



ADDENDUM #3
EASTERN PRATER WAY STORM DRAIN
BID #20/21-002 / PWP #WA-2020-319
BIDS DUE NO LATER THAN: 1:45 PM ON SEPTEMBER 1, 2020 - REVISED
PUBLIC BID OPENING: 2:00 PM ON SEPTEMBER 1, 2020 - REVISED

This addendum is to notify all potential proposers of clarifications made to the Bid documents as stated below.

COVID-19 Precautions – Due to the City’s response to the COVID-19 virus and associated reduction in staff, in-person staff availability is limited. Bidders wishing to physically deliver their bids on the bid due date shall note that the Purchasing Office will open at 1PM on September 1st for the purpose of receiving bids. Bids may also be delivered via USPS, UPS, FEDEX at any time prior to the bid deadline. Bids are due no later than 1:45PM on September 1, 2020. The public bid opening will be available to all bidders via Zoom as detailed in the Notice to Bidders. A complete bid recap will be available on the City’s website no later than 5PM on September 1, 2020.

RFI RESPONSE

Question #9:

What are pressure testing requirements for the 24” Storm Drain Force Main?

Response:

Bid item clarification for BID ITEM 7: INSTALL 24” FORCE MAIN has been updated to include hydrostatic pressure testing requirements.

Question #10:

Can all the trees in the Yield Lane island (Lift Station/30” RCP area) be removed and is it incidental for the lift station bid item or 30” RCP?

Response:

Trees may be removed and are incidental to the construction within the island.

SPECIAL PROVISION MODIFICATIONS

BID ITEM 7: INSTALL 24" FORCE MAIN

Measurement of this bid item shall be by the linear foot along the pipe centerline. Measurement shall be made from inside wall of the pump station access hatch to inside wall of downstream pipe connection.

Force main construction may be completed with either 24" C900 (DR 18) PVC or Class 250 Ductile Iron. Force main construction shall be entirely with one type of pipe and not change. If C900 (DR 18) PVC is used, it shall conform to AWWA C900 with gaskets meeting ASTM F477 and joints meeting ASTM D3139. If Ductile Iron Pipe is used, it shall be pressure class 250 with rubber gasket/mechanical joints meeting AWWA C111, Pg. 77 of OB).

Where restrained joints are indicated on the plans, restrained joints shall meet or exceed the pressure rating of the pipe. Self-restrained joint gaskets or restraint harnesses may be used for C900 PVC and push-on restrained joint gaskets or mechanically restrained joints may be used for Ductile Iron. CONTRACTOR shall submit proposed restraining product to Engineer for approval prior to construction.

The unit price shall constitute full compensation for furnishing all labor, materials, tools, equipment, and incidentals for excavating, trenching, restraining joints, backfilling pipe and connecting force main to the existing storm drain, complete in place. Reference Standard Specifications Sections 203.00, 305.00, and 306.00.

After force main and appenences have been installed, test force main and drain. Hydrostatic testing of the force main shall be performed after installation of pipe and may be accomplished with joints exposed or covered. If joints are exposed, partially backfill trench. CONTRACTOR shall schedule testing of force main sections with the Engineer and City project coordinator.

1. Fill pipe with potable water; allow pipe to stand under slight pressure for not less than 24 hours to allow pipe to absorb water and allow the escape of air from air pockets.
2. Hold pressure on each section of force main for at least two hours.
3. Test pressure at the lowest point in the pipeline section being tested. Test pressure shall be 200 psi.
4. Leakage not to exceed the limits as stated in AWWA C600.
5. Correct all leaks, both those that are noticeable and those that are above allowable limits and re-test.

SECTION 400 ELECTRICAL FOR LIFT STATIONS

Section 262419 Motor Control Centers has been updated to the attached.

BID ITEM SCHEDULE REPLACEMENT

The original Bid Item Schedule found on Pages 4-7 of the original Bid Book and replaced in Addendum 1 is further revised and provided in the following pages. Please use this Bid Item Schedule as a replacement of the previous 2 versions.

The bid schedule item #28 has been revised to reflect a quantity of 7 and priced by the each to match the Bid Item Clarification Modification that can be found in the Addendum #1 document.

Please note and adjust your bid according to the revisions, additions, deletions, clarifications or modifications as presented on this Addendum #3, which are made a part of this bid. NOTE: To avoid disqualification, this Addendum 3 (and any other addenda) must be signed by an authorized representative of the bidding firm in the space provided and must be submitted with your firm's sealed proposal. Failure to return this addendum, duly signed, may be cause for rejection of the bid. ALL ADDENDA SHOULD BE SIGNED AND PLACED IN SEQUENTIAL ORDER AND ATTACHED TO THE FRONT OF THE BID PACKAGE, COMPLETE WITH ALL REQUIRED DOCUMENTS.

CONTRACTOR BUSINESS NAME

X _____
Authorized Signature

Printed Name of Person Signing

Dan Marran, C.P.M., CPPO
Contracts and Risk Manager

August 27, 2020

CITY OF SPARKS
BID ITEM SCHEDULE – 2ND REVISION (ADDENDA #3)

BID TITLE: Eastern Prater Way Storm Drain
BID #20/21-002
PWP#WA-2020-319

PRICES must be valid for 90 calendar days after the bid opening.

COMPLETION of this project is expected **PURSUANT TO CONTRACT DOCUMENTS**.

BIDDER acknowledges receipt of _____ Addenda.

Bidder Name _____			(signature) _____		
Item No.	Quantity	Unit	Description	Unit Price	Total Price
1	1	LS	Mobilization/Demobilization	\$ _____/LS	\$ _____
2	1	LS	Traffic Control	\$ _____/LS	\$ _____
3	1	LS	Dewatering	\$ _____/LS	\$ _____
4	3	LF	Install 12” SDR-35 PVC	\$ _____/LF	\$ _____
5	2	LF	Install 18” SDR-35 PVC	\$ _____/LF	\$ _____
6	197	LF	Install 24” C900PVC (DR 18)	\$ _____/LF	\$ _____
7	2,994	LF	Install 24” Force Main	\$ _____/LF	\$ _____
8	11	LF	Install 18” Class III RCP	\$ _____/LF	\$ _____
9	58	LF	Install 24” Class III RCP	\$ _____/LF	\$ _____
10	249	LF	Install 30” Class III RCP	\$ _____/LF	\$ _____
11	239	LF	Install 42” Class V RCP	\$ _____/LF	\$ _____
12	84	LF	Install 53”x34” Class III HERCP	\$ _____/LF	\$ _____
13	3	EA	Install 24” 11.25° Elbow Fitting	\$ _____/EA	\$ _____
14	9	EA	Install 24” 22.5° Elbow Fitting	\$ _____/EA	\$ _____
15	9	EA	Install 24” 45° Elbow Fitting	\$ _____/EA	\$ _____
16	4	EA	Install 4” Flush Valve Assembly	\$ _____/EA	\$ _____
17	5	EA	Install 1” Air Release Valve Assembly	\$ _____/EA	\$ _____
18	3	EA	Construct Concrete Collar	\$ _____/EA	\$ _____
19	250	LF	Remove Storm Drain Pipe	\$ _____/LF	\$ _____
20	4	EA	Construct High Capacity Curb Inlet (Double Grate)	\$ _____/EA	\$ _____
21	2	EA	Construct High Capacity Curb Inlet (Quadruple Grate)	\$ _____/EA	\$ _____
22	4	EA	Construct Type CM2 Drop Inlet (Single Unit Frame)	\$ _____/EA	\$ _____
23	3	EA	Construct NDOT Type 4 Storm Drain Manhole	\$ _____/EA	\$ _____

24	5	EA	Construct Type V Storm Drain Manhole	\$ _____/EA	\$ _____
25	1	LS	Pump Station Electrical and Instrumentation and Control Connections	\$ _____/LS	\$ _____
26	1	LS	Construct Pump Station	\$ _____/LS	\$ _____
27	1	LS	Construct Concrete Pad and Bollards	\$ _____/LS	\$ _____
28	7	EA	TMWA Water Line Replacement	\$ _____/EA	\$ _____
29	1	LS	TMWA Water Main Support and Slurry Backfill	\$ _____/LS	\$ _____
30	625	SF	Remove and Replace P.C.C. Sidewalk, Driveway Apron, or Valley Gutter	\$ _____/SF	\$ _____
31	88	LF	Remove and Replace P.C.C. Curb (Median)	\$ _____/LF	\$ _____
32	420	LF	Remove and Replace P.C.C. Curb and Gutter (Type 1, 1A, & Rolled)	\$ _____/LF	\$ _____
33	112	SF	Remove Existing and Construct Portland Cement Concrete Pedestrian Ramp	\$ _____/SF	\$ _____
34	3,523	LF	Permanent Bituminous Pavement Patching	\$ _____/LF	\$ _____
35	9,975	SY	2-1/2" Grind and Overlay	\$ _____/SY	\$ _____
36	1	LS	Protect and Adjust Utility Valve Boxes and Manholes to Finished Grade	\$ _____/LS	\$ _____
37	176	LF	Preformed Thermoplastic Pavement Markings, 12" and 24" Stop Bar and Yield	\$ _____/LF	\$ _____
38	374	LF	Preformed Thermoplastic Pavement Markings, 24" by 10' Long Crosswalk	\$ _____/LF	\$ _____
39	2	EA	Preformed Thermoplastic Pavement Markings, Bike Symbol	\$ _____/EA	\$ _____
40	12	LF	Preformed Thermoplastic Pavement Markings, Triangles	\$ _____/LF	\$ _____
41	11	EA	Preformed Thermoplastic Pavement Markings, Arrow (Turn or Straight or Combination)	\$ _____/EA	\$ _____
42	511	LF	Pavement Marking 4" Double Solid Yellow or White Paint	\$ _____/LF	\$ _____
43	1,724	LF	Pavement Marking 4" Single Solid Yellow or White Paint	\$ _____/LF	\$ _____
44	3,192	LF	Pavement Marking 4" Single Dashed Yellow or White Paint (10' Stripe 30' Gap)	\$ _____/LF	\$ _____
45	130	LF	Pavement Marking 4" Single Dashed Yellow or White Paint (2.5' Stripe 3.5' Gap)	\$ _____/LF	\$ _____

46	1	LS	Remove and Replace Loop Detectors	\$ _____/LS	\$ _____
47	1	LS	Landscape Restoration (Contingent Item)	\$15,000/LS	\$15,000
48	250	CY	Over Excavation of Unsuitable Material & Backfill (Contingent Item)	\$ _____/CY	\$ _____
49	25	LF	Lateral Pipe Damage (Contingent Item)	\$ _____/LF	\$ _____
50	1	LS	Force Account	\$400,000/LS	\$400,000
51	5	EA	Relocation of Utilities (Contingent Item)	\$ _____/EA	\$ _____

<p>Total Price for Eastern Prater Way Storm Drain</p> <p>\$ _____</p> <p style="text-align: center;">(written total bid price)</p>	<p>\$ _____</p>
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SECTION 262419 - MOTOR-CONTROL CENTERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes MCCs for use with ac circuits rated 600 V and less, with combination controllers and having the following factory-installed components:
 - 1. Feeder-tap units.
 - 2. Measurement and control.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each MCC, manufacturer's approval and production drawings as defined in UL 845. In addition to requirements specified in UL 845, include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - 1. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Enclosure types and details.
 - d. Nameplate legends.
 - e. Short-circuit current (withstand) rating of complete MCC, and for bus structure and each unit.
 - f. Features, characteristics, ratings, and factory settings of each installed controller and feeder device, and installed devices.
 - g. Specified optional features and accessories.
 - 2. Schematic Wiring Diagrams: For power, signal, and control wiring for each installed controller.
 - 3. Nameplate legends.
 - 4. Vertical and horizontal bus capacities.
 - 5. Features, characteristics, ratings, and factory settings of each installed unit.

1.3 INFORMATIONAL SUBMITTALS

- A. Standard Drawings: For each MCC, as defined in UL 845.
- B. Seismic Qualification Data: Certificates, for MCCs, accessories, and components, from manufacturer.

- C. Product Certificates: For each MCC.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Load-Current and Overload Compile after motors have been installed, and arrange to demonstrate that selection of current values match actual motor nameplate full-load currents.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace MCC that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. NEMA Compliance: Fabricate and label MCCs to comply with NEMA ICS 18.
- B. Ambient Environment Ratings:
 - 1. Ambient Temperature Rating: Not less than 0 deg F (minus 18 deg C) and not exceeding 104 deg F (40 deg C), with an average value not exceeding 95 deg F (35 deg C) over a 24-hour period.
 - 2. Ambient Storage Temperature Rating: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C)
 - 3. Humidity Rating: Less than 95 percent (noncondensing).
 - 4. Altitude Rating: Not less than 5000 feet (1500 m).
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: MCCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."

2. Component Importance Factor: 1.5.
3. Component Amplification Factor: 2.5.
4. Component Response Modification Factor: 6.0.

B. Capacities and Characteristics:

1. MCC Enclosure and Assembly:
 - a. Nominal System Voltage: 480 V.
 - b. Service Equipment Rated: No.
 - c. Enclosure: Type 4.
 - d. Integrated Short-Circuit Rating for MCC:
 - 1) Combination series rated; 42 kA.
 - 2) Fully rated; 42 kA.
 - e. Integrated Short-Circuit Rating for Each Unit:
 - 1) Combination series rated; 42 kA.
 - 2) Fully rated; 42 kA.
 - f. Bus:
 - 1) Neutral Bus: Full size.
2. VFCs:
 - a. Tag Number: 175 hp, 261 full-load A.
 - 1) Bypass Mode: None required.
 - 2) Overload Relays: Integral Solid state.
 - 3) Isolated Overload Alarm Contact: Per system integrator.
3. Panelboards:
 - a. Mains: MCCB, 1 phase, 120/240 V, 1-phase, 40 A.
 - b. Bolt-on circuit breakers.
4. Transformer(s): 10 kVA, 480 V, 1-Phase primary, 120/240 V, 1-phase secondary.
 - a. Primary Circuit Breaker: MCCB, 30 A.

2.3 ENCLOSURES

- A. Space Heaters: Factory-installed electric space heaters of sufficient wattage in each vertical section to maintain enclosure temperature above expected dew point.
1. Space-Heater Control: Thermostats to maintain temperature of each section above expected dew point.
 2. Space-Heater Power Source: 120-V external branch circuit.

- B. Outdoor Enclosures: Type 4, non-walk-in aisle.
 - 1. Finish: Factory-applied finish in manufacturer's standard color; undersurfaces treated with corrosion-resistant undercoating.
 - 2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
 - 3. Doors: Personnel door for each section, opening outwards; with provisions for padlocking.
 - 4. Accessories: LED lighting fixtures, ceiling mounted; wired to a three-way light switch at each end of enclosure; GFCI duplex receptacle.
 - 5. Power for space heaters, ventilation, lighting, and receptacle supplied from panel within MCC

2.4 ASSEMBLY

- A. Structure:
 - 1. Comply with UL requirements for service entrance equipment.
 - 2. Units up to and including Size 3 shall have drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
 - 3. Units in Type B and Type C MCCs shall have pull-apart terminal strips for external control connections.
- B. Compartments: Modular; individual lift-off doors with concealed hinges and quick-captive screw fasteners.
 - 1. Interlock compartment door to require that the disconnecting means is "off" before door can be opened or closed, except by operating a concealed release device.
 - 2. Compartment construction shall allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in MCC.
 - 3. The same-size compartments shall be interchangeable to allow rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.
- C. Bus Transition and Incoming Pull Sections: Included and aligned with the structure of the MCC.
- D. Interchangeability: Compartments constructed to allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in MCC; same-size compartments to permit interchangeability and ready rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.
- E. Wiring Spaces:
 - 1. Vertical wireways in each vertical section for vertical wiring to each unit compartment; supports to hold wiring in place.
 - 2. Horizontal wireways in bottom and top of each vertical section for horizontal wiring between vertical sections; supports to hold wiring in place.

- F. Provisions for Future:
 - 1. Compartments marked "future" shall be bused, wired and equipped with guide rails or equivalent, and ready for insertion of drawout units.
 - 2. Compartments marked "spare" shall include provisions for connection to the vertical bus.
- G. Integrated Short-Circuit Rating:
 - 1. Short-Circuit Current Rating for Each Unit: Fully rated; 17 kA.
 - 2. Short-Circuit Current Rating of MCC: Fully rated with its main overcurrent device; 17 kA.
- H. Factory-Installed Wiring: Factory installed, with bundling, lacing, and protection included. Use flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
 - 1. Control and Load Wiring: Factory installed, with bundling, lacing, and protection included. Use flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
- I. Bus:
 - 1. Main Horizontal and Equipment Ground Buses: Uniform capacity for entire length of MCC's main and vertical sections. Provide for future extensions.
 - 2. Vertical Phase and Equipment Ground Buses: Uniform capacity for entire usable height of vertical sections, except for sections incorporating single units.
 - 3. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent minimum conductivity or tin-plated alloy, with mechanical connectors for outgoing conductors.
 - 4. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent minimum conductivity or tin-plated, high-strength, electrical-grade aluminum alloy, with mechanical connectors for outgoing conductors.
 - 5. Ground Bus: Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for ground conductors, minimum size 1/4-by-2 inches (6 by 50 mm). Equip with mechanical connectors for outgoing conductors.
 - 6. Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2-inch (6-by-50-mm) copper bus, arranged to connect neutral bus to ground bus.
 - 7. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Insulation temperature rating shall not be less than 105 deg C.

2.5 MAIN SURGE PROTECTIVE DEVICE

- A. 240 kA: Fixed mounted.
 - 1. Factory connected at incoming lugs

2.6 VFC

- A. Controller Units: Combination controllers, consisting of variable-frequency power converter that is factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged for self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency. Comply with NEMA ICS 7, NEMA ICS 61800-2, UL 508C, and UL 508E.
1. Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
 2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
 3. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- B. Disconnects:
1. MCP:
 - a. UL 489, with interrupting capacity complying with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - b. Lockable Handle: For three padlocks and interlocks with cover in closed position.
- C. Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
 2. Input AC Voltage Unbalance: Not exceeding [3] [5] percent.
 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 4. Minimum Efficiency: 96 percent at 60 Hz, full load.
 5. Minimum Displacement Primary-Side Power Factor: 96 percent under any load or speed condition.
 6. Overload Capability:
 - a. For variable-torque controllers, 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 - b. For constant-torque controllers, 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 7. Starting Torque: Minimum of 100 percent of rated torque from 3 to 60 Hz.
 8. Speed Regulation: Plus or minus 5 percent.
 9. Output Carrier Frequency: Field selectable.
 10. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
 11. Internal Adjustability Capabilities:
 - a. Minimum Speed: 5 to 25 percent of maximum rpm.
 - b. Maximum Speed: 80 to 100 percent of maximum rpm.
 - c. Acceleration: 0.1 to 999.9 seconds.

- d. Deceleration: 0.1 to 999.9 seconds.
 - e. Current Limit: 30 to a minimum of 150 percent of maximum rating.
12. Self-Protection and Reliability Features:
- a. Loss of Input Signal Protection: Selectable response strategy including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - b. Under- and overvoltage trips.
 - c. Inverter overcurrent trips.
 - d. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved and listed and labeled by an NRTL.
 - e. Critical frequency rejection, with three selectable, adjustable deadbands.
 - f. Instantaneous line-to-line and line-to-ground overcurrent trips.
 - g. Loss-of-phase protection.
 - h. Reverse-phase protection.
 - i. Short-circuit protection.
 - j. Motor overtemperature fault.
13. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
14. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- D. Operator Station:
- 1. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.
 - 2. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
 - 3. Panel-mounted, manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - a. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
- E. Displays:
- 1. Historical Logging Information and Displays:
 - a. Real-time clock with current time and date.
 - b. Running log of total power versus time.
 - c. Total run time.
 - d. Fault log, maintaining last four faults with time and date stamp for each.
 - 2. Indicating Devices: Digital display and additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters including the following:
 - a. Output frequency (Hz).

- b. Motor speed (rpm).
 - c. Motor status (running, stop, fault).
 - d. Motor current (amperes).
 - e. Motor torque (percentage).
 - f. Fault or alarming status (code).
 - g. PID feedback signal (percentage).
 - h. DC-link voltage (V dc).
 - i. Set-point frequency (Hz).
 - j. Motor output voltage (V ac).
- F. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- G. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
- H. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- I. Communication Port: Per system integrator.

2.7 CONTROLLER-MOUNTED AUXILIARY DEVICES

- A. Control-Circuit and Pilot Devices: Factory installed in controller enclosure cover unless otherwise indicated. Comply with NEMA ICS 5.
- 1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oiltight type.
 - a. Push Buttons: Covered types; momentary contact unless otherwise indicated.
 - b. Pilot Lights: LED types; push to test.
 - c. Selector Switches: Rotary type.
- B. Meters: Elapsed Time
- 1. Panel type, 2-1/2-inch (64-mm) minimum size with 90- or 120-degree scale and plus or minus 2 percent accuracy, with selector switches having an off position.
- C. Auxiliary Dry Contacts: Reversible NC/NO.

2.8 SOURCE QUALITY CONTROL

- A. MCC Testing: Test and inspect MCCs according to requirements in NEMA ICS 18.
- B. MCCs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. NEMA Industrial Control and Systems Standards: Comply with parts of NEMA ICS 2.3 for installation and startup of MCCs.
- B. Floor Mounting: Install MCCs on 4-inch (100-mm) nominal-thickness concrete base. Comply with requirements for concrete base specified in other specification sections.
- C. Seismic Bracing: Comply with requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."
- F. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- G. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- H. Comply with NECA 1.
- I. Comply with requirements in Section 260553 "Identification for Electrical Systems" for identification of MCC, MCC components, and control wiring.
 - 1. Identify field-installed conductors, interconnecting wiring, and components.
 - 2. Install required warning signs.
 - 3. Label MCC and each cubicle with engraved nameplate.
 - 4. Label each enclosure-mounted control and pilot device.

3.2 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers and remote devices. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - 2. Connect selector switches within enclosed controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.3 CONNECTIONS

- A. Comply with requirements for installation of conduit in Section 260533 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings, and specialties.
- B. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
 - 5. Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.
- D. MCCs will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload relay pickup and trip ranges.
- B. Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium

Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Owner before increasing settings.

- D. Set the taps on reduced-voltage autotransformer controllers at 80 percent.
- E. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage, solid-state controllers.
- F. Program microprocessors in VFCs for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- G. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination Study."

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers.

END OF SECTION 262419