

PROJECT MANUAL

MUNICIPAL BUILDING ALTERATION

**MUNICIPAL BUILDING ADA
COMPLIANT DOORS**

**VILLAGE OF KRONENWETTER,
MARATHON COUNTY, WI**

FEBRUARY 18, 2024

PREPARED FOR:

**VILLAGE OF KRONENWETTER
2024-020(B)**

PREPARED BY:

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01.60.10 GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

A. RELATED REQUIREMENTS

1. Applicable requirements of Section 26 shall govern work in this Section.

B. DEFINITIONS

1. The Owner: Village of Kronenwetter, WI
2. The Engineer: Roth Professional Solutions, Portage, Wisconsin.
3. Provide: Furnish, install and wire complete and ready for service.
4. Exposed: Exposed to view in any room, corridor or stairway.
5. Code: National, State and Local Electrical codes including OSHA requirements.
6. NEC: National Electrical Code
7. NFPA: Standard for Fire Protection in Wastewater Treatment and Collection Facilities
8. Signal Voltage: NEC class 1, 2, or 3 remote control, signaling, or power limited circuits.
9. Low Voltage: 50 to 600 volts
10. Medium Voltage: 601 to 35,000 volts
11. High Voltage: 35,001 volts and greater

C. STANDARDS AND CODES

1. All work shall be installed in accordance with National, State, and Local codes, ordinances, laws, and regulations. National Codes include, but are not limited to, the NEC and NFPA 820. Comply with all applicable OSHA regulations.
2. All materials shall have a UL or ETL label where a UL or ETL Standard and/or test exists.

D. DIMENSIONS AND DEFINITE LOCATIONS

1. The drawings depicting electric work are diagrammatic and show, in their approximate location, symbols representing electrical equipment and devices. The exact location of such equipment and devices shall be established in the field in accordance with instructions from the Engineer and/or as established by manufacturer's installation drawings and details.
2. The Contractor shall refer to shop drawings and submittal drawings for all equipment requiring electrical connections to verify rough-in and connection locations.
3. Unless specifically stated to the contrary, no measurement of an electric drawing derived by scaling shall be used as a dimension to work by. Dimensions noted on the electric drawings are subject to measurements of adjacent and previously completed work. All measurements shall be performed prior to the actual installation of equipment.

E. DRAWINGS

1. The Contractor shall keep a detailed up-to-date record, of the manner and location in which all installations are actually made, indexing each feeder, pull box and protective device.
2. As Built Drawings - See General Requirements - Section 26.
3. In the event of a conflict between the drawings and specifications, Contractor shall base their bid on the greater quantity, cost or quality of the item in question, unless such conflict is resolved by an addendum.

F. SHOP DRAWINGS AND EQUIPMENT BROCHURES

1. Submit to Engineer for review, the manufacturer's shop drawings and/or equipment brochures in accordance with the following specifications:
 - a. Section 01.60.11 – Electrical Studies
 - b. Section 01.61.11 – Conduits
 - c. Section 01.61.12 – Conduit Fittings
 - d. Section 01.61.20 – Low Voltage Wires, Cables and Connectors
 - e. Section 01.61.30 – Electrical Boxes
 - f. Section 01.61.40 – Wiring Devices
 - g. Section 01.61.70 – Motor and Circuit Disconnects (Include disconnect overcurrent devices with this submittal)
 - h. Section 01.64.02 – Underground Electric Service
 - i. Section 01.64.21 – Surge Protective Devices
 - j. Section 01.64.50 – Grounding (including Ground rod locations and measured resistance)
 - k. Section 01.64.61 – Low Voltage Dry Type Transformers
 - l. Section 01.64.70 – Electrical Panelboards (Include panelboard overcurrent devices with this submittal)
 - m. Section 01.64.75 – Low Voltage Overcurrent Protective Devices
 - n. Section 01.64.81 – Motor Starters
 - o. Section 01.64.83 – Adjustable Frequency Controllers
 - p. Section 01.65.01 – Lamps
 - q. Section 01.65.10 – Lighting Fixtures
 - r. Section 01.66.20 – Standby Power Generator
 - s. Section 01.66.21 – Automatic Transfer Equipment
 - t. Section 01.69.60 – Testing Electrical System
2. Plans - Lighting Control Contactors, Lighting Control Time Clocks, Lighting Control Photocells
3. Shop drawings shall be submitted in advance of construction and installation so as to not cause delay in other Contractor's work.

G. TESTS AND ACCEPTANCE

1. The operation of the equipment and electrical systems does not constitute an acceptance of the work by the Owner. The final acceptance is to be made after the Contractor has adjusted his equipment and demonstrated that it fulfills the requirements of the drawings and the specifications.
2. After the work is completed and prior to acceptance, the Contractor shall conduct the following tests, tabulate data, date, sign and submit to the Engineer:
 - a. Standard megger insulation test on each feeder.
 - b. Ground resistance test.
 - c. Clamp ammeter test on each feeder conductor with all utilization equipment energized. The load current in each phase conductor of the feeder or the portion thereof supplying the panel shall not differ from the average connected load currents in the feeder conductors by more than 7½%. If the load current does differ by more than 7½%, the Contractor shall change phase loading to same or receive written approval from the Engineer that this is not required due to the nature of the load.
3. Upon completion of the installation, the Contractor shall furnish certificates of approval from all authorities having jurisdiction. The Contractor shall demonstrate that all work is complete and in perfect operating condition, with race way and conduit system properly

grounded, all wiring free from grounds, shorts, and that the entire installation is free from any physical defects.

4. In the presence of the Engineer and the Owner, the Contractor shall demonstrate the proper operation of all miscellaneous systems.
5. Perform other tests as specifically directed in other sections of the specification for specific equipment.

H. IDENTIFICATION

1. Each distribution and lighting panel shall be equipped with a typewritten directory describing the loads served. Directory shall be contained in a steel frame mounted on the inside face of the panel's door and shall be covered with a sheet of clear plastic.
2. All distribution panels, transformers, telephone backboards, transfer switches, panels and cabinets shall be provided with 1/8" minimum thickness 5 ply lamecoid plastic nameplates indicating usage, plan designation and voltage where applicable. Nameplates shall be white with black engraved lettering. Lettering shall be 1/2" high minimum. Fasten nameplates with escutcheon pins.
3. All panelboards and control panels shall include a warning label indicating the risk of Arc Flash. The warning label shall comply with N.E.C. article 110.16 and O.S.H.A. 29.
4. Junction and pull boxes shall be stenciled as follows:
 - a. Lighting and power feeders and branch circuits - 120, 208, 240, 277, and 480V.
 - b. Voice/Data communications - V/D COM
 - c. Instrumentation & Control - I&C
5. Branch wiring shall be color coded per industry standards. Where wires of different systems junction in a common box each cable shall be grouped with its own system and identified using tags or identification strips.
6. On all 3 phase systems, each phase shall be identified at all terminals using code marker.
7. All cover plates for control stations controlling remote equipment shall be engraved to identify the device being controlled.
8. All motor starters, remote control stations, etc., shall be identified with engraved lamecoid nameplates fastened to the equipment with escutcheon pins. Nameplates shall be 1/8" 5 ply lamecoid with 1/2" black letters on a white background. Adhesive cloth labels, similar to those manufactured by Brady Label Co., may be used on motor switches and controls only, indicating the number, designation, size and usage of the motor.
9. Refer to individual specification sections for more specific or additional identification requirements.

I. ACCESS PANELS

1. All access panels required by code or otherwise to electrical service equipment shall be supplied and installed by the Contractor.

J. CORROSIVE AREAS

1. Refer to drawings for areas that are designated corrosive.

K. HAZARDOUS AREAS

1. NFPA 820 identified NEC-Area Electrical classifications. The Contractor shall provide material and installation in compliance with this national standard.
2. All sanitary sumps and wastewater wet wells have a CLASS 1, SECTION 26 area rating. Contractor shall provide material and installation labor accordingly.

L. FIRESTOPPING

1. Openings in fire rated construction and annular spaces around conduits, cable trays, and other penetrating items shall be protected in accordance with NEC article 300-21 and in accordance with the Wisconsin Administrative Code, Department of Commerce Chapter 51.049. The fire rating of the protective seal shall be at least that of the floor or wall into which it is installed, so that the original fire rating of the construction is maintained.
2. Firestopping materials shall include, but not be limited to, mortars, sealants and caulks, putties, collars, intumescent wrap strips mastics, and firestop pillows. All materials and methods used shall be recognized by an independent testing agency and shall have flame and temperature ratings assigned by that agency.
3. Materials using solvents or those requiring hazardous waste disposal shall not be used.
4. All wall or floor penetrations openings shall be as small as possible.
5. All openings and annular spaces required by code to be protected, shall be protected whether specifically indicated on the plans or not.
6. The firestop assemblies shall meet ASTM E-814 and all of the fire test and hose stream test requirements of an independent testing agency.
7. Installation of materials and assemblies shall be in strict accordance with the manufacturer's instructions.
8. Acceptable Manufacturers
 - a. 3M Corporation.
 - b. Nelson Firestop Products
 - c. Rectorseal Corporation

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-END OF SECTION-

01.61.11 CONDUITS

PART 1 GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Section 26 shall govern work in this Section.
- B. SCOPE
 - 1. Provide conduit systems for all power, control, and communications systems wiring as specified. Flexible, modular wiring systems shall not be used unless expressly accepted by the Engineer.
- C. QUALITY ASSURANCE
 - 1. National Electrical Contractors Association (NECA) Standard of Installation.
 - 2. National Electrical Code (NEC) Including State of Wisconsin and local supplements.

PART 2 PRODUCTS

- A. GALVANIZED RIGID CONDUIT (GRC)
 - 1. Manufactured lengths, full weight, heavy wall, rigid steel conduit, protected inside and out by hot-dipped galvanized or electro-galvanized coating.
 - 2. Minimum conduit size shall be 3/4 inch.
- B. POLYVINYL CHLORIDE CONDUIT (PVC)
 - 1. Standard lengths and sizes.
 - 2. Minimum size 3/4" with the exception that the minimum size conduit for underground site lighting circuits shall be 1".
 - 3. Schedule 40 or 80, heavy wall rigid plastic (PVC) conduit manufactured to NEMA TC-2 standards, UL listed, and as required by NEC. Sunlight resistant.
 - 4. Rated for 90 degrees C. cable.
- C. PVC COATED RIGID METAL CONDUIT
 - 1. Per NEMA Standards Publication No. RN 1 - 1980 and ANSI C80.1. Shall be ETL Verified PVC-001.
 - 2. Rigid steel galvanized conduit with PVC coating.
 - 3. Full weight 40 mil thick PVC coating, bonding to galvanized metal shall be stronger than plastic tensile strength.
 - 4. Minimum conduit diameter shall be 3/4 inch.
- D. LIQUIDTIGHT FLEXIBLE METAL CONDUIT
 - 1. Galvanized spiral strip flexible steel.
 - 2. Standard conduit sizes.
 - 3. Heavy wall sunlight resistant PVC jacket.
 - 4. **Minimum** size 3/4 inch.

PART 3 EXECUTION

A. GENERAL

1. Interior conduits for wiring systems rated 50 to 600 volts shall be galvanized rigid conduit (GRC). Exceptions to the requirements stated above are as follows:
 - 1) Conduits for feeder conductors shall be GRC regardless of conduit size.
 - b. Conduits in poured concrete construction shall be GRC regardless of size.
 - c. Flexible conduit where required by other paragraphs in this section.
 - d. Conduits in hazardous locations.
 - e. Conduits in corrosive areas.
2. Exterior underground conduit in direct contact with the earth and conduits embedded in concrete lighting fixture pole bases shall be heavy wall schedule 40 PVC except as follows:
 - a. Underground conduit runs which enter or exit the building envelope shall utilize PVC-coated rigid metal conduit from the point of penetration of the building envelope and the next 5' portion of the run in direct contact with the earth.
 - b. Underground conduit runs which contain adjustable frequency drive conductors shall be PVC-coated rigid metal.
3. Exterior exposed conduit (i.e. outside of building wall or above roof) shall be GRC.
4. Conduits encased in concrete as part of an underground electrical duct package shall be schedule 40 HW PVC except that conduits within 5' of a manhole or within 5' of the building envelope shall be PVC-coated rigid metal.
5. Conduits installed in corrosive areas shall be PVC coated rigid metal conduit. Corrosive areas are identified on the drawings.
6. Conduits containing only electrical service bare copper grounding conductors shall be HW PVC.

B. DIRECT BURIED UNDERGROUND CONDUIT

1. Exterior underground direct buried conduits shall be buried at a depth of not less than 30 inches below grade.
2. Provide conduits or ducts terminating below grade with means to prevent entry of dirt or moisture.
3. Underground conduits shall slope 1/8" per foot for proper drainage. Conduits shall drain toward manholes and junction boxes, not the electrical equipment.

C. PROCEDURES AND PRACTICES

1. All conduit shall be routed concealed in finished spaces and shall not be visible at any point within the finished space or from the building's exterior. This requirement also applies to new conduits installed in existing construction. Exposed raceway may be used on remodeling projects only where physically impossible to route concealed in existing construction. In each case the specific raceway type and routing shall be submitted to the Engineer for approval. Where allowed, the general installation requirements are as follows.
 - a. Raceways shall be routed horizontally along the corners of walls and ceilings, directly above edges of base molding at floors, or along the tops of window and door frames.
 - b. Raceways shall be routed vertically along corners of adjacent walls and along the edges of window and door frames.
 - c. Raceways shall not be routed down or across open wall surfaces except in portions of runs not exceeding 12" in length.
 - d. Raceways shall be painted to match wall finishes, in finished spaces.

- e. Fittings and boxes used with raceways shall be specifically designed and approved for use with the raceways.
 - f. Raceways may not be routed on or across finished floors.
 - 2. Cut joints shall be square, reamed smooth, and drawn up tight.
 - 3. Keep conduit plugged, clean, and dry during construction.
 - 4. Install No. 12 pull wire in empty conduit.
 - 5. Cap spare conduits.
 - 6. Provide a watertight conduit system where installed in wet locations such as outdoors, underground, in wash-down areas, or where embedded in concrete.
 - 7. Conduits may be routed exposed in mechanical equipment, electrical, and utility rooms.
 - 8. Route all conduits parallel to or at right angles with lines of the building construction and structural members except conduit runs routed concealed in poured-in-place concrete floor slabs may be run in a direct line from source to load.
 - 9. Make bends and offsets without kinking or destroying smooth bore of conduit. Arrange bends and offsets in parallel conduits to present a neat symmetrical appearance.
 - 10. Secure conduits in place with malleable corrosion-proof alloy straps or hangers. Conduit straps used in corrosive areas shall be PVC coated.
- D. The use of perforated strapping as a conduit hanging method is not approved.
- 1. Conduit runs that extend through areas of different temperature or atmospheric conditions shall be sealed using approved seal off devices, drained, and installed in a manner that will prevent drainage of moisture or gas migration into cabinets, and equipment enclosures.
 - a. Conduits routed within poured concrete construction (poured walls, floor slabs, topping slabs, etc.) shall comply with the following requirement.
 - b. Conduits shall be parallel to each other, spaced on center to center distance of at least three times conduit trade diameter, and provided with a minimum of 2 inches concrete covering. Contractor shall note that precast planks below topping slabs may camber. Topping slab thickness will be less at the high point of the camber.
 - c. Conduits larger than 1¼ inches ID shall not be installed in floor slabs. Conduits over ¾ inches ID shall not be installed in topping slabs.
 - d. Conduits embedded in a structural frame slab shall comply with applicable provisions of American Concrete Institute (ACI), Standard 318. Refer to structural drawings for locations of structural frames.
 - e. Conduits used for feeders shall not be embedded in concrete floor slabs or concrete topping slabs.
 - f. Conduits in poured concrete construction shall not cross other conduits or other piping.
 - g. Unless specifically indicated on the electrical plans, conduits installed in (or under) the poured concrete construction shall be approved by the Engineer prior to conduit installation. The contractor will be required to submit drawings showing conduit sizes and routings to the Engineer for his review. Approval may not be given prior to bidding. Contractors who base their bid on the assumption that conduits will be allowed in concrete construction do so at their own risk. No changes will be made to the contract if, during construction, the Engineer prohibits the installation of conduit in concrete construction.
 - 2. In areas constructed of precast concrete conduits may be run in cores of planks.
 - 3. Connections to Motors and Equipment Subject to Vibration:
 - 1) Flexible steel conduit not over 3 ft. long for connection to motorized equipment.

- 2) Liquid-tight flexible conduit not over 3 ft. long where exposed to moisture, dirt, fumes, oil, corrosive atmosphere, with connectors to assure a liquid-tight, permanently grounded connection. Locate so it is least subject to physical abuse. Corrosive areas are identified on the floor plans.
 - 3) Use double locknuts and insulated bushings with threads fully engaged.
 4. Install bushings with ground lugs and integral plastic linings at equipment with open-bottom conduit entrances.
 5. Install conduit expansion fittings where conduits cross expansion joints.
- E. FIRESTOPPING
1. Provide firestopping at conduit penetrations through fire rated construction in accordance with the GENERAL ELECTRICAL PROVISIONS specification.
- F. CUTTING AND PATCHING
1. Provisions for openings, holes, and clearances through walls, floors, ceilings, and partitions shall be made in advance of construction.
 2. Provide cutting, patching and painting necessary for the installation of electrical systems.
 3. Where conduits need to penetrate concrete or masonry construction the contractor shall install 22-gauge galvanized steel pipe sleeves, 1 in. larger in diameter than the conduit being installed. Sleeves shall extend 2" above and below the floor slab or wall penetrated. Install sleeves before walls and/or slabs are poured or constructed.
 4. The contractor shall prepare drawings indicating size and location of all anticipated floor sleeves for the installation of electrical conduits. Such drawings shall be made available 10 days prior to any scheduled concrete work.
- G. RESTRICTIONS
1. Conduits routed parallel to steam lines, hot water pipes, flues, high temperature piping or ducts shall be routed at least 12" from such and shall be a minimum 12" clear when crossing same.
 2. Do not route conduit over boiler, incinerator, or other high temperature equipment.
 3. Where conduits must cross or follow the same path as water, steam or other fluid piping, run electrical conduits above such piping wherever possible.
- H. ADJUSTMENT AND CLEANING
1. Restore damaged areas on PVC jacketed, rigid conduit with spray type touch-up coating compound or as directed by manufacturer
 2. Pull cleaning plug through conduits to clear of dirt, oil, and moisture.
- I. CONDUIT SYSTEMS
1. Separate raceways shall be provided for each wiring category as follows;
 - a. 120/208 volt or 120/240 volt normal power wiring systems.
 - b. 480 volt normal power wiring systems.
 - c. I&C: analog
 - d. I&C: 120VAC control
 - e. I&C: 24VAC control
 - f. I&C: pulsed frequency
 - g. I&C: field instrument signal
 - h. I&C: fiber-optic

-END OF SECTION-

01.61.12 CONDUIT FITTINGS

PART 1 GENERAL

- A. RELATED REQUIREMENTS
 - 1. Applicable requirements of Section 26 shall govern work in this Section.
- B. SCOPE
 - 1. Provide conduit fittings to form a complete raceway system as specified herein.
- C. QUALITY ASSURANCE
 - 1. Reference National Electrical Contractors Association (NECA) - Standard of Installation

PART 2 PRODUCTS

- A. MATERIAL
 - 1. Fittings shall be steel or malleable iron and shall be zinc galvanized, or cadmium plated.
 - 2. Do not use aluminum or die cast fittings.
 - 3. Do not use running threads.
 - 4. Do not use set screw or indenter type fittings.
- B. CONNECTORS AND COUPLINGS
 - 1. Galvanized Rigid Conduit and Intermediate Metal Conduit
 - a. Threaded.
 - b. Liquid tight.
 - c. Insulated throat.
 - 2. Polyvinyl Chloride (PVC)
 - a. Schedule 40 or 80, to match conduit.
 - 3. PVC Coated Galvanized Rigid Conduit
 - a. Full weight 40 mil PVC jacket.
 - b. PVC gasketed for mating surfaces.
 - c. Same as for Rigid Conduit.
 - 4. Liquidtight Flexible Metal Conduit
 - a. Liquid tight.
 - b. Suitable for grounding.
 - c. Suitable for wet locations.
 - d. Tapered threaded hub.
 - e. Non-metallic materials.
 - 5. Flexible Metal Conduit
 - 6. Threaded.
 - 7. Grounding type.
 - 8. Insulated throat.
 - 9. Two screw clamp type with locknuts.
 - 10. Externally Secured.
- C. EXPANSION FITTINGS
 - 1. Expansion fittings: Copper bonding jumper, Crouse Hinds Type XJ.
 - 2. Expansion/deflection fittings: Copper bonding jumper, Crouse-Hinds Type XD.

D. CONDUIT BODIES

1. Galvanized or cadmium plated.
2. Threaded hubs.
3. Removable cover, with gasket.
4. Corrosion-resistant screws.

E. SEALS

1. Wall entrance seals. Link Seal type as manufactured by Thunderline Corporation.
2. Explosion-proof seals. Appleton type EYS, SFM, or equal.

PART 3 EXECUTION

A. INSTALLATION

1. Install electrical fittings in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that fittings serve intended purposes.
2. Rigidly secure connectors at cabinets and boxes with galvanized lock nut and bushing. Use appropriate connectors on NEMA 3R (weatherproof) and NEMA 4 (spray tight) enclosures to maintain their ratings. NOTE: Conduit penetrations to NEMA 3R and NEMA 4 enclosures shall be made on the bottom (or the sides, if the bottom access is insufficient) – do not penetrate the top of the enclosure.
3. Seal conduits that run through different temperature or atmospheric conditions to prevent moisture or gases from entering electrical equipment and devices.
4. Install wall entrance seal where conduits or direct burial conductors pass through foundation walls below grade.
5. Install conduit expansion fittings complete with bonding jumper in following locations:
6. Conduit runs which cross a structural expansion joint.
 - a. Conduit runs where movement perpendicular to axis of conduit may be encountered.
 - b. Locate conduit bodies so as to assure accessibility of electrical wiring.
7. Install fittings designed for use with flexible liquid-tight conduit to ensure continuity of ground throughout the fittings and conduit and prevent entrance of moisture.

-END OF SECTION-

01.61.20 LOW VOLTAGE WIRES, CABLES AND CONNECTORS

PART 1 GENERAL

- A. RELATED REQUIREMENTS
 - 1. Application provisions of Section 26 shall govern work under this Section.
- B. SCOPE
 - 1. Provide wires, cables and connectors as specified herein.
- C. QUALITY ASSURANCE
 - 1. Reference Standards of the following associations.
 - a. National Electrical Contractors Association (NECA) - Standard of Installation
 - b. Insulated Cable Engineers Association (ICEA)

PART 2 PRODUCTS

- A. WIRE CONDUCTORS
 - 1. Copper Conductor only.
 - 2. Insulated with 90 degree C, 600 volt insulation and color code conductors for low voltage (secondary feeders and branch circuits) as required by code.
 - 3. Type THHN solid or stranded: Single conductor No. 10 AWG and smaller for general use wiring, No. 12 AWG minimum size.
 - 4. Type THW or THHN Stranded: Single conductor No. 8 AWG and larger for general use wiring. Conductor triple rated for use as types THHN, THWN and MTW is approved.
 - 5. Conductors installed in wet locations and areas with high humidity shall be type THW or XHHW. Wet locations shall include, but not be limited to, conduits installed in direct contact with the earth and underground electrical ductbanks.
 - 6. Conductors shall not be installed at temperatures below the manufacturer's minimum installation temperature.
- B. CONTROL CONDUCTORS
 - 1. #14 AWG Stranded THHN Copper
 - 2. 90 Degree C insulation
 - 3. Color coded insulation per instrumentation drawing and specification requirements.
- C. TWISTED SHIELDED PAIR AND TRIAD INSTRUMENTATION CABLE
 - 1. Twisted pair or triad with #16 AWG Stranded Copper conductors
 - 2. 100% coverage mylar tape shield with tinned copper drain wire
 - 3. PVC Jacket
 - 4. When field instrumentation requires an extra conductor for DC powered instruments provide triad instead of pair at no additional cost to owner.
- D. COMMUNICATIONS CABLES
 - 1. Communications cables shall be the type as called for in the specifications and drawings for the installation of various communications systems.
 - 2. Communications cables installed in cable trays shall be approved for use in cable tray and shall be of fire resistive construction.

3. Cables routed exposed through return air ceiling plenums shall be smoke resistance teflon coated cable classified as type CLP or CMP communications cable.
- E. JOINTS, TAPS AND SPLICES
1. Conductors No. 10 AWG and Smaller: 3M Scotch-lok compression type solderless connectors with plastic cover.
 2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless compression type connectors, tool and die applied, of a type that will not loosen under vibration or normal strains. Burndy "Hy-Dent" type or equivalent.

PART 3 EXECUTION

A. INSTALLATION

1. Run wire and cable in conduit, unless otherwise indicated on drawings.

B. JOINTS, TAPS AND SPLICES

1. Each tap, joint, or splice in conductors No. 8 AWG and larger shall be taped with two half-lap layers of vinyl plastic electrical tape and a finish wrap of color-coding tape, where required by code. Electrical tape shall be 3M Scotch brand.
2. Cable splices shall be made only in distribution and junction boxes.

C. WIRE AND CABLE IDENTIFICATION

1. Install label tags on wire and cable in junction boxes, pullboxes, wireways, and wiring gutters of panels. Tags identify wire or cable number and/or equipment served as shown on drawings.
2. Different conductor insulation colors and electrical tape colors shall be used to identify the different conductors in a given circuit. Code requirements shall always be followed where applicable. In general, colors shall be as follows;
 - a. 120/20- volt systems neutral conductor - solid white. Provide additional markings for neutral conductors in the same raceway as required by code.
 - b. 120/208-volt systems A-phase, B-phase, and C-phase unswitched legs. Solid black, solid red, and solid blue respectively. Different colors shall be used to identify switched legs.
 - c. 480/277-volt systems neutral conductor - solid gray. Provide additional markings for neutral conductors in the same raceway as required by code.
 - d. 480/277-volt systems A-phase, B-phase, and C-phase unswitched legs. Solid brown, solid orange, and solid yellow respectively. Different colors shall be used to identify switched legs.
 - e. Ground Conductors - solid green. Provide additional markings for ground conductors in the same raceway as required by code.

D. LIGHTING FIXTURE OUTLETS

1. Use conductor with insulation suitable for current, voltage, and temperature to which conductor will be subjected
2. No. 12 wire size minimum for conductors supplying power to a single fixture. 600V insulation minimum.
3. Insulation suitable for operation at 90 degrees C. minimum for lighting fixtures with integral ballast, mogul base sockets, quartz lamps, or otherwise where subject to excessive temperatures.

4. Fixture wiring shall be continuous wiring system to lampholder or to ballast and from ballast to lampholder.
- E. TAGS AND LABELS
1. Provide metal or flame-resistant adhesive label tags and identify the cable source, use and destination.
 2. Line voltage conductors shall be identified by circuit number using sleeve type adhesive markers.

-END OF SECTION-

08.71.13 ADA DOOR HARDWARE

A. GENERAL

1. RELATED DOCUMENTS

- a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

2. SUMMARY

- a. This Section includes the following types of automatic door operators:
 - I. Exterior and interior, automatic door operators, low energy, with visible mounting.
 - II. Automatic door operators shall be configured for doors as follows:
 - i. Simultaneous pairs, out swing, in swing, or double egress.
 - ii. Simultaneous pairs, with single operator, out swing or in swing.
 - iii. Single doors, out swing or in swing.
- b. Related Sections:
 - I. Division 8 Section "Doors and Frames" for entrances furnished separately in Division 8 Section.
 - II. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished separately in Division 8 Section.
 - III. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - IV. Division 26 Sections for electrical connections including conduit and wiring for power to, and control of, automatic door operators.

3. REFERENCES

- a. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- b. Underwriters Laboratories (UL):
 - I. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - II. UL 10C – Positive Pressure Fire Tests of Door Assemblies
- c. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
 - I. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- d. American Society for Testing and Materials (ASTM):
 - I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - II. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- e. American Association of Automatic Door Manufacturers (AAADM):
- f. International Code Council (ICC):
 - I. IBC: International Building Code
- g. Building Officials and Code Administrators International (BOCA), 1999:
- h. National Fire Protection Association (NFPA):
 - I. NFPA 101 – Life Safety Code.
 - II. NFPA 70 – National Electric Code.
- i. International Standards Organization (ISO):
 - I. ISO 9001 - Standard for Manufacturing Quality Management Systems
 - II. ISO 14025 – Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
 - III. ISO14040 – Environmental Management -- Life Cycle Assessment -- Principles and Framework
 - IV. ISO 14044 – Environmental Management -- Life Cycle Assessment -- Requirements and Guidelines

V. ISO 21930 – Sustainability in Buildings and Civil Engineering Works -- Core Rules For Environmental Product Declarations Of Construction Products And Services

- j. National Association of Architectural Metal Manufacturers (NAAMM):
I. Metal Finishes Manual for Architectural and Metal Products.

4. DEFINITIONS

- a. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

5. PERFORMANCE REQUIREMENTS

- a. Provide automatic door operators capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
b. Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).
c. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) to set door in motion, and not more than 15 lbf to fully open the door. Forces shall be applied at 1" (25 mm) from the latch edge of the door.
d. Break Away Requirements: Automatic door operators provided with a breakaway device shall require no more than 50 lbf (222 N) applied at 1" (25 mm) from the latch edge of the door.

6. SUBMITTALS

- a. Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
b. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
c. Color Samples for selection of factory-applied color finishes.
d. Closeout Submittals: Provide the following with project close-out documents.
I. Owner's Manual.
II. Warranties.
e. Reports: Based on evaluation performed by a qualified agency, for automatic door operators.
I. Environmental Product Declaration.
II. Evaluation Report for compliance with IBC.

7. QUALITY ASSURANCE

- a. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.
b. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.
c. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.
d. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
I. ANSI/BHMA A156.19.
II. NFPA 101.
III. UL 325 Listed.
IV. UL 10C Listed.
V. IBC 2009 and 2012.
e. Environmental Product Declaration (EPD): EPD for automatic door operators shall be certified by the manufacturer to comply with the following:
I. Prepared under Product Category Rule (PCR) UNCPC 4212.
II. Conform to ISO standards 14025, 14040, 14044, 21930
III. Life Cycle Assessment Basis: Cradle to Gate, minimum.
f. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.

- g. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated.
- h. Power Operated Door Standard: ANSI/BHMA A156.19.
- i. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- j. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

8. PROJECT CONDITIONS

- a. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- b. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- c. Other trades: General Contractor shall advise of any inadequate conditions or equipment.

9. COORDINATION

- a. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- b. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, remote activation devices, and electric door latching hardware.
- c. System Integration: Integrate automatic door operators with other systems as required for a complete working installation. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

10. WARRANTY

- a. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- b. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- c. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

B. PRODUCTS

1. AUTOMATIC DOOR OPERATORS

- a. Manufacturer: Stanley Access Technologies; IR LCN; or approved equal.

2. MATERIALS

- a. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - I. Headers: 6063-T6.
 - II. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - III. Sheet and Plate: ASTM B 209.
- b. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants", if none is provided, submit for Shop Drawing review.
- c. Conduit: Refer to Division 26 Section "Conduits"; if none is provided, submit for Shop Drawing Review.
- d. Electrical Wiring Materials: Refer to Division 26 Section "Wiring" or "Wiring Devices"; if none is provided, submit for Shop Drawing Review.
- e. Stainless Steel: As recommended by manufacturer, subject to Shop Drawing Review.

3. COMPONENTS

- a. Header Case: Header case shall not exceed 6-1/8 inch x 4 inch (156 mm x 102 mm) in rectangular section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover,

edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.

- b. Door Arms and Linkage Assembly: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- c. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

4. SWINGING DOOR OPERATORS

- a. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- b. Operators: Self-contained units powered by a minimum fractional horsepower, permanent-magnet DC motors.
 - I. Electro-mechanical Operator: Transmit power from operator to door through reduction gear train, splined spindle, door arm, and linkage assembly. Drive train shall have positive constant engagement.
 - II. Operation: Power opening and spring closing.
 - III. Capacity: Rated for door panels weighing up to 125 lb (57 kg)
 - IV. Mounting: Visible
 - V. Features:
 - i. Adjustable opening, open check, and closing speeds.
 - ii. Adjustable opening force.
 - iii. Adjustable hold-open time between 0 and 30 seconds.
 - iv. Reverse on obstruction.
- c. Push to operate activation.

Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be adjustable for positive closing action at a low material stress level for long spring life.

Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.

Electrical service to door operators shall be provided under Division 26 Electrical; if Division is not provided, submit for Shop Drawing review. Minimum service to be 120 VAC, 5 amps.

5. ELECTRICAL CONTROLS

- a. Electrical Control System: Electrical control system shall include a solid state controller with quick connect plugs.
- b. Controller Protection: The controller shall incorporate the following features to ensure trouble free operation:
 - I. Main Fuse Protection.
 - II. Electronic Surge Protection.
 - III. Internal Power Supply Protection.
 - IV. Motor Protection, over-current protection.
- c. Program Dip Switches: The controller shall have program dip switches to allow selection or change of activation options; standard activation or push-to-operate.
- d. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

6. ACTIVATION DEVICES

- a. Push Plates, Wall-Mounted: Provide 4 ½ inch (114 mm) square SPDT push plates with UL listed switch as indicated on the Plans. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open". Push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls.

- b. Push Plate, Center Jamb: Provide 2.25” wide rectangular push plate, aluminum store front concealed mounting, and related hardwiring & controls.
- c. Bollard Post: ADA Exterior Push Plate Bollard Post, with 4.5” top and bottom plates, concrete base mounted, watertight top cap and installation, and related hardwiring and controls.

7. ALUMINUM FINISHES

- a. Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- b. Class II, Clear Anodic Finish: AA-M12C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611-98, and the following:
 - I. AAMA 607.1
 - II. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.
- c. Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:
 - I. Color: Dark Bronze.
 - II. AAMA 606.1
 - III. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

C. EXECUTION

1. INSPECTION

- a. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- a. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- b. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
 - I. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - II. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- c. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections and/or as required by NEC.
- d. Painting: If required, for uniformity to existing colors and finishes; See Section 09.91.00 Painting.

3. FIELD QUALITY CONTROL

- a. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

4. ADJUSTING

- a. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI A156.19 by AAADM Certified Technician.

5. CLEANING AND PROTECTION

- a. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

- END OF SECTION-

09.91.00 PAINTING

A. GENERAL

1. SECTION INCLUDES
 - a. Surface preparation and filed application of paints and coatings.
2. REFERENCES
 - a. ASTM D16 – Definitions of Terms Relating to Paint, Varnish, Lacquer and Related.
3. SUBMITTALS
 - a. Product Data: Submit Manufacturer’s data on each paint and coating product including:
 1. Product characteristics.
 2. Surface preparation instructions and recommendations.
 3. Primer requirements and finish specification.
 4. Storage and Handling requirements and recommendations.
 5. Application methods.
 6. Cautions.
 - b. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer’s color sample available.
 - c. Verification Samples: For each finish product specified, submit samples that represent actual product, color and sheen.
4. QUALIFICATIONS
 - a. Manufacturer: Company specializing in manufacturing the Products specified in this section with a minimum of five years of experience.
 - b. Applicator: Company specializing in performing the work of this section with a minimum of three years of experience. At least one person shall be present at all time during execution of the work of this section, who is thoroughly familiar with the specified requirements and the materials and methods needed for the work.
5. REGULATORY REQUIREMENTS
 - a. Conform to applicable codes for flame and smoke rating requirements for finishes.
6. DELIVERY, STORAGE AND HANDLING
 - a. Except for custom-mixed colors, deliver products to site in sealed and labeled containers.
 - b. Container label to include manufacturer’s name, type F paint, brand name, lot number, brand code, coverage, surface preparation, drying time, clean-up requirements, color designation and instructions for mixing and reducing.
 - c. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area and as required by manufacturer’s instructions.
7. ENVIRONMENTAL REQUIREMENTS
 - a. Do not apply coating when surface and ambient temperatures are outside the ranges required by the product manufacturer.
 - b. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity range s required by the product manufacturer.
 - c. Do not apply coating in areas where dust is being generated.
 - d. Provide lighting level of 80 ft-candles measured mid-height at substrate surface.
8. EXTRA MATERIAL
 - a. Provide one gallon of each color or type.
 - b. Label each container with color, type, texture and room locations, in addition to the manufacturer’s label.

B. PRODUCTS

1. ACCEPTABLE MANUFACTURERS

- a. Manufacturer's and specific products are listed to establish the type and quality of coating to be provided. Products of other manufacturers are acceptable if equal in type and quality.

2. MATERIAL

- a. Metal Doors and Frames:
 1. Type: Acrylic
 2. Finish: Semi-Gloss
 3. 1st Coat: Factory-Primed
 4. 2nd Coat: Sherwin Williams, Sher-Cryl HPA; 3 mils DFT/coat.
 5. 3rd Coat: Sherwin Williams, Sher-Cryl HPA; 3 mils DFT/coat.
 6. Color: To be selected by Owner.
- b. Interior/Exterior Piping:
 1. Type: Acrylic
 2. Finish: Gloss
 3. 1st Coat: Sherwin Williams, Pro-Cryl Universal Primer; 3 mils DFT/coat.
 4. 2nd Coat: Sherwin Williams, Pro Industrial 0 VOC Acrylic; 3 mils DFT/coat.
 5. 3rd Coat: Sherwin Williams, Pro Industrial 0 VOC Acrylic; 3 mils DFT/coat.
 6. Color: Grey or match existing.

C. EXECUTION

1. EXAMINATION

- a. Verify surfaces are ready to receive work as instructed by the product manufacturer.
- b. Examine surfaces scheduled to be painted prior to commencement of the work. Report any condition that may potentially affect proper application.
- c. Do not proceed with surface preparation or application until conditions are suitable.
- d. Test shop applied to primers for compatibility with subsequent cover materials.

2. PREPARATION

- a. Remove electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing
- b. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
- c. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves and protective clothing. Quickly wash off any of the mixture that come in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
- d. Definitions:
 1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
 2. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast-Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter,

except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains or rust, stains of mill scale or stains of previously applied paint.

3. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast-Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks or minor discoloration caused by stains of rust, stains of mill scale or stains of previously applied paint.

- e. Prepare surfaces in accordance with the coating manufacturer's recommendations and the following:
 1. Shop Primed Steel Surface: Sand and scrape to remove loose primer and rust and solvent clean. Feather edges to make touch-up patched inconspicuous. Prime bare steel surfaces.
 2. Steel and Ductile Iron Pipe: Solvent Cleaning follow by Commercial Blast Cleaning.
 3. Submerged Steel and Ductile Iron Pipe: Solvent Cleaning followed by Near-White Blast Cleaning.

3. APPLICATION

- a. Apply all coatings and materials with manufacturer specifications in mind. Mix and thin coatings according to manufacturer recommendation.
- b. Do not apply to wet or damp surfaces.
- c. Apply coatings using methods recommended by manufacturer.
- d. Uniformly apply coatings without runs, drips or sags, without brush marks and with consistent sheen.
- e. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- f. Regardless of number of coats specified, apply as many coats as necessary for complete hid and uniform appearance.

4. CLEANING

- a. Reinstall electrical cover plates, hardware, fixture trim, fittings, etc. removed for painting.
- b. Collect waste materials which may constitute a fire hazard, place in closed metal container and remove daily from site.
- c. Touch up and restore damage finishes. Remove spilled, splattered or splashed paint.

-END OF SECTION-