

DESIGN CRITERIA

1. Related Sections: Division 01, Section 26 05 00, Design Standards 27 15 00-01 through 27 15 00-05, and Section 27 15 00 Communications Horizontal Cabling.
2. Point-of-Sale (POS) Support:
 - A. Abbreviations and Acronyms:
 - 1). ADP – Automated Data Processing; general term including all electronic data systems.
 - 2). BICSI – a telecommunications industry association; ref.: www.bicsi.org.
 - 3). CFCI – Contractor Furnished, Contractor Installed.
 - 4). CISIC – Capital Interment System Integration Center; DeCA's ADP room; also used to identify the DeCA organizational element responsible for the ADP equipment and related systems.
 - 5). GFGI – Government Furnished, Government Installed.
 - 6). IG – Isolated Ground.
 - 7). ISP – In-Store Processor (Central).
 - 8). LAN – Local Area Network; cabling systems for voice and data networks.
 - 9). LIU – Lightguide Interconnection Unit.
 - 10).NCR – National Cash Register, DeCA POS equipment subcontractor.
 - 11).NIC – Not in Contract (Construction).
 - 12).HHT – Hand Held Terminal; Radio-frequency hand-held terminal communicates via wireless LAN with the ISP. (Formerly "PDED").
 - 13).POS – Point-of-Sale electronic equipment and systems.
 - 14).SCO – Self Checkout.
 - 15).RAS – Remote Attendant Station (used with SCO's).
 - B. Layout of Datacom and POS Equipment:
 - 1). Data networks for POS and PC LAN are to be Category 6 networks, using 4 pair 23 AWG UTP Type CMP plenum cable.
 - 2). DeCA (Store Director and Operations Specialist) will identify exact locations of outlets and equipment not shown on the definitive floor plan nor described herein, no later than the 50% design review meeting. Contact the DeCA Project Manager for information.
 - 3). No underfloor ductwork shall be used; all data and telephone lines shall be run overhead.
 - 4). Default locations of POS data outlets (All outlets are dual cable, dual RJ45 jack):
 - a. Each checkout stand 1 (Full Service & Self Checkout; RJ45 by others).
 - b. Remote Attendant Station (SCO) 2 (RJ45 by others).
 - c. Cashier's Office 4 (2 above back counter, 2 above front counter).
 - d. CISIC Room 31B 3
 - e. Admin Office 15 2
 - f. Wireless LAN Access Points (Wavepoint Controllers) locations (dual RJ45 jack) must have a clear "line-of-sight" view of the area covered. Coordinate exact locations with DeCA IT during design. Locations shall be as follows:

- (1). Sales Floor, Aisle Area - 4 drops.
 - (2). Install on columns if possible (on walls if no columns), .two at front of sales floor and two at rear of sales floor (equal distance from the walls and each other), at 10' AFF.
 - (3). Sales Floor, Produce/Deli Area (if separate area from the main sales floor) - 1 drop: Install on wall in central location, 10' AFF.
 - (4). Sales Floor, Bread Section (if separate area from main sales floor) - 1 Drop: Install on wall or pole in central location, 10' AFF.
 - (5). Warehouse, Main Receiving Aisle - 2 drops: Install one on each end (equal distance from the walls and each other), 10' AFF. Other Receiving Aisle (if separate from main receiving aisle) - 1 drop: Install at 10' AFF.
 - (6). Warehouse, Open Area (if present) - 3 drops. Install on wall and/or post in central locations (equal distance from the walls and each other, 10' AFF). If steel warehouse racks will be present, install 1 drop at each end of each aisle.
 - (7). Administrative area - 1 drop: Install in central location of offices, 10' AFF.
 - (8). Front End cash register area - 1 drop for small store, 2 drops for medium store, 3 drops for large store: install in a central location near the store exit, equal distance from the walls and from each other, 10' AFF.
 - (9). All walk-in freeze and chill storage locations, including but not limited to the following: Frozen Foods, Meat Wrapping, Meat Processing, Meat Holding, Produce Prep, Produce Dry and Produce Chill, Bakery/Deli freeze/chill, Pre-Packaged Meat/Poultry Chill, and Dairy Chill. Each requires a data outlet within 65' cable distance, located outside the refrigerated room, with provision for a remote antenna inside the room. One dual data drop can cover four rooms if all within 65' of cable distance, that is one access point connected to the data drop can have up to four antenna cables connected to it. (Renovations: if a data outlet does not exist within 65', provide a new one) The remote antenna inside the rooms requires a coaxial cable (Hyperlink 400-Style, 50-Ohm Coax Cable, with RP-TNC connectors) terminated in a 4" weatherproof Type FSE junction box with a blank cover. The box should be located 2' to 4' from the corner of the room that has the closest access to a data drop location. This coaxial cable will run continuous without splice inside/outside of walls and 3/4" conduit to the closest data drop and connect to a mounted splitter (2, 3, or 4 way depending on number of antenna cables to be connected). A moisture-impervious seal is required inside and outside of the nipple through the insulated cooler panel. See Figures 1, 2, and 3 at the end of this section for further details. Refer to Section 26 05 33 Raceways and Boxes for Electrical Systems.
 - (10). Outdoor building antenna provisions (One or two as indicated for wireless register outdoor sales locations): Install on wall at front corner(s) or front center of store, depending on number and location of parking area(s). Store Director and Technical inspector on site will identify the location for the outside building antenna. Each location requires a data outlet within 50' cable distance (not more than 40' conduit), located inside the building, with provision for a remote building antenna outside the building. The remote antenna requires a coaxial cable to a weatherhead fitting at the proposed antenna location. Provide the coaxial cable to the data outlet location: Hyperlink 400-Style, 50-Ohm Coax Cable, RP-TNC connectors. This coaxial cable will run continuous without splice inside/outside of walls and 3/4" conduit. Coil slack cable in an inconspicuous manner near the antenna location.
 - g. One POS data outlet and one isolated ground duplex receptacle in a weatherproof flush box with a gasketed cover, located directly below each outdoor remote antenna provision at the front of the store. Mounting height 84" AFF to discourage tampering.
 - h. One POS data outlet at the Deli-Bakery cash register, mounted below the countertop.
- 5). Default Locations of PC LAN Outlets. (All outlets are dual cable, dual RJ45 jack unless noted otherwise):
- a. Cashier's Office (Room 4): 3 ea.
 - b. Store Director's Office (Room 12): 3 ea.

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| c. | Customer Service Office (Rooms 6): | 3 ea. |
| d. | Store Administrator Office (Room 18): | 3 ea. |
| e. | Store Manager's Office (Room 19): | 3 ea. |
| f. | CISIC Room 31B: | 3 ea. |
| g. | Administrative Area (Room 15): | 3 ea., plus 1 per work station |
| h. | Training Room (Room 17): | 5 ea. |
| i. | Contract Stocker Storage (Room 30): | 3 ea. |
| j. | Receiving Manager's Office (Room 35): | 3 ea. |
| k. | Produce Manager's Office (Room 45): | 3 ea. |
| l. | Meat Manager's Office (Room 57): | 3 ea. |
| m. | Vendors Room (Room 84): | 3 ea. |
| n. | Perishable Manager's Office (Room 87): | 3 ea. |
| o. | Semi-Perishable Manager's Office (Room 88): | 3 ea. |
| p. | Zone Manager's Office (Room 89): | 3 ea. |
| q. | Management Support Center (Room 90): | 3 ea. |
| r. | Medical Food Inspection Office (Room 34): | 3 ea. |
| s. | Receiving (Room 36): | 3 ea. |
| t. | Receiving Doors: | 1 at ea. door |
| u. | Other Offices: | 3 ea. |
| v. | RMCS Terminal location: | 1 ea. |
| w. | Key Control Cabinets (Usually Two in a Store) | 1 ea. |
| x. | Time Clock(s) (verify location and qty) | 1 ea. |
3. ADP Cabinets
- A. Main ADP Cabinet – in CISIC Room 31A, to house the ISP and Cisco Routers. Free-standing with doors, 84" high, 24" wide, 30" deep; single cabinet for small stores, double cabinet for medium to large stores.
- B. Sub Hub Cabinet(s) – If commissary size and configuration result in some data outlets exceeding the 300' CAT6 cable length limitation to the Main ADP Cabinet, one or more Sub Hub cabinets will be required to serve the more distant outlets with less than 300' of cable. Cabinet is wall-mounted, 48" high, 23" wide, 20" deep. One Sub Hub is usually enough. A Sub Hub room will be necessary to provide security and environmental conditions for the Sub Hub equipment.
- C. Refer to Design Standards 27 15 00-06, 27 15 00-07, 27 15 00-08 for CISIC and Sub Hub Room layouts.
4. GF/GI Equipment: (NIC - not in the construction contract)
- A. In-lane Terminal (cash registers) with Dyna Keys, Customer Displays, Magnetic Strip Readers, Scanner-Scales, Receipt Printers, UPS, and Customer-Activated Terminals.
- B. Checkstands.
- C. Power poles and lane lights associated with checkstands.
- D. Associated POS equipment (Network Printers and Data Entry Terminals – DETs).
- E. In-Store Processors (ISPs 1 and 2) with UPS.
- F. Wireless LAN Wavepoint Controllers and Air Defense Sensors.
- G. PC LAN equipment.
- H. Processors.
- I. Routers and Electronic Switches.
5. CF/CI Systems and Equipment: (included in the construction contract)
- A. Building electrical service.
- B. Generator/transfer switch.
- C. Panels.
- D. Conduit.
- E. Cable Tray Systems.
- F. Power Poles – except at Checkstands and Remote Attendant Stations.
- G. Receptacles.
- H. Cash register power.
- I. Cables for PC LAN and POS data.
- J. ADP Equipment Rack Cabinets.
6. Standby Electrical Generator and Power Distribution:

- A. Provide diesel-driven standby generator. Refer to Design Standard 27 15 00-01. Provide with suitable weather enclosure, fuel tank sized for at least 48 hours at full load fuel supply (72 hours in remote areas with unreliable power), and residential exhaust silencer.
- B. Provide a power conditioning type transformer with voltage regulation if utility conditions provide poor incoming voltage regulation, or if long feeders in an existing commissary being remodeled would result in poor regulation. Size generator to serve following loads during power failures:
 - 1). POS equipment:
 - a. Cash register/scanner-scales equipment.
 - b. In-Store Processors (ISPs).
 - c. Printers.
 - d. POS and LAN signal-handling devices.
 - e. Data Entry Terminals (DETs).
 - f. Switches/Hubs (when required).
 - 2). PC LAN central equipment.
 - 3). Front doors in sales area, i.e. front automatic entry and exit doors (1 circuit per vestibule).
 - 4). Communications, i.e. telecommunications systems:
 - a. Telephone.
 - b. Intercom.
 - c. Paging.
 - 5). Checkout stands, full service:
 - a. Conveyor belts (1 checkout stand per circuit).
 - b. Lane lights on Tele-Power Poles at checkout counters: Provide circuit(s) in accordance with load, separate from the conveyor belt circuit.
 - 6). Emergency lighting fixtures and exit signs. Connect to line side of standby ballast or battery.
- C. Fire Alarm, Mass Notification, and Security Alarm systems. Connect to line side of standby battery charger.
- 7. Dedicated Feeder for POS System Panel: extend from emergency service (on load side of the automatic transfer switch) through a dedicated step-down transformer located close to load. Provide Surge Protective Device at the head end of this feeder.
 - A. Secondary: 120/208 volt, three-phase, 8-wire (three phase conductors, three AC neutral conductors, one insulated and isolated ground conductor, and one conventional green equipment ground conductor).
 - B. Insulated/isolated ground conductor: Connect solidly to ground at step-down transformer and also bond to service ground at main switchboard. (See Design Standard 27 15 00-02).
 - C. Conventional equipment ground: Solidly connect to ground at step-down transformer.
 - D. Feeder: Run in conduit or wire duct that contains no other wiring. Size in accordance with National Electrical Code except insulated and isolated ground shall be stranded #2 AWG (minimum) for feeder lengths up to 300' and #1/0 AWG (minimum) for feeders over 300' long.
- 8. POS System Panel (clean power):
 - A. Provide power to:
 - 1). Checkout POS equipment (registers, printers, scanner/scales) – prewired J-box on checkstand. (Label wires to be connected by checkstand installers. Leave coiled and tie-wrapped at the cable tray above each location, sufficient length to reach the floor plus 10'.)
 - 2). POS Equipment at Deli-Bakery, and at Outdoor Sales locations(s).
 - 3). CISIC Main ADP Cabinet.
 - 4). Sub Hub ADP cabinet (if provided).
 - 5). Printer.
 - 6). Data entry terminals.
 - 7). Cashier's terminal.
 - 8). File maintenance terminal(s).

- 9). Courtesy desk terminal.
 - 10). Credit terminal.
 - 11). PC LAN equipment.
 - 12). Electronic scales in preparation, service and staging areas.
- B. Rating: 100 amperes, 120/208 volts, three phase.
- C. Features:
- 1). 6-wire.
 - 2). Insulated solid neutral.
 - 3). Insulated isolated ground bar.
 - 4). Conventional equipment ground bar (not insulated).
 - 5). Flush mounted (Ensure wall thickness sufficient to accommodate flush panel).
 - 6). Cash register sub panel of same type may be located closer to cash registers (if desirable) and fed from POS system panel.
 - 7). Coordination: Carefully design and install electrical support for cash registers and POS equipment items to ensure proper operation of this sophisticated system. Provide close coordination of design with the POS equipment manufacturer (NCR) and rigorous construction inspection. Connect ONLY the items listed below to the POS system panel. For each, provide a 20 ampere, 120 volt, 4 wire isolated ground branch circuit and isolated ground (IG) duplex receptacle(s) as indicated (Reference: Hubbell IG5362).
 - a. Cash register, receipt printer, scanner/scale unit: Provide one circuit for each installed and future check stand (full service or self-checkout) for "clean" power to cash registers and peripherals (NOT to include conveyors or lane lights). For full-service checkout stands, self-checkout (SCO) "Fast Lane" checkout stands and Remote Attendant station (RAS), leave the branch circuit conductors coiled and labeled, tie-wrapped to the cable tray or ceiling supports directly above the drop point. The coil must include sufficient length to reach the floor plus 10'. Leave approximately 10' additional slack conductors in the cable tray to allow for minor relocations of all checkout stands of either type.
 - b. Provide one isolated ground receptacle at the Deli-Bakery cash register, mounted below the countertop.
 - c. CISIC Main ADP Cabinet: Provide one receptacle inside each cabinet, for the rack-mounted In-Store Processors, monitors, hubs, modems, and communication bridges. Where the Main ADP Cabinet consists of two cabinets bolted together, provide two receptacles.
 - d. Sub Hub Cabinet. For each Sub Hub cabinet required, provide one receptacle inside the cabinet.
 - e. Laser Printer. Provide one receptacle on a dedicated circuit (usually adjacent to the CISIC Main ADP cabinet).
 - f. Data Entry Terminals. Provide one circuit for each two units (2 receptacles). (Generally 1 to 3 data entry terminals are provided - verify with DeCA project manager.)
 - g. Cashier's Terminal. Provide one for cashiers' terminal in Cashier's Office. May be connected to cash register sub panel, if one is provided in Cashier's Office.
 - h. Cash Management System. Provide one circuit with two receptacles for coin counter, bill counter, MICR encoder, and processor equipment at Cash Management System location in Cashier's Office.
 - i. Wireless Cash Register. Provide two or 3 receptacles, one at each "remote" location used for outdoor sales and one at "in-store" management support center location designated for wireless register. "In-store" receptacle may share circuit with not more than one other terminal or similar POS device connected. Outdoor remote locations shall have weatherproof-while-in-use cast-metal flush box and cover [see paragraph 2.B.4.g, above].
 - j. Courtesy Desk Terminal. Provide one receptacle. May be on common branch circuit with one other equivalent POS terminal or device.

- k. Electronic Scales in Service/Preparation Areas. Provide one or more circuits as needed to provide power to electronic scales.
 - l. Miscellaneous Additional POS Equipment Items. Provide receptacles as required. May be on common branch circuit with one other equivalent POS terminal or device.
9. Miscellaneous Emergency Circuit Panel (dirty power):
- A. Provide 100 ampere, 120/208 volt, three phase 5-wire panel to provide power to branch circuits supplying:
 - 1). Automatic entry/exit doors.
 - 2). Check stand conveyor belts and fans.
 - 3). Check stand lane lights.
 - 4). Emergency lights.
 - 5). Telephone PABX Switching Unit.
 - 6). Intercom equipment.
 - 7). Paging amplifier.
 - B. Provide separate feeder from transfer switch to panel through step down transformer, with three phase conductors, insulated neutral conductor, and green equipment ground conductor.
 - C. Panel shall not require isolated insulated grounding, or shielded transformer.
 - D. Provide circuit breakers as required for the listed loads, and 25% spares.
 - E. Do not connect equipment or services, other than those listed above or specifically identified by the DeCA Project Manager to this panel.
 - F. Refer to Design Standards 27 15 00-03 for check stand power circuit information, and design Standard 27 15 00-02 for Emergency Power system configuration.
 - G. Check stands are Government Furnished and Government Installed (via contract with IBM). Installed in conjunction with major and minor construction projects.
 - H. Full-service check stand conveyor and fan branch circuits shall serve one check stand each, based on a 12.0-ampere load for each stand. Wiring must be left coiled and labeled, tie-wrapped to the cable tray or ceiling supports, for connection by the checkstand installers. Coiled length must be sufficient to reach the floor plus 10'. Leave additional slack of approximately 10' in the cable tray for future relocations. Diversity load factor with multiple stands: generally on the order of 0.50. SCO "Fast Lane" stands and RAS do not require a "dirty power" circuit, as they have no conveyor belts.
 - I. Install all wiring for all installed and future check stands in the cable tray. Leave the wiring coiled and labeled, tie-wrapped to the cable tray or ceiling supports, sufficient length to reach the floor plus 10'. Leave approximately 10' additional slack conductors in the cable tray to allow for minor relocations. Tape, identify, and secure conductors for future check stands at each end for future use.
10. Power construction plans and specifications: Show the locations and connections for all the required electrical power outlets, panelboards, transformers, generator, contactors and switches on the drawings, as well as any details clarifying the methods and scope of the work. If Design Standards from this DeCA Commissar Design Guidance are used in the drawings, revise and adapt them to the site-specific job requirements and remove all general design guidance intended for designers. Provide specifications to establish the kind and quality of all components and wiring, based on current DeCA guide specifications edited to include specific requirements of this project.
11. Data and Telecomm Cables. Construction contractor shall furnish, install and terminate all data and telecomm cables.
- A. POS System: CAT6, color blue. Terminate on CAT6 patch panel in ADP Cabinet; RJ45 jack at remote outlet end.
 - B. Wireless LAN Access Point System: CAT6, color yellow. Terminate on CAT6 patch panel in ADP Cabinet; RJ45 jack at remote outlet end.
 - C. PC LAN System: CAT6, color green. Terminate on CAT6 patch panel in ADP Cabinet; RJ45 jack at remote outlet end. User terminal outlet should be combined with a telephone outlet under one cover plate, where they occur at the same location. Color code shall identify the jack type.

- D. Telephone System: CAT6, color gray. Terminate on punch down blocks at telephone terminal cabinet; RJ45 jack at instrument outlet. User terminal outlet should be combined with a PC LAN outlet under one cover plate, where they occur at the same location. Color code shall identify the jack type.
- E. Scale System: Scales shall have wireless connections.
- F. Maximum length of CAT6 data cable to any outlet shall be 295'. Any outlet more than 295' cable length from the CISIC Main ADP Cabinet must be run to a Sub Hub Cabinet located within the 295' limit. Telephone CAT6 cable shall similarly be limited to 295' from outlet to telephone main board or sub-distribution board.
- G. Each Sub Hub Cabinet shall be connected to the CISIC Main ADP Cabinet by 12-strand Multi Mode fiber optic cables installed inside an orange inner duct terminated with LIU's, and an additional two CAT6 cables. Provide RJ-45 jack outlets for CAT6 inside ADP cabinet at each end.
- H. The CISIC Main ADP Cabinet shall be connected to the main telephone board by 12-strand Indoor Multi-Mode/Single-Mode fiber optic cable installed inside a yellow inner duct terminated with LIU's, and an additional three CAT6 cables. Provide RJ-45 jack outlets for CAT6 inside ADP cabinet and terminate on main telephone backboard with a 10' coil.

12. Cable Trays:

- A. Provide suspended cable trays above the checkout stands, self-checkouts, and monitor stations for checkout stand power, intercom, telephone, alarm, and data wiring. Use separate cable trays, or divided cable tray, for power and communications. If a lay-in ceiling is available, locate the cable tray above the ceiling; if the ceiling is an open type, locate the cable tray high as possible while avoiding conflicts with HVAC ductwork. Extend data cable tray to the CISIC room and turn tray down to the top of the Main ADP Cabinet. Extend telephone/voice cable tray to the CISIC room and turn tray down to the top of the Main Telephone Back Board. Size each tray (or portion of a multi-compartment tray) per NEC for the conductor load (based on a separate MC cable per branch circuit) plus 25%.
 - 1). Specify solid-bottom non-ventilated steel cable trays with ventilated hinged cover, to provide magnetic and electrostatic shielding.
 - 2). Specify "C" shaped hanger brackets to permit lay-in wiring.
 - 3). Specify steel divider barrier between power and communications part of cable trays.
- B. Provide suspended cable trays running perpendicular to and above gondola shelving for power (and communication wiring if required) within gondola shelving. Refer to Design Standard Plate 26 27 26-02 and 26 27 26-03.
- C. Cable trays may optionally be used elsewhere throughout the building for power, alarm, data and telephone wiring, where it is economical to do so.

13. Power Poles: The checkstand installer will provide a dual-service power pole at each check stand to conduct power and communication cables from the cable tray to the check stand, install the conductors in the power pole, and connect devices in the checkstand. Connections at the cable tray shall maintain separation between power and communications cables.

14. Data Outlets.

- A. Each data outlet shall consist of two RJ45 jacks fed by two runs of CAT6 cable to the ADP Cabinet. The jacks shall be flush mounted in the wall, vertically oriented; except at checkstands jacks may be mounted in a power pole (or floor stub-up where underfloor ducts are used).
- B. Mounting heights (AFF), unless noted otherwise:
 - 1). POS:
 - a. Between 6" - 30" above floor on power poles.
 - b. 12" - 16" above floor on walls; or 8" above counter tops; match height of adjacent duplex receptacles; or in modular furniture signal wireway.
 - c. Wireless LAN: 10' in Sales Area; 10' in Receiving/Staging.

- 2). PC LAN: 12" - 16" above floor on walls; or 8" above counter tops; or in modular furniture signal wireway. Match height of adjacent duplex receptacles. Where Telephone outlet occurs at the same location, combine the PC LAN and telephone outlets on one box cover plate. Color code the jacks to distinguish the two types.
15. **Signal Reference Ground:** Provide copper wire in conduit from the CISIC Room (and Sub Hub Room if provided) to the main building grounding electrode, for signal system isolated grounding. Follow National Electric Code, including Articles 800.100 and 770.93, in sizing the ground conductors.
16. **Systems Construction Plans and Specifications:** Show the locations and connections for all the required data and telephone outlets, terminal panels, ADP cabinets, backboards, conduits, cable trays, and cables on the drawings, as well as any details clarifying the methods and scope of the work. Include a project-specific one-line schematic diagram of data and telephone wiring systems. If Design Standards from this DeCA Commissary Design Guidance are used in the drawings, revise and adapt them to the site-specific job requirements and remove all general design guidance intended for designers. Provide specifications to establish the kind and quality of all components and wiring.
17. **Wall Shelf with Outlet Strip:** Provide to accommodate storing and recharging HHTs (PDEDs) in the CISIC room.
 - A. Provide shelf 12" deep by 4'-0" long at 54" AFF
 - B. Provide outlet strip (Multi-outlet Assembly, single receptacles, spaced 6" O.C.) full length of shelf at 60" AFF on single 20-ampere 120-volt circuit.
18. **Building Service cables:**
 - A. Size of telephone service copper cable and fiber optic cable according to store size.
 - 1.) 10,000 sf – 25 pair, 12 strands of single mode fiber.
 - 2.) 20,000 sf – 50 pair, 12 strands of single mode fiber.
 - 3.) 30,000 sf – 50 pair, 12 strands of single mode fiber.
 - 4.) 40,000 sf and larger – 100 pair, 12 strands of single mode fiber.
 - B. Provide one 4" conduit for copper cable, one spare 4" conduit, and one 4" conduit with 4 inner ducts for fiber optic cables.
 - C. A pull box may be required where the main service conduits enter the building footprint. Provide an interior 48" x 48" x 8" deep, double-door cabinet as a pull box for all conduits, just inside the building in a dry accessible space. The cables shall pass-through the box without splice, making one 360 degree loop in the box. Provide this pull box if the CISIC room is on the second floor, or if the conduit path inside the building is more than 75 LF or would require more than one 90 degree ell to reach the telephone terminal board.
 - D. Provide all telephone system backboards, cabinets, conduits, j-boxes, wire, jacks, and cover plates for GF/GI telephone system. Provide data systems cabinets, conduits, j-boxes, wire, jacks, and cover plates for POS and PC LANS. Provide facility pre-wiring. Coordinate Work of this Section with the Facility telephone switch, telephone instrument, workstation, and local area network (LAN) equipment suppliers. Coordinate the service entrance arrangement with the local exchange carrier.
 - E. Locate the main telephone backboard in the main CISIC Room (typically RM 31A) for installation (NIC) of GF/GI telephone PBX equipment. Terminate the telephone building service conduits and cables at this board. Terminate the main building service cable on a protected terminal. Provide terminals to terminate all telephone branch wiring (except as may be run to a sub terminal) at this board. Provide two duplex receptacles on emergency generator power at this board. Run a #6 AWG minimum dedicated signal reference ground wire from this board to connect to the main electrical service grounding point. The total impedance of this ground conductor must be less than 0.25 ohm. Additionally, the main single-point ground for the building must have less than 5 ohms resistance to remote earth. If a Sub Hub is provided, provide a telephone sub terminal in the Sub Hub Room. Refer to Design Standard Plates.

FIGURE 1: FSE junction box with a 12" long by 3/4" NSF Plain End PVC conduit (gray) installed from the outside (attic) of the freezer/chill storage to the inside (ceiling) Only 2" of the PVC conduit will be



exposed above the outside (attic). The remaining 10" will be fastened securely to the inside wall of the freezer/chill storage and will terminate inside a 3/4" two gang Type FSE box.

FIGURE 2: Each freezer and chill storage requires a 400-Series Cable with a RP-TNC plug on one end and a RP-TNC jack installed on the other end. The RP-TNC jack connector end of the 400-series cable will be installed into the 12" long by 3/4" NSF Plain End PVC conduit and terminate inside the 3/4" two gang Type FSE box installed in the freezer/chill storage. No more than 3" of the 400-Series Cable will be exposed inside the Type FSE box.



FIGURE 3: The RP-TNC Plug connector end of the 400-series cable will terminate at the closest wireless data outlet as indicated on the floor plan. No more than 1-1/2' of the 400-Series Cable will be exposed at the wireless data outlet location. The cable will be installed above the freezer, fastened down at 12" intervals and any excess cable will be coiled above the entry point into the freezer. The 400-series cable will not be installed in conduit, except the 12" conduit length through the cooler ceiling. A moisture-impervious seal is required inside

and outside of the conduit installed in the freezer/chill storage.

END OF SECTION