SECTION 16100 - WIRING METHODS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Wire and Cable.
2. Conduit
3. Outlet boxes and Conduit Fittings.
4. Wiring Devices.
5. Surface Raceway.
6. Wire Connectors.
7. Fire Alarm/Security Alarm System Rough-In

B. Related Requirements:
1. Section 13810 - Energy Management System (EMS)
2. Section 16050 - Basic Electrical Materials and Methods: Hangers and Supports
3. Section 16500 – Lighting
4. Section 16700 – Communication
5. Appendix A – Products and Work By Owner or Separate Contractor.
   a. General procedures related to Owner furnished products and transport, handle, store and protect products.
   b. Manufacturers, suppliers, and vendor contacts and product names and numbers related to Owner furnished products.

1.2 REFERENCES

A. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code (NEC).

B. American Society for Testing Material (ASTM)
1. ASTM D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft
2. ASTM D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-bf/ft3)

C. National Electrical Manufacturers Association (NEMA):
1. NEMA VE 1 – Metal Cable Tray Systems

D. Underwriters Laboratories (UL)
1. UL 1569 - Metal Clad Cables

1.3 QUALITY ASSURANCE

A. Final Power Plan Review Meeting:
1. A Final Power Plan Review Meeting shall be held on-site to review the Final Power Plan and scheduling requirements. The mandatory attendees shall be the Construction Manager, General Contractor, Electrical Contractor, Security Services Representative, CCTV Representative, and Store Planning Field Manager. The meeting shall be scheduled by the General Contractor approximately 14 days after receipt of Final Power Plan Drawings. At least ten days advance notification shall be given to all attendees.
2. The purpose of the meeting will be to review the Final Power Plan requirements and to schedule completion dates for various critical components of the Final Power Plan.
3. The Construction Manager will review the PCOB and EWA process at this meeting, as it applies to the Final Power Plan requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Receive, store and handle products in accordance with the requirements of Appendix A – Products and Work By Owner or Separate Contractor.

B. Arrange with Owner for delivery of Owner furnished materials at such stage of construction as will expedite the work. Deliveries may be staged and scheduled to correspond to construction schedule and to minimize on-site storage.

C. Allow minimum of four weeks for delivery.

D. Products will be supplied to the job site complete and ready for installation.

E. Provide proper facilities for handling and storage of Owner furnished materials to prevent damage. Keep materials dry and fully protected from weather.

F. Upon receipt of shipment, check contents of shipment against bill of material furnished by vendor. Report any shortages or damage to the vendor immediately so that replacements can be ordered and/or freight claims can be filed. Note damage on Bill of Lading in order to substantiate freight claims.

PART 2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

A. Owner will furnish and install fire and security alarm system as specified in Appendix A (Section 16100).
   1. Contractor shall provide rough-in as specified herein.

2.2 WIRE AND CABLE

A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by a nationally recognized testing agency and marked for use.

B. Wire and cable shall bear UL label and shall conform to standards established for such materials by nationally recognized agencies.

C. Provide code gauge, soft annealed copper wire, not less than 98 percent conductivity and of 600 volt class.

D. Aluminum Alloy Conductors: Compact, stranded Stabiloy AA-8000 series. Aluminum alloy conductors may be used only as indicated in project documents and permitted by Authority Having Jurisdiction and where permitted by local utility company. Use of aluminum alloy conductors will be limited to new service entrance feeders only. Aluminum alloy conductors shall not be used where terminations to existing equipment is required.

E. Conductors:
   1. Insulation type shall be one of the following:
      a. THHN
      b. THWN
      c. XHHW
      d. XHHW-2
   2. Type:
      a. #10 and smaller – stranded or solid.
      b. #8 and larger - stranded

F. Interlocked Armor Metal Clad (MC) Cable: Contractor's option as allowed by authorities having jurisdiction. MC cable shall have the following characteristics:
   1. Aluminum MC-Lite or Standard MC.
   2. Minimum size conductor, #12 AWG copper, including green insulated equipment ground, sized in accordance with the NEC.

3. Overall moisture resistant tape.
4. Galvanized steel or aluminum interlocked cladding.
5. Manufactured in accordance with UL 1569.

G. Wire smaller than #12 AWG not permitted unless otherwise noted. #14 AWG, type MTW or TFF permitted for signal and pilot control circuits unless otherwise noted.

H. Color code:

SYSTEM VOLTAGE	NEUTRAL COLOR	PHASE	GROUND	ISOLATED GROUND
208/120V	white	A-black B-red C-blue	green	green W/ yellow tracer
240/120V	white	A-black B-red	green	green W/ yellow tracer
480/277V	lt. gray or white with colored stripe other than yellow	A-brown B-orange C-yellow	green	green W/ yellow tracer

I. Color code #6 AWG and smaller phase and neutral conductors by continuous outer covering. Conductors #4 AWG and larger may be color coded by tape. Tape shall have minimum of two complete wraps around conductor at 6 inches from terminations, splices, and junction points.

J. Identify circuit numbers with synthetic cloth or plastic labels at splice and junction points.

2.3 CONDUIT

A. Conduit types shall be as follows and shall bear UL or ETL label:
1. Galvanized Rigid Metal Conduit (GRC): Hot-dip galvanized.
2. Intermediate Metal Conduit (IMC): Hot-dip galvanized.
3. Electrical Metallic Tubing (EMT): Hot-dip galvanized.
4. Schedule 40 heavy-wall PVC for all underground conduit runs.
5. Flexible Metal Conduit: Zinc-coated steel or Aluminum.
6. Liquid Tight Flexible Steel Conduit with PVC jacket.
7. MC Cable: Steel or Aluminum Cladding.

B. Conduit Sizes: Size conduit in accordance with NEC unless noted otherwise on Drawings, but not less than the following:
1. Alarm and Data Systems: 3/4 inch.
2. Flexible Metal Conduit: For connection of recessed light fixtures in suspended ceilings, 3/8 inch. For connection of other equipment subject to vibration: 1/2 inch.
3. Underground Conduit in Parking Lot: 1 inch.
4. Other Uses: 1/2 inch.

C. Contact Information:
1. Prime Conduit MWE Inc. 816-842-9283 or 800-678-3075
2. Vikimatic 800-345-8454
3. Innerduct 800-332-8114

2.4 OUTLET BOXES AND CONDUIT FITTINGS

A. Outlet boxes and conduit fittings shall bear the label of a nationally recognized testing laboratory and be rated for environmental conditions where installed.

B. Boxes: Comply with NEC in regard to maximum allowable number of conductors .
1. Interior Boxes: Hot-dip galvanized, 4 inches minimum octagon or square, unless otherwise noted. Provide single or multiple gang outlet boxes as required for flush installation in drywall construction. Provide masonry boxes for outlets installed flush in concrete unit masonry. Provide single surface-mounted outlet boxes for utility type boxes.
2. Exterior Boxes: Provide masonry boxes for outlets installed flush in concrete unit masonry.
3. Outlet Boxes: Suitable for supporting lighting fixtures if intended for that purpose.
4. Ceiling Fan Boxes: Rated and listed for mounting ceiling fans.

C. Conduit Fittings:
1. EMT Fittings for Dry Locations: Diecast or steel set screw type.
2. EMT Fittings For Wet or Damp Locations: Steel Compression type.
3. GRC, IMC, or EMT Box Connectors For Wet or Damp Locations: Weather-tight hubs.
4. Threadless GRC or IMC Fittings: Not permitted.
5. GRC or IMC connectors for dry locations.
6. PVC Fittings: Solvent weld type for PVC conduit.

2.5 NONMETALLIC FLOOR BOXES

Type	Hubbell	Carlon	Wiremold
Floor Box	PFB1	E971FB	882C
Brass Cover Plate	S3925 w/ S3082	E97BR2 w/ E97ABR2	895

2.6 WIRING DEVICES

A. Branch Circuit Switches: Specification grade rated 20A 120/277V AC as follows:
1. Single Pole:
   a. Hubbell HBL1221I.
   b. Pass and Seymour PS20AC1-I.
   c. Cooper 2221V.
   d. Leviton 1221-2I.
2. Three Way:
   a. Hubbell HBL1223I.
   b. Pass and Seymour PS20AC3-I
   c. Cooper 2223V.
   d. Leviton 1223-2I.
3. Four Way:
   a. Hubbell HBL1224I.
   b. Pass and Seymour PS20AC4-I.
   c. Cooper 2224V.
   d. Leviton 1224-2I.
4. Dimmers:
   a. Lutron NT-600- IV.
5. Single Pole Occupancy Sensor (Dual Technology):
   a. Hubbell AD1277I1.
   b. Sensor Switch WSD-PDT-IV.
   c. Leviton OSSMT-MD-I.
6. Double Pole Occupancy Sensor:
   a. Hubbell AD1277I2.
   b. Sensor Switch WSD-PDT-2P-IV.
7. Ceiling Mounted Occupancy Sensor:
   a. Sensor Switch CMR-9

b. HubbellATP 1500C/with CU277A Control Unit

8. Low Temp Occupancy Sensor
   a. Ceiling Mount-Sensor Switch CMR-10-LT
   b. Wall Mount-Sensor Switch WSX-IV-LT

B. Receptacles - Straight Blade Nylon Grounding - Type Outlet Devices: Specification grade as follows:

1. Duplex Receptacle 15A 125V (5-15R):
   a. Hubbell HBL5262I.
   b. Pass and Seymour 5262-I.
   c. Cooper 5262V.
   d. Leviton 5262-I.
   e. Bryant BRY5262I.
2. Single Receptacle 20A 125V (5-20R):
   a. Hubbell HBL5361I.
   b. Pass and Seymour 5361-I.
   c. Cooper 5361V.
   d. Leviton 5361-I.
3. Duplex Receptacle 20A 125V (5-20R):
   a. Hubbell HBL5362I.
   b. Pass and Seymour 5362-I.
   c. Cooper 5362V.
   d. Leviton 5362-I.
4. Duplex Receptacle 20A 125V Isolated Ground (5-20R):
   a. Hubbell IG5362.
   b. Pass and Seymour IG5362.
   c. Cooper IG5362RN.
   d. Leviton 5362-IG.
5. GFCI Duplex Receptacle 20A 125V (5-20R):
   a. Hubbell GF20ILA.
   b. Pass and Seymour 2095-I.
   c. Cooper VGF20V.
   d. Leviton 7899-I
6. GFCI Weather Resistant Duplex:
   a. Hubbell GFTR20I
   b. Pass and Seymour – 2095TRWR
   c. Cooper – TWRVGF20-I
   d. Leviton – W7899
7. GFCI Tamper Resistant Duplex 20A 125V:
   a. Hubbell GFTR20I
   b. Pass and Seymour – 2097TR-I
   c. Cooper – TRVGF20-V
   d. Leviton – GFTR2-I
8. GFCI With Blank Face 20A 125V:
   a. Hubbell GFBF20-ILA
   b. Pass and Seymour – 2085-I
   c. Cooper – VGFD20-V
   d. Leviton – W7899
9. Single Receptacle 15A 250V 2 pole 3 Wire Grounded (6-15R):
   a. Hubbell HBL5661I.
   b. Pass and Seymour 5671-I.
   c. Cooper 5661V.
   d. Leviton 5661-I.
10. Single Receptacle 20A 250V 2 pole 3 Wire Grounded (6-20R):
    a. Hubbell HBL5461I.
    b. Pass and Seymour 5871-I.
    c. Cooper 5461V.
    d. Leviton 5461-I.
11. Single Receptacle 30A 250V 2 pole 3 Wire Grounded (6-30R):

a. Hubbell HBL9330.
b. Pass and Seymour 3801.
c. Cooper 5700N.
d. Leviton 5372.

12. Single Receptacle 20A 125/250V 3 pole 4 Wire Grounded (14-20R):
    a. Hubbell HBL8410.
    b. Pass and Seymour 3820.
    c. Cooper 5759.
    d. Leviton NOT AVAILABLE.
13. Single Receptacle 30A 125/250V 3 pole 4 Wire Grounded (14-30R):
    a. Hubbell HBL9430A.
    b. Pass and Seymour 3864.
    c. Cooper 5744N.
    d. Leviton 278.
14. Single Receptacle 20A 3 Phase 250V 3 pole 4 Wire Grounded (15-20R):
    a. Hubbell HBL8420.
    b. Pass and Seymour NOT AVAILABLE.
    c. Cooper NOT AVAILABLE.
    d. Leviton NOT AVAILABLE.
15. Single Receptacle 30A 3 Phase 250V 3 pole 4 Wire Grounded (15-30R):
    a. Hubbell HBL8430A.
    b. Pass and Seymour 5740.
    c. Cooper 8430N.
    d. Leviton 8430.
16. Single Receptacle 50A 3 Phase 600V 3 pole 4 Wire Grounded (15-50R):
    a. Hubbell HBL8450A.
    b. Pass and Seymour 5750.
    c. Cooper 8450N.
    d. Leviton 8450.

C. Receptacles - Locking Nylon Grounding - Type Outlet Devices: Specification grade as follows:
1. Single Locking Receptacle 15A 125V (L5-15R):
    a. Hubbell HBL4710.
    b. Pass and Seymour 4710.
    c. Cooper CWL515R.
    d. Leviton 4710.
2. Single Locking Receptacle 15A 125V Isolated Ground (L5-15R):
    a. Hubbell IG4710.
    b. Pass and Seymour IG4710.
    c. Cooper IGL515R.
    d. Leviton 4710-IG.
3. Duplex Locking Receptacle 15A 125V (L5-15R):
    a. Hubbell HBL4700I.
    b. Pass and Seymour 4700.
    c. Cooper 4700.
    d. Leviton 4700.
4. Duplex Locking Receptacle 15A 125V Isolated Ground (L5-15R):
    a. Hubbell IG4700A.
    b. Pass and Seymour IG4700.
    c. Cooper IG4700.
    d. Leviton 4700-IG.
5. Single Locking Receptacle 20A 125V (L5-20R):
    a. Hubbell HBL2310.
    b. Pass and Seymour L520-R.
    c. Cooper CWL520R.
    d. Leviton 2310.
6. Single Locking Receptacle 20A 125V Isolated Ground (L5-20R):
    a. Hubbell IG2310.

b. Pass and Seymour IGL520-R.
c. Cooper IGL520R.
d. Leviton 2310-IG.

7. Single Locking Receptacle 30A 125V (L5-30R):
   a. Hubbell HBL2610.
   b. Pass and Seymour L530-R.
   c. Cooper CWL530R.
   d. Leviton 2610.
8. Single Locking Receptacle 30A 125V Isolated Ground (L5-30R):
   a. Hubbell IG2610.
   b. Pass and Seymour IGL530-R.
   c. Cooper IGL530R.
   d. Leviton 2610-IG.
9. Single Locking Receptacle 20A 250V 2 Pole 3 Wire Grounded (L6-20R):
   a. Hubbell HBL2320.
   b. Pass and Seymour L620-R.
   c. Cooper CWL620R.
   d. Leviton 2320.
10. Single Locking Receptacle 30A 250V 2 Pole 3 Wire Grounded (L6-30R):
   a. Hubbell HBL2620.
   b. Pass and Seymour L630-R.
   c. Cooper CWL630R.
   d. Leviton 2620.
11. Single Locking Receptacle 30A 250V 2 Pole 3 Wire Grounded Isolated Ground (L6-30R):
   a. Hubbell IG2620.
   b. Pass and Seymour IGL630-R.
   c. Cooper IGL630R.
   d. Leviton 2620-IG.
12. Single Locking Receptacle 20A 125/250V 3 pole 4 Wire Grounded (L14-20R).
   a. Hubbell HBL2410.
   b. Pass & Seymour L1420-R.
   c. Cooper CWL1420R.
   d. Leviton 2410.
13. Single Locking Receptacle 30A 125/250V 3 pole 4 Wire Grounded (L14-30R).
   a. Hubbell HBL2710.
   b. Pass & Seymour L1430-R.
   c. Cooper CWL1430R.
   d. Leviton 2710.
14. Single Locking Receptacle 50A 600V 2 pole 3 Wire Grounded (Non-Nema):
   a. Hubbell HBL3771.
   b. Pass and Seymour 3771.
   c. Cooper 3771.
   d. Leviton 3771.
15. Single Locking Receptacle 50A 125/250V 3 pole 4 Wire Grounded (Non-Nema):
   a. Hubbell CS6369.
   b. Pass and Seymour CS6369.
   c. Cooper CS6369.
   d. Leviton CS63-69.

D. Connectors - Cord mounted Locking Nylon Grounding - Type to match Plugs as follows:
1. Locking Connector 15A 125V (L5-15R):
   a. Hubbell HBL4729C.
   b. Pass and Seymour PSL515-C.
   c. Cooper 4731N.
   d. Leviton 4729-C.
2. Locking Connector 20A 125V (L5-20R):
   a. Hubbell HBL2313.
   b. Pass and Seymour L520-C.

c. Cooper CWL520C.
d. Leviton 2313.

3. Locking Connector 20A 3 Phase 250V 3 Pole 4 Wire Grounded (L15-20R):
   a. Hubbell HBL2423.
   b. Pass and Seymour L1520-C.
   c. Cooper CWL1520C.
   d. Leviton 2423.

E. Connectors - Cord mounted Corrosion Resistant Locking Nylon Grounding - Type to match Plugs as follows:
1. Corrosion Resistant Locking Connector 20A 125V (L5-20R):
   a. Hubbell HBL23CM13.
   b. Pass and Seymour CRL520-C.
   c. Cooper CRL520C.
   d. Leviton 23CM-13.
2. Corrosion Resistant Locking Connector 20A 125/250V 3 Pole 4 Wire Grounded (L14-20R):
   a. Hubbell HBL24CM13.
   b. Pass and Seymour CRL1420-C.
   c. Cooper CRL1420C.
   d. Leviton NOT AVAILABLE.
3. Corrosion Resistant Locking Connector 20A 3 Phase 250V 3 Pole 4 Wire Grounded (L15-20R):
   a. Hubbell HBL24CM23.
   b. Pass and Seymour NOT AVAILABLE.
   c. Cooper CRL1520C.
   d. Leviton NOT AVAILABLE.
4. Corrosion Resistant Locking Connector 30A 3 Phase 120/208V 4 Pole 5 Wire Grounded (L21-30R):
   a. Hubbell HBL28CM13.
   b. Pass and Seymour NOT AVAILABLE.
   c. Cooper NOT AVAILABLE.
   d. Leviton NOT AVAILABLE.

F. Plugs - Cord mounted Nylon Grounding - Type to match Outlet Devices as follows:
1. Plug 20A 125V 2 Pole 3 Wire Grounded (5-20P):
   a. Hubbell HBL5366CA.
   b. Pass and Seymour PS5366SSAN.
   c. Cooper 5366AN.
   d. Leviton 5366-CA.
2. Plug 20A 250V 2 Pole 3 Wire Grounded (6-20P):
   a. Hubbell HBL5466CA.
   b. Pass and Seymour PS5466SSAN.
   c. Cooper 5466AN.
   d. Leviton 5466-CA.
3. Plug 20A 3 Phase 250V 3 Pole 4 Wire Grounded (15-20P):
   a. Hubbell HBL8421C.
   b. Pass and Seymour NOT AVAILABLE.
   c. Cooper NOT AVAILABLE.
   d. Leviton NOT AVAILABLE.
4. Plug 30A 3 Phase 250V 3 Pole 4 Wire Grounded (15-30P):
   a. Hubbell HBL8432C.
   b. Pass and Seymour 5741-AN.
   c. Cooper 8432AN.
   d. Leviton 8432-P.
5. Plug 50A 3 Phase 250V 3 Pole 4 Wire Grounded (15-50P):
   a. Hubbell HBL8452C.
   b. Pass and Seymour 5751-AN.
   c. Cooper 8452AN.
   d. Leviton 8452-P.

G. Plugs - Cord mounted Locking Nylon Grounding - Type to match Outlet Devices as follows:
1. Locking Plug 15A 125V 2 Pole 3 Wire Grounded (L5-15P):
   a. Hubbell HBL4720C.
   b. Pass and Seymour L515-P.
   c. Cooper 4721N.
   d. Leviton 4720-C.
2. Locking Plug 20A 250V 2 Pole 3 Wire Grounded (L6-20P):
   a. Hubbell HBL2321.
   b. Pass and Seymour L620-P.
   c. Cooper CWL620P.
   d. Leviton 2321.
3. Locking Plug 30A 250V 2 Pole 3 Wire Grounded (L6-30P):
   a. Hubbell HBL2621.
   b. Pass and Seymour L630-P.
   c. Cooper CWL630P.
   d. Leviton 2621.
4. Locking Plug 20A 3 Phase 250V 3 Pole 4 Wire Grounded (L15-20P):
   a. Hubbell HBL2421.
   b. Pass and Seymour L1520-P.
   c. Cooper CWL1520P.
   d. Leviton 2421.

H. Plugs - Cord mounted Corrosion Resistant Locking Nylon Grounding - Type to match Outlet Devices as follows:
1. Corrosion Resistant Locking Plug 20A 125V 2 Pole 3 Wire Grounded (L5-20P):
   a. Hubbell HBL23CM11.
   b. Pass and Seymour CRL520-P.
   c. Cooper CRL520P.
   d. Leviton 23CM-11.
2. Corrosion Resistant Locking Plug 20A 125/250V 3 Pole 4 Wire Grounded (L14-20P):
   a. Hubbell HBL24CM11.
   b. Pass and Seymour CRL1420-P.
   c. Cooper CRL1420P.
   d. Leviton NOT AVAILABLE.
3. Corrosion Resistant Locking Plug 20A 3 Phase 250V 3 Pole 4 Wire Grounded (L15-20P):
   a. Hubbell HBL24CM21.
   b. Pass and Seymour NOT AVAILABLE.
   c. Cooper CRL1520P.
   d. Leviton NOT AVAILABLE.
4. Corrosion Resistant Locking Plug 30A 3 Phase 120/208V 4 Pole 5 Wire Grounded (L21-30P):
   a. Hubbell HBL28CM11.
   b. Pass and Seymour NOT AVAILABLE.
   c. Cooper NOT AVAILABLE.
   d. Leviton NOT AVAILABLE.

I. Pin & Sleeve - Insulated Water Tight - Type Outlet Devices: Specification grade as follows:
1. Water Tight Receptacle 30A 250V 2 Pole 3 Wire Grounded (Non-Nema):
   a. Hubbell HBL330R6W.
   b. Pass and Seymour PS330R6W.
   c. Cooper CD330R6W.
   d. Leviton 330R6W.
2. Water Tight Receptacle 60A 250V 2 Pole 3 Wire Grounded (Non-Nema):
   a. Hubbell HBL360R6W.
   b. Pass and Seymour PS360R6W.
   c. Cooper CD360R6W.
   d. Leviton 360R6W.

J. Boots: Weatherproof Boots for Locking Plug and Connector Bodies - Type to match Devices as follows:

1. Corrosion Resistant Locking Plug and Connector 20/30A 125V (L5-20):
    a. Hubbell HBL60CM31 & HBL60CM32.
    b. Pass and Seymour CRL2030-RBC & CRL2030-RBP.
    c. Cooper BM1 & BM2.
    d. Leviton 6031-Y & 6032-Y.
2. Corrosion Resistant Locking Plug and Connector 20/30A 125/250V 3 Pole 4 Wire Grounded (L14-20):
    a. Hubbell HBL60CM35 & HBL60CM36.
    b. Pass and Seymour CRL2030-RBC & CRL2030-RBP.
    c. Cooper BL1 & BL2.
    d. Leviton 6033-Y & 6034-Y.
3. Corrosion Resistant Locking Plug and Connector 20/30A 3 Phase 250V 3 Pole 4 Wire Grounded (L15-20):
    a. Hubbell HBL60CM35 & HBL60CM36.
    b. Pass and Seymour CRL2030-RBC & CRL2030-RBP.
    c. Cooper BL1 & BL2.
    d. Leviton 6033-Y & 6034-Y..
4. Corrosion Resistant Locking Plug and Connector 30A 3 Phase 120/208V 4 Pole 5 Wire Grounded (L21-30):
    a. Hubbell HBL60CM35 & HBL60CM36.
    b. Pass and Seymour CRL2030-RBC & CRL2030-RBP.
    c. Cooper BL1 & BL2.
    d. Leviton 6033-Y & 6034-Y.

K. Cover Plates:
1. Nylon cover plates for flush mounted devices.
2. Galvanized steel plates where devices are installed on exposed fittings or boxes.
3. Single Gang GFCI Receptable Weatherproof, While-In-Use, Lockable Vertical Metallic Cover Plate:
    a. Red Dot CKMUV
    b. Hubbell WP26M
    c. Intermatic WP1010MXD
    d. Pass and Seymour WIUCASTI
4. Single Gang GFCI Receptacle Weatherproof, While-In-Use, Lockable Horizontal Metallic Cover Plate:
    a. Red Dot CKMU
    b. Hubbell WP26MH
    c. Intermatic WP1010HXD
    d. Pass and Seymour WIUCASTI
5. Single Gang Deep Box Twistlock Receptacle Weatherproof, While-In-Use, Lockable Vertical Metallic Cover Plate:
    a. Red Dot CKLSVLU
    b. Hubbell WP7D
    c. Intermatic WP1250MVXD
6. Double Gang Two GFCI Receptacles Weatherproof, While-In-Use, Lockable Vertical Metallic Cover Plate:
    a. Red Dot 2CKU
    b. Intermatic WP1030MXD
7. 302 stainless steel cover plates for recessed outlet boxes in masonry walls.
8. Blank cover plate on all boxes without device.

L. Colors:
1. Unless otherwise noted, wiring devices and cover plates shall be ivory nylon.
2. Blank Cover Plates: On boxes without devices or fixtures, provide same type and color as those installed on devices in the same room or area.
3. Isolated ground receptacles: Orange nylon cover plates with circuit number printed in 3/16 inch black lettering on clear adhesive label (Brady label or equal) adhered to plate.
4. Cover plates for wiring devices mounted in FRP or NRP panels shall match the color of FRP or NRP panels.

2.7 SURFACE RACEWAY (G3000)

A. Manufacturer
1. The surface raceway system specified herein for branch circuit wiring shall be the 3000 Series Steel Prewired Raceway as manufactured by The Wiremold Company.

B. Materials
1. The raceway and all system components must be UL Listed. The raceway base and cover sections shall be manufactured of galvanized steel, finished in grey and be suitable for field repainting to match surroundings.
   a. Fittings: Multi-outlet system consisting of factory assembled components with a full complement of fittings including, but not limited to, elbows (90 degree, internal and external) slide couplings for joining raceway sections, blank end caps for closing open ends of the raceway, and flat tees. No field cutting of raceways will be permitted.
   b. Devices: Wiring devices and other connectors shall be factory installed, electrically wired, and covers labeled as identified on the Drawings. Each receptacle shall be identified noting the panel number and circuit number from which it is fed. Receptacles rated higher than NEMA 5-20R shall also be provided with voltage, phase and amperage identified in the same manner. Raceway sections shall be provided with 12 inch pigtails at feed locations for ease of installation. Grounding shall be maintained by means of factory installed NEC sized grounding conductors and utilize insulation displacement connectors as required.

2.8 WIRE CONNECTORS

A. Splices:
1. #8 AWG and Smaller: Ideal Wingnut, 3M Scotchlok, or equal connectors of proper size. 3M No. 567 in-line self-stripping connectors will be permitted only at ballast lead connections in fluorescent light rows.
2. #6 AWG and Larger: Solderless lugs and connectors.

2.9 FIRE AND SECURITY ALARM SYSTEM ROUGH-IN

A. Fire Alarm/Security Alarm Conduit System: Provide conduit system with pull string and outlet box including remote conduit to fire pump, control valve supervisory switches (PIV valves) or tank as indicated on Drawings and outlined below.
1. If shut off valve is located remote from store building, provide 3/4 inch conduit with pull string from remote location to building entrance location.
2. If pump and pump controls are located remote from store building, provide 2 inch conduit with pull string from the remote location to building entrance location.
3. If tank and tank indicators are located remote from store building, provide 2 inch conduit with pull string from remote location to building entrance location.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Install specified materials in accordance with manufacturer's recommendations.

B. Where switches are ganged, provide permanently installed steel barriers between switches. Where or provide separate boxes and separate coverplates for each circuit.

C. Access to Equipment: Coordinate access doors to allow for easy access of equipment for repair and maintenance.

D. Aluminum Alloy Conductors: Compact, stranded Stabiloy AA-8000 series. Aluminum alloy conductors may be used only as indicated in project documents and permitted by Authority Having Jurisdiction and where permitted by local utility company. Use of aluminum alloy conductors will be limited to new service entrance feeders only. Splices in service entrance and feeders will not be permitted. Utilize oxidation inhibiting compound (Penetrox, De-

ox) at conductor terminations.Aluminum alloy conductors shall not be used where terminations to existing equipment is required.

3.2 HANGERS AND SUPPORTS

A. Hangers and Supports are specified in Section 16050.

3.3 WIRE

A. Tie wrap groups of conductors in switchboards and panel boards.

3.4 CONDUIT

A. Installation:
1. Install conduit concealed, except in unfinished areas and where indicated on Drawings.
2. Support conduit by means of specified hangers.
3. Clean PVC conduit per manufacturer's recommendations before application of solvent cement.
4. Coordinate flashings where conduit penetrates roof membrane.
5. Paint metallic conduit under concrete slab or where installed in contact with earth. Apply two 6 mil coats of PVC or Asphalt paint continuously along entire length of conduit prior to installation below grade. Do not run conduit in concrete slab.
6. Install flexible metal conduit or liquid tight flexible metal conduit for final connections to dry-type transformers, baler, air compressors, HVAC equipment, motors and other vibrating equipment.
7. Coordinate installation of conduit in masonry work.
8. Do not install conduit under slab unless indicated on Drawings. Conduit installed below slab shall be galvanized rigid metal (GRC), intermediate metal conduit (IMC), or Schedule 40 PVC. Provide exterior coated GRC bends and elbows for all under ground conduit.
9. Route above grade conduit parallel or perpendicular to building lines.
10. Maintain minimum of 6 inches clearance at flues and heat sources.
11. Install GRC conduit when penetrating from below grade outdoors or penetrating concrete slabs, Including elbow.
12. Install GRC elbow on all conduit runs below grade that have 45º bends or greater.
13. Install double locknut and bushings when terminating GRC or IMC conduit, except where conduit terminates in threaded hub.
14. Install insulated throat bushings on all PVC conduit runs.

B. Location:
1. Galvanized Rigid Metal Conduit (GRC): Permitted for general exposed or concealed work above or below grade.
2. Intermediate Metal Conduit (IMC): Permitted for general exposed or concealed work above or below grade.
3. Electrical Metallic Tubing (EMT): Permitted for general exposed or concealed work above grade.
4. Polyvinyl Chloride rigid Nonmetallic Conduit (PVC) unless noted otherwise on drawings: Permitted for below-grade use when permitted by local governing codes..
5. Flexible Metal Conduit: Permitted in attic spaces and exposed in lengths of 6 feet or less for connections to equipment in dry areas. Not permitted for general exposed or concealed work. For connection of recessed light fixtures in suspended ceilings and connection of other equipment subject to vibration.
6. Liquid tight Flexible Metal Conduit: Permitted exposed in lengths of 6 feet or less for connections to food service equipment, refrigeration equipment and other vibrating equipment in damp locations where rigid connections are not suitable.
7. MC Cable: Permitted only where concealed inside partitions and above finished ceilings. Cable exposed on walls or in open bar joist areas will not be permitted. Cut cable with manufacturer's recommended armor stripping tool. Provide manufacturers approved connectors.

3.5 WIRING DEVICES

A. Replace outlets or devices improperly located or installed. Set outlets and devices plumb or horizontal and extend to, but not project above, finished surface.

B. Unless otherwise noted, receptacles, switches, and other wiring devices shall not be mounted back-to-back.

C. Install receptacles so that the ground prong is in the down position.

3.6 WIRE CONNECTIONS

A. Make final connection of motors, starters, disconnects, and other items furnished under other Sections.

3.7 FIRE AND SECURITY ALARM SYSTEM ROUGH-IN

A. Install fire alarm/security alarm conduit system, raceways, and 120 volt supply connections.

3.8 PROTECTION

A. Protect installed products from damage until completion of construction operations.

3.9 SURFACE RACEWAY (G3000)

A. INSPECTION
1. Examine conditions under which raceways, boxes, distribution systems, accessories, and fittings are to be installed and substrate that will support raceways. Notify the Architect/Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. INSTALLATION
1. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and to prevent electrical hazards.

END OF SECTION