SSSP. Any McKinstry requested modifications shall be made prior to commencement of the work.
4. Subcontractor is required to either attend McKinstry's weekly safety meeting, or hold its own weekly safety meeting to discuss safety topics relevant to the work occurring during the term of the subcontract. Records of attendance must be kept on site and provided to McKinstry upon request.
5. All Subcontractor personnel are required to attend a McKinstry jobsite specific orientation prior to commencement of any work.
6. All Subcontractor personnel are required to complete daily McKinstry PTPs prior to starting work tasks or anytime work conditions change. PTPs shall be kept on site and provided to McKinstry upon request.
7. Subcontractor shall provide and execute all work to comply with OSHA, state and local regulatory agencies and McKinstry's client safety requirements.
8. Subcontractor shall designate a competent Site Safety Representative who is directly responsible for implementation and maintenance of the SSSP, filing all safety meeting attendance rosters and PTPs on site, and monitoring all Subcontractor field activities. Name and contact information must be provided in the subcontractor's SSSP. McKinstry reserves the right to require additional safety training for the designated safety representative. McKinstry reserves the right to require Subcontractor to replace its Site Safety Representative if McKinstry determines the individual is not qualified, is ineffective, or is not fulfilling all applicable safety responsibilities.
9. Subcontractor shall provide and enforce the use at all times of the personal protective equipment (PPE) for its employees, staff or other related personnel as specified by OSHA, Federal Register Title 29, 1926/1910, state regulatory agencies, the McKinstry Safety Program, and the SSSP. Failure to wear required PPE could result in removal from the jobsite.
10. Subcontractor shall inspect tools and equipment as required by OSHA, state and local regulatory agencies, the McKinstry Safety Manual, and the SSSP.
11. Subcontractor shall ensure that all workers on site have the required safety training/certification to perform specific work tasks and/or operate equipment in compliance with OSHA and all state and local regulatory agencies, the McKinstry Safety Program, and the SSSP. Training/certification required may include, but is not limited to: operation of powered industrial equipment (forklift, scissor /boom lifts), confined space entry, work tasks involving respirator protection, trenching and excavation, and rigging and signaling. McKinstry may, at any time, request copies of certification and/or training records to ensure compliance. Subcontractor's failure to have adequately trained personnel will result in the worker(s) being unable to continue performing the work task or operate the equipment.
12. Any workplace incidents, including unsafe conditions, practices, violations of job safety, injuries, and near misses, must be reported to the McKinstry Safety Incident Hotline (1-866-722-3108) within two hours and notify the McKinstry project safety representative. Safety Incident Reports (SIRs) shall be submitted in accordance with the McKinstry Safety Program. McKinstry reserves the right to investigate any workplace incidents.
13. Subcontractor will correct all unsafe conditions when discovered. The Subcontractor will stop any work deemed unsafe until corrective measures have been made to McKinstry's satisfaction. Subcontractor is not entitled to any damages for subcontractor safety related stoppages and will indemnify McKinstry for costs, losses, or damages incurred by McKinstry for such stoppages. If Subcontractor neglects to take corrective measures, McKinstry will do so at the expense of the Subcontractor and deduct the cost from any payments due to the Subcontractor. Subcontractor must develop and submit a written Corrective Action Plan (CAP) to McKinstry within 24-hours of a safety work stoppage.
14. Subcontractor shall complete and file Safety Data Sheets (SDS) for all hazardous materials brought onto the jobsite. Subcontractor is responsible for conducting all required hazardous material training and provide all required PPE. SDS must be on site at the time of arrival for all hazardous materials.
15. Subcontractor shall ensure all equipment, tools, materials and other apparatuses are stored, stacked, placed, temporarily spotted or set up in such a manner as to maintain safe ingress/egress and a clean and orderly work place. Housekeeping shall include the removal of all debris and trash daily. McKinstry has the right to direct Subcontractor to take corrective action immediately to address any ingress/egress or housekeeping issues.

**Special Terms and Conditions
Commissioning**

Unless otherwise specified elsewhere in this Subcontract:

Subcontract #: _

1. Professional Services

Subcontractor's Work includes performance of professional services. To that extent, Subcontractor shall be characterized and viewed as a professional services provider.

2. Deliverables

Subcontractor shall submit to McKinstry the deliverables described in the Scope of Work, including all aspects of the Work not explicitly identified as deliverables in the Scope of Work that are necessary to achieve the objectives of Customer and McKinstry. This includes any services that are necessary to perform commissioning services in accordance with McKinstry's and the Customer's requirements, as outlined in the project program and other relevant data defining the project.

To the extent required by law, such deliverables shall be prepared under the direction of and shall bear the seal of an appropriately licensed professional. Subcontractor shall treat such deliverables as confidential, and shall distribute copies of them only to McKinstry and any other party authorized in writing by McKinstry to receive copies, except Subcontractor shall be entitled to distribute them as required by local laws and to provide documents as otherwise required by law. Reports and other documents created by Subcontractor are prepared solely for the use of McKinstry and Customer, and other entities engaged by McKinstry or Customer, and such reports and other documents are not for the benefit of any third party not expressly identified in this Subcontract.

3. Tax Exemption

If Subcontractor claims an exemption for taxes, Subcontractor shall indemnify and hold McKinstry and Customer harmless for all liability, penalty, interest, fine, tax assessment, attorneys' fees, or other expense or cost incurred by McKinstry or Customer as a result of any action taken by McKinstry or Customer in accordance with Subcontractor's decision.

Special Terms and Conditions

Construction

Unless otherwise specified elsewhere in this Subcontract:

1. Documents

The documents referenced in this Subcontract represent materials, products and equipment that establish a standard of required function, dimension, appearance and quality. Deviations of any kind from the documents shall require written acceptance from McKinstry. Subcontractor shall check all documents upon their receipt and immediately notify McKinstry of any discrepancies. Subcontractor shall compare all documents, including drawings, and verify figures and requirements before laying out the work and will be responsible for any errors, changes, additions or discrepancies, which might have been avoided thereby.

2. Schedule

It is Subcontractor's responsibility to allocate the necessary manpower, material and equipment to meet the schedule, which is part of the Subcontract. All detailed construction activities are to be coordinated with McKinstry's project manager. The schedule is subject to change from time to time at McKinstry's sole discretion. After receipt of communication from McKinstry of any major schedule change, Subcontractor shall have five (5) days to provide feedback to McKinstry, and McKinstry shall use good faith efforts to consider Subcontractor's feedback in scheduling. If McKinstry determines Subcontractor may not meet the schedule, then McKinstry may require Subcontractor to provide a manpower recovery schedule that clearly demonstrates how Subcontractor will meet the schedule. If McKinstry reasonably determines that Subcontractor will not meet the schedule without a change in its approach, McKinstry may require Subcontractor to take specific steps to meet the schedule, including increasing its labor force, the number of shifts, amount of overtime work, days of work including weekends, holidays, and the amount of construction plant and equipment, all without increase in Subcontract Price, and McKinstry may backcharge Subcontractor for associated costs and expenses incurred by McKinstry that are directly related to the foregoing.

3. Submittals

- a) Subcontractor shall submit, as applicable and as directed by McKinstry project manager, the following: physical shop drawings, physical copies of catalog data, brochures, material schedules, and all other documentation; electronic copies of all of the above
- b) Subcontractor shall accompany all submittals with a letter of transmittal.
- c) Any proposed modification to the specifications set forth in this Subcontract must be specifically described in a substitution request and must be conspicuously called out on the shop drawings, product data, etc.
- d) McKinstry acceptance of submittals shall not relieve the Subcontractor from full compliance with the requirements of this Subcontract, including corrections of errors, omissions, and aspects of the submittals, and aspects of the constructed Work, that are not in compliance with this Subcontract.
- e) If a specific material that is to be incorporated into the Work is not identified in the Subcontract, contact McKinstry for clarification.
- f) If McKinstry requires reasonable corrections to any submittals, Subcontractor shall promptly correct and resubmit any and all submittal information.

4. Progress Payments

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- a) Subcontractor must submit progress payment requests and invoices to McKinstry no later than the 15th day of each month in order for the invoice amounts to be incorporated into McKinstry's application for payment to the Customer the following month.
- b) Submissions must be made in as prescribed in this Subcontract, including submission of all required documentation
- c) The Subcontract number must be referenced on all pay requests and invoices.
- d) Subcontractor shall provide McKinstry a list of all material suppliers and lower tier subcontractors with the value of the material supplied or work performed on the project.
- e) By submitting a pay request Subcontractor certifies that no lien rights exist, whether a lien release is submitted or not.

5. Background Checks

Subcontractor shall provide evidence that every person performing any part of the Work has passed all required background checks. Subcontractor will bear the costs of all such background checks.

6. Supervision and Employees

Subcontractor shall have a competent superintendent or foreman on the job at all times supervising the Work, who has authority to act on behalf of Subcontractor. Subcontractor agrees to remove from the job any employee(s) who are deemed unsatisfactory to Customer or McKinstry. No lower tier subcontractors will be allowed on site without prior written approval from McKinstry.

7. Work Hours

If not specified elsewhere in the Subcontract or Prime Contract, normal work hours will be Monday through Friday between 7:00 AM and 4:00 PM or as communicated or required by the McKinstry project manager. No work shall be performed on weekends, holidays, or weekdays before 7:00 AM or after 4:00 PM without specific approval from the McKinstry project manager. Aspects of the Work may require shift work beyond the hours listed above. If shift work may be required, then the Subcontract Price includes the cost of such shift work.

8. Smoking and Tobacco

Smoking and tobacco are prohibited on the project site.

9. Permits

Subcontractor is responsible to obtain and post at the jobsite all necessary and applicable permits and regulatory notices.

10. Sequencing, Barricading, Traffic Control

Sequencing and barricading of work shall provide for the complete safety of the public and all construction personnel, and shall create a minimum of interference with the normal flow of pedestrians and vehicles either on or off the site. This shall include, but not limited to, flagmen and/or traffic plates across trenches to provide uninterrupted traffic flow. Subcontractor's proposed method of sequencing, barricading and traffic control shall be submitted to McKinstry prior to performing the Work.

11. Temporary Services

Unless otherwise specified, Subcontractor shall furnish and pay for all temporary services as may be required in connection with the Work. Subcontractor shall operate and maintain such services in a condition satisfactory to McKinstry and Customer and adhere to all regulatory requirements. Subcontractor is responsible for the following services, except to the extent voluntarily provided by McKinstry or required to be provided by McKinstry:

- a) Storage for materials, tools and equipment.
- b) Parking for vehicles
- c) Office trailer
- d) Communication, telephone, and facsimile services
- e) Potable water
- f) Sanitary and bathroom facilities
- g) Temporary power
- h) Trash dumpsters
- i) Transportation of personnel
- j) Secured hazardous waste storage

All temporary services shall be removed in a manner satisfactory to McKinstry and Customer by the Subcontractor at no cost to McKinstry or Customer upon completion of the Work.

A source of temporary electric power (120V) and lighting may be provided by McKinstry or Customer for use by Subcontractor, at the discretion of McKinstry and Customer. Use of power is at Subcontractor's sole risk. McKinstry and Customer are not responsible for the condition, adequacy, or reliability of power. Except to the extent provided by McKinstry, Subcontractor shall provide its own connections, task lighting and temporary wiring from the power source. Power and connections for equipment that exceeds the reasonable capacity of

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sources provided by McKinstry or Customer, such as welders, will be Subcontractor's responsibility. Subcontractor shall provide any additional electrical devices, equipment and conductors, including GFIs, necessary to perform the Work safely and in compliance with all laws and regulations.

12. Parking and Storage

The parking of equipment, storage of materials, parking of construction personnel vehicles, and use of any pertinent facilities at the project site shall be under the sole direction and supervision of McKinstry and the expense of the Subcontractor. Subcontractor will be responsible for any theft or damage caused to materials stored on site. Regardless of any payment, the risk of loss of such materials and equipment, including partially completed Work, shall remain upon Subcontractor until final acceptance of the Work by Customer.

13. On Site Deliveries

Subcontractor shall make final coordination of material deliveries to the site with McKinstry's project manager a minimum of two (2) business days in advance. Subcontractor shall have a qualified representative and necessary equipment present to accept and unload all deliveries. Subcontractor shall be responsible for inventory, verification, reconciliation, and timely inspection for damage for all delivered equipment and material related to the Work.

14. Items Provided by McKinstry or Customer

If the Work involves incorporation of any item, including but not limited to supplies, materials, equipment, components, or intangible property, provided by McKinstry or Customer, all of Subcontractor's obligations under this Subcontract apply to such item, and shall commence on delivery of such item to the project site, unless the Scope of Work explicitly specifies differently.

15. Coordination

Subcontractor shall be responsible for coordination with all other trades and owner furnished items to insure proper interface between all systems. A contact list of all subcontractors can be obtained from McKinstry's project manager.

16. Systems Installation

Provide all fasteners, hardware and miscellaneous accessories necessary for a complete installation of the applicable building system(s) according to the more stringent of contract documents, manufacturer's instructions or building codes unless explicitly identified elsewhere in this Subcontract.

17. Layout

Subcontractor shall layout its work and be responsible for the accuracy thereof. Subcontractor shall coordinate its layout with the layout of other trades.

18. Core Drilling and Saw Cutting

Subcontractor shall perform or otherwise be responsible for all core drilling, saw cutting, sleeving, cutting, patching and fire-stopping which may be required in connection with the Work. Prior to any such activities, layout must be completed by all applicable trades and the McKinstry project manager must view the current condition of the area of such activities.

19. Protection of Work and Property

Subcontractors shall continuously maintain adequate protection of its work from damage that may be caused by others. Subcontractor shall protect its work area from damage caused by the elements including rain, wind, snow, erosion. Subcontractor shall protect Customer property from damage arising in connection with this Subcontract. Subcontractor shall immediately notify the McKinstry project manager of any damages to Customer property, including pre-existing damages, regardless how the damages are caused. Subcontractor is responsible for all damage it causes, including to any non-Subcontractor property, and Subcontractor will promptly repair such damage at its sole cost.

20. Safety

Subcontractor is responsible for compliance with all safety requirements, and for the ultimate safety of its employees, lower tier subcontractors, agents, and others under its direction or control and will implement and follow all best practices designed to ensure the safety of all people on and around Subcontractor's work area.

21. Hazardous Materials

Subcontractor certifies that the Work may involve known or unknown exposure to hazardous materials, pollutants, and mold, including asbestos and lead ("Hazardous Materials"). Subcontractor's employees, lower tier subcontractors, and agents, shall be trained in the recognition, risks, and safeguards associated with work that may disturb and/or expose any person or property to Hazardous Materials prior to performing any work, and Subcontractor shall implement best practices to eliminate all dangers to persons and property associated with

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Hazardous Materials related to the work. Subcontractor shall consult with Hazardous Materials experts if reasonably necessary for Subcontractor to comply with the foregoing obligations. Subcontractor is solely responsible for damages and injuries that may arise out of Subcontractor's work associated with Hazardous Materials. If McKinstry has received any assessments related to Hazardous Materials from Customer, then such assessments are available for review and inspection by Subcontractor, but McKinstry shall in no way be responsible for the accuracy, completeness, or reliability of such assessments, and Subcontractor relies on such assessments at its sole risk.

22. Clean Up

On at least a daily basis, Subcontractor shall clean and organize its work area to the satisfaction of the McKinstry project manager. Subcontractor is responsible for disposal of and disposal fees for its own waste. If Subcontractor fails to comply with the foregoing, McKinstry may backcharge Subcontractor for all costs incurred by McKinstry in cleaning and organizing Subcontractor's work area.

23. Remedial Work

Cutting, patching, repairing and any other remedial work that becomes necessary as a result of Subcontractor's work shall be either performed by or paid for by the Subcontractor whose scope of work necessitated such repairs. If McKinstry determines the remedial work is not performed in a timely fashion and/or adequately, it shall be repaired by McKinstry at Subcontractor's expense.

24. Reports

Reports in the form and timing proscribed in this Subcontract or required by the McKinstry project manager must be turned in to McKinstry's project manager at the end of each reporting period.

25. Closeout

At closeout, Subcontractor shall as directed by McKinstry provide information to McKinstry that includes but is not limited to all operations and maintenance instructions and manuals, warranty letters and certificates and information, additional stock, proof of permit sign-offs, proof of compliance with prevailing wage and certified payroll requirements as applicable, three (3) physical copies of as-built drawings for all phases of Work, and one (1) electronic copy of as built drawings for all phases of the Work.

Special Terms and Conditions

Controls

Subcontractor is a control provider. Relative to commissioning and project closeout, this document serves to clarify control provider's performance obligations under this Subcontract on various points including: Scope and Sequence Clarifications; Schedule; Communication; Manpower and Support; System Start-Up; Point to Point / Basic Function Testing; Sequence of Operation Verification; Device Calibration; Test Instrumentation; Electrical lower tier subcontractors; Punch lists / Deficiency Resolution; Training; O&M Manuals; and Deliverables. The following defines and describes some of the performance levels performance control providers are required to comply with, but the following is not all inclusive. Unless otherwise specified elsewhere in this Subcontract:

1. Scope and Sequence Clarifications

- a) All control provider questions, comments, clarifications or concerns during the closeout and commissioning process must be communicated without hesitation. Email is the preferred means of recordable communication. Unless otherwise directed, emails will carbon copy the appointed McKinstry project/construction manager, McKinstry mechanical or electrical designer and McKinstry's commissioning lead(s).
- b) Dissemination of project specific information to other trades without McKinstry's consent should be avoided.

2. Schedule

- a) All work is to be performed in conjunction with applicable construction schedules. Completion of controls must also be accomplished with sufficient time remaining for McKinstry commissioning to complete the verification process before the end date of the project.
- b) Control provider adherence to the performance standards outlined in this document, will result in an efficient and timely final validation of the controls system. Any deviation from this performance standard must be communicated to McKinstry immediately for impacts on cost and schedule.

3. Communication

- a) McKinstry requires control providers to adhere to an appropriate level of communication as determined by the specific project. This includes but is not limited to:
 - i) Promptly returning phone calls and e-mails.
 - ii) Timely response to or delivery of RFI's, punch lists, and observation logs.
 - iii) Attend and participate in any required coordination / start-up meetings.

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iv) Acknowledgment of aforementioned communications shall be made by the control provider within one business day of initial notification and shall include a resolution or planned date of resolution.

4. Manpower and Support

- a) The control provider is responsible for providing adequate, qualified manpower for the purpose of providing a complete control installation within the constraints of the project schedule.
- b) Support is defined as providing experienced personnel for the task at hand. For example, during functional performance testing, the support person provided by the control provider shall be a programming-capable engineer, familiar with the system being tested and shall be present alongside the test crew to make necessary changes needed to correct deficiencies found during the testing process.
- c) At a minimum the control provider shall anticipate supporting all peripheral functions including but not limited to:
 - i) Equipment start-up,
 - ii) Testing, adjusting and balancing? (TAB) activities,
 - iii) McKinstry point to point, functional performance, and integrated system testing
 - iv) Customer training, etc.
- d) McKinstry reserves the right to have the control provider remove and replace incompetent or ineffective personnel.
- e) Control provider will supply McKinstry with any proprietary software, cables, dongles/security keys, at no cost to McKinstry for the duration of the commissioning effort needed to commissioning and validate the system.
- f) If the control provider is unable to provide software, cables, etc. that can be loaded onto McKinstry-owned hardware, the control provider will either loan McKinstry pre-configured computers/interface tools or supply control provider manpower with the appropriate devices for the duration of the commissioning effort at no additional expense to McKinstry.
- g) If the control provider is unable to supply experienced support personnel McKinstry will evaluate the schedule cost impacts subject to reimbursement from the control provider.

5. System Start Up

- a) Clearly document start-up and checkout results according to manufacturer's written instructions and the contract documents.
- b) Control provider submits compiled electronic copies of start-up and checkout results and certifies that start up and checkout procedures have been completed according to the contract documents and product manufacturer's instructions. This electronic document package is to be submitted to the Commissioning Lead(s).

6. Point-to-Point / Basic Function Testing

- a) A documented, comprehensive point to point and basic function testing in the field is required on all installations. Factory calibration and bench tests are not acceptable alternates to on site field-testing.
- b) Point-to-point (or calibration verification) scope of work consists of testing from all end field devices (any device that provides an input signal to, or receives an output signal from the control hardware) through proper input/output to the graphic and operator interface. Testing must be complete, detailed and documented on approved point to point verification forms. Point-to-point should be performed with a separate device from the installation sensor – “ringing out a sensor” alone is not an acceptable level point-to-point testing. Point-to-point testing forms will include all point database requirements (i.e. alarm priority, paging, email, device range, etc.).
- c) Submittal of the control provider's forms for approval must take place 3 weeks prior to commencement of field testing. The point-to-point report summary documentation must include the signature of the test technicians and date completed. The technician's signature certifies that the system has been tested and is fully ready for the commissioning lead's performance verification testing.
- d) Point-to-point testing and documentation for McKinstry projects will include, but not be limited to, the following criteria:
 - i) Field device and functionality.
 - (1) Verify all field devices installed are properly sized or ranged for anticipated operating range. Devices are adjusted for correct position, orientation and full range.
 - (2) All zone devices that are installed on perimeter walls, or on any spaces that are at risk of being influenced by conditions other than the space being measured, shall be installed with a proper thermal insulation (typically fiberglass batt insulation) to allow the sensor to properly read the space conditions. If spray foam insulation is used, care must be taken to protect the wiring to allow for replacement, if necessary. Any sensors found to be influenced during commissioning will be corrected or relocated, as necessary at no cost to McKinstry or others.
 - ii) Conductor integrity.

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(1) Test all wiring continuity from field devices to correct input/output terminals.

iii) Conductor termination.

(1) Verify all device wire terminations are per the submittal package

(2) Verify all input/output wire terminations are correct

(3) Verify field devices communicate to the operator interface (final user graphics pages as well as any 'hardware device' pages)

(4) Label all input wires per the project specification requirements – if no project-specific labeling requirements have been defined, the following is the minimum labeling standard:

(a) All wires and cables shall be identified with permanent markers or wire tag at each end.

(b) Wire designators at controllers shall describe the device termination point and function. (i.e. – AC-1_SAT or EF-1_Status, AC-1_OSA Dmpr, etc.). The intent is that the wiring tags in the control panels clearly describe the device/service that each wire provides. Labeling shall be identical to the labeling shown on the As-Built drawings – update each to match each other at project completion.

(c) Wire designators at devices shall describe the control panel, controller number and terminal numbers that the device is wired to.

(d) Label all input and output field devices as they are labeled or defined on the control diagram installation drawings.

(e) At project completion, update the construction drawings to 'as-built' conditions and after the drawing content/accuracy are approved, provide a laminated print (min. size: 11"x17") of each panel's terminations/systems attached to the inside cover or door of each controller.

(5) Verify that cable labeling is complete at each end of each cable and properly identifies the termination/device at the opposite end – include the labeling information on the point-to-point documentation report.

iv) Command to output.

(1) Test linear-scaling calibration of every analog output point. For points that have custom scaling, verify that the value on the graphics page (0-100%, etc.) match the scaling input of the field device (for example, some valves reach 100% design flow GPM at a lower analog input signal). Detail these values on the point-to-point checkout documentation.

v) Alarm Graphics Interlocking.

(1) Specific high/low setpoints and requirements should be provided in the project points list and coordinated with McKinstry and facility owner prior to control system startup.

(2) Verify requirements for alarm definitions, routing, priorities, etc. before the initiation of system checkout. Submit required information early enough in the process so that the lack of information does not impact the commissioning and/or checkout process.

(3) Verify all alarm signals from device initiation through all required notification components. (Work station, pager, e-mail, local annunciation, etc.)

vi) Device Calibration.

(1) Document device calibration per the table listed under device calibration. Document both the field reading/condition and the value represented on the graphical interface.

e) System Usability (GUI)

i) The intent of a graphical user interface is to provide an easy-to-use window into the system components. As such, the user-interface should have the ability to manipulate the final control devices and all adjustable setpoints directly from the graphics.

(1) For example, if there is a chilled water valve being controlled by the BMS system, the operator shall be able to click on the valve, value or obvious control link to allow the position to be manually set, locked in place, or released back to automatic control, as required.

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ii) When a point has been overridden from automatic mode, this state shall be readily displayed or indicated on the system graphic schematic screen without having to drill deep into the controller hardware level of access screens.

iii) Access Control: When possible and with the Customer's consent, provide programmed minimum (3) access levels:

(1) Read Only – Ability to review the system operation only. No ability to make system modifications.

(2) Operator – Ability to manipulate the system (setpoints, trends, schedules, etc.) for the purposes of day to day system operations.

(3) Full Control – Ability to modify any component or element within the system.

iv) Trend Reports: Establish trend reports system points as requested by McKinstry. Trend reports shall be transmitted as *.*.csv or Excel files.

(v) Scheduling:

(1) For each start/stop point, provide, at a minimum, a scheduler with eight day types (M, Tu, W, Th, F, Sa, Su, H), a minimum of four start/stop schedules each day type, 30 holidays each year and 10 multiple-day special event schedules each year.

(2) System schedules shall be set up by the control provider as directed by McKinstry for a minimum of 36 months from project completion. Schedule reports or screen shots shall be provided as a part of the control provider's closeout package.

vi) Colorgraphics:

(1) All colorgraphic templates shall be submitted for review by the owner, engineer, and McKinstry commissioning lead 3 weeks prior to system start up.

(2) As part of each colorgraphic screen page, provide a menu for switching to associated system screen pages to minimize the amount of menu switching required. (Typically via key buttons or 'Forward/Back' buttons)

(3) Provide one colorgraphic screen for each air handling system and associated exhaust fans, zone pumps, etc. in schematic format. (Custom-built for each project)

(4) Provide at least one colorgraphic screen for each heating or cooling water system in schematic format, more if the systems are complicated. (Custom-built for each project)

(5) Provide one colorgraphic screen for each floor plan (scaled to fit the screen), displaying all zone space temperatures with same display access to each zone controller graphic, and a unique background color for each air handling system (area served) to facilitate easy understanding of the zoning.

(6) Provide dynamic display graphics, to indicate status feedback (i.e., fans spin and dampers actuate for all control output devices, VAV boxes and hydronic heat pump zones.) If the dynamic graphic is used to indicate command, it should be clearly labeled on the graphic that it is a command value not actual status.

(7) All graphics will be properly labeled including units and spelling. Unused and unnecessary points will be removed from the graphics.

7. Sequence of Operation Verification

a) Comprehensive sequence of operation verification is required on every installation or modification to a control system by the control provider.

b) Test and documents shall include all logic and control sequence statements for accomplishing each specific control function as detailed in the approved sequence of operation.

c) Submittal of the control provider's forms for approval must take place 3 weeks prior to commencement of field testing. The verification documentation must include the signature of the test technicians and date completed. The technician's signature certifies that the system has been tested and is fully ready for the commissioning agent's performance verification testing.

8. Device Calibration

a) All devices are to be field verified for calibration. Verification must be done at or close to normal operating conditions. For example, do not verify calibration of a chilled water supply temperature sensor when the water temperature is at 78°.

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b) Unless otherwise specified, calibrate per the following criteria:

| | |
|-------------------------------------------------|---------------------|
| Air Temperature - Unitary (SAT, RAT, MAT, etc.) | ±1 deg F |
| Fluid Temperature (CHW, CW, HW) | ±1 deg F |
| Air Flow Rate | ±5% (of full-scale) |
| Liquid Flow Rate | ±5% (of full-scale) |
| Differential Pressure | ±3% (of full-scale) |
| Gage Pressure | ±5% (of full-scale) |
| Relative Humidity | ±2% RH |
| CO Monitor | ±5% mid range |
| CO2 Monitor | ±5% mid range |
| Refrigerant Monitor | ±5% at 50 PPM |

Note: Accepted calibration tolerances will vary according to measured medium and application of sensors. The Tolerances listed are standard accepted criteria.

9. Test Instrumentation

- a) All field calibration must be done with high quality instrumentation. Test instrumentation selected for calibrating field devices shall be suitable for application.
- b) Instruments need to display a current (within 12-month) calibration sticker. Calibration facility shall use NIST-traceable reference instruments in their calibration process.
- c) Associated instrument calibration certificates need to be available within 24 hours of request for copy.

10. Electrical Lower Tier Subcontractors

- a) The control provider is completely responsible for its electrical lower tier subcontractors and will be held accountable for any issues relating to:
 - i) Scope
 - ii) Schedule
 - iii) Material delivery or storage
 - iv) Coordination with various trades
 - v) Workmanship
 - vi) Manpower
 - vii) Back charges
 - viii) Site Specific Safety

11. Punch List / Deficiency Resolution

- a) If deficiencies are discovered and deemed the responsibility of the control provider, McKinstry will notify the control provider.
- b) Within one business day of deficiency notification, the control provider must resolve or provide the earliest possible time and date the deficiency can and will be resolved.
- c) McKinstry's commissioning team will begin control system point verification after the control provider's point-to-point testing and documentation is completed and provided to McKinstry. Control deficiencies discovered during McKinstry's commissioning process that results in the need for McKinstry to retest, are subject to cost impacts.
- d) McKinstry's commissioning team will begin control system functional performance testing after the control provider's sequence of

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operation verification testing and documentation is completed and provided to McKinstry. Control deficiencies discovered during McKinstry's commissioning process that results in the need for McKinstry to retest, are subject to cost impacts.

12. Training

- a) The control provider is responsible to provide owner training on their installed system. A training agenda will be created by McKinstry with input from the control provider. Owner facility staff attending training sessions "sign off" on attendance sheets and "sign off" on thoroughness of training sessions. Control provider shall supply electronic copies of Training Session attendance sheets and signed Owner Acceptance of Training sheets to McKinstry.
- b) The training must be performed by qualified individuals familiar with the specifics of the project for a sufficient duration to ensure that facility staff has all the information needed to optimally operate, maintain and replace the commissioned features and systems.

13. O&M Manuals

- a) Control provider submits electronic copies of O&M Manuals to McKinstry for compiling into a single electronic document. Design Engineer and Commissioning Agent or McKinstry Construction Manager approves test procedures.

14. Deliverables

- a) In addition to the project operation and maintenance manual requirements the control provider will be required to provide the following documentation:
 - i) Completed Point-to-Point documentation prior the commencement of McKinstry's commissioning team back check.
 - ii) Completed sequence of operation verification documents prior to the commencement of McKinstry's commissioning team functional performance testing.
 - iii) System schedule reports or screen shots.
 - iv) Hard and electronic copy of the project specific as-built programming.
 - v) Hard and electronic copy of the as-built sequence of operation.
 - vi) Hard and electronic copy of the as-built systems points list including all alarm setpoints.
- b) At project completion, ensure that any computer hardware or software necessary for accessing/operating the control system, is permanently installed and functional at the owner's user interface, and has the appropriate licensing to allow for full functionality of the system at project turnover. All hardware, software, and license(s) will become the property of the system owner.
- c) At project completion, ensure that the version of any installed software is the most-current available from the control manufacturer for the system installed at the project (Do not knowingly provide outdated software when newer versions are available.)

Special Terms and Conditions

Testing and Balancing

Subcontractor is a testing and/or balancing ("TAB") provider. Relative to commissioning and project closeout, this document serves to clarify TAB provider's performance obligations under this Subcontract on various points including: Scope Clarifications; Schedule; Communication; Manpower and Support; Test Instrumentation; Lower Tier Subcontractors; Punch Lists / Deficiency Resolution; and Reporting. The following defines and describes some of the performance levels performance TAB providers are required to comply with, but the following is not all inclusive. Unless otherwise specified elsewhere in this Subcontract:

1. Scope Clarifications

- a) All questions, comments, clarifications or concerns the TAB provider has through the balancing, closeout and commissioning process need to be communicated directly to McKinstry without hesitation. E-mail is the preferred means of recordable communication. Unless otherwise directed, emails will cc the appointed McKinstry project manager, McKinstry mechanical designer and McKinstry's commissioning lead.
- b) TAB provider is responsible for thoroughly understanding the project. Drawing review and a complete assessment of site conditions are required. The TAB provider is required to provide feedback regarding damper / valve installations needed to meet all design requirements prior to executing field work on the project. Additional balancing components (i.e. Dampers, Valves etc.) identified after installations are substantially complete may be subject to cost impacts to the subcontractor.
- c) The TAB provider will assign a project manager / lead person as McKinstry's single point of contact for this project.

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d) Dissemination of project specific information to other trades without McKinstry's consent should be avoided.

2. Schedule

a) All work is to be in conjunction with applicable construction schedules. Completion of TAB activities must also be accomplished with sufficient time remaining for the commissioning team to complete the verification process as required to meet the project schedule. Any deviation from this performance standard needs to be communicated to McKinstry immediately and will be evaluated for cost and schedule impacts.

3. Communication

a) McKinstry requires TAB providers to adhere to an appropriate level of communication as determined by the specific project. This includes but is not limited to:

- i. Promptly returning phone calls, e-mails, or pages
- ii. Timely response to or delivery of RFI's or punchlists
- iii. Attend and participate in any required coordination / start-up / commissioning meetings.

4. Manpower and Support

a) The TAB provider is responsible for providing adequate, qualified manpower for the purpose of completing systems verifications and the final TAB report.

b) TAB provider shall support all peripheral functions including equipment start-up, test and balance activities, commissioning, owner training, etc. 'Support' is defined as providing the required personnel for the task at hand. For example, during functional performance testing, the TAB provider may be asked to provide a project lead engineer, familiar with the system being tested, to be present alongside the commissioning team to make changes needed to correct deficiencies found during the testing process or demonstrate/verify values.

c) McKinstry reserves the right to have the TAB provider remove and replace incompetent or ineffective personnel.

5. Test Instrumentation

a) All field calibration must be done with high quality instrumentation. Test instrumentation selected for calibrating field devices shall be suitable for application.

b) Instruments need to display a current (12-month) NIST traceable calibration sticker or adhere to NEBB calibration standards.

c) Associated instrument calibration certificates need to be available within 24 hours of request for copy.

6. Lower Tier Subcontractors

a) The TAB provider is completely responsible for its lower tier subcontractors and will be held accountable for all associated issues, including but not limited to issues relating to:

- i. Scope
- ii. Schedule
- iii. Parts
- iv. Coordination with various trades
- v. Workmanship
- vi. Manpower
- vii. Back charges

7. Punch Lists / Deficiency Resolution

a) If deficiencies are discovered and deemed the responsibility of the TAB provider, McKinstry will notify the TAB provider.

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b) Within one business day of deficiency notification, the TAB provider must resolve or provide the earliest possible time and date the deficiency will be resolved. In either case, the deficiency must be resolved within 5 working days unless otherwise approved by McKinstry.

c) McKinstry's commissioning intent is to begin TAB verification after the TAB provider's field documentation is complete. Deficiencies discovered during McKinstry's commissioning process that result in the need for McKinstry to retest, are subject to possible back charges to the subcontractor.

8. Reporting

a) A preliminary TAB report may be required (subject to local jurisdictional requirements) to be turned over at the time of final inspections.

b) All TAB documentation (completed or partial) shall be available within 24 hours shall a request be made by McKinstry.

c) The Final TAB report shall be submitted in both hard copy and electronic format.

Arizona State Provisions

SAMPLE