

CHAPTER FOUR ELECTRICAL INSTALLATIONS/CONNECTIONS

- 4-1 General
- 4-2 Electrical Feeders
- 4-3 Service Equipment
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4-1 General.

4-1.1 Electrical Installations. This chapter of the code is intended to supplement the **National Electrical Code (NEC)** concerning manufactured dwellings and manufactured dwelling parks, but is not intended to take the place of the **NEC** or the federal **Manufactured Home Construction and Safety Standards 24 CFR 3280**.

(a) Wherever the requirements of this code differ from the **NEC**, this code shall apply;

(b) Alternate methods permitted in the **NEC** but not mentioned in this code may be permitted if acceptable to the authority having jurisdiction;

(c) All electrical equipment shall be without defect; damaged materials or equipment cannot be used. Used electrical equipment shall be examined for defect prior to installation, and all damaged electrical materials or equipment shall be repaired with approved component parts, or replaced;

(d) All electrical equipment, materials, devices, appliances, and fittings shall be listed and labeled for its intended use, and installed according to this code and where not specific, to the **NEC**.

4-1.2 Manufactured Dwellings. All electrical installations in connection with a manufactured dwelling installation, alteration, repair, conversion, or addition to a manufactured dwelling shall be made according to this code and, where not specific, to the **NEC**.

(a) See Chapter 9 for smoke alarm and smoke detector locations.

(b) When a manufactured dwelling is located in a flood hazard area, all electrical connections on the lot shall be a minimum of 12 inches (30 cm) above the base flood level.

4-1.3 Accessories. All electrical installations to external equipment, alterations, repairs, conversions, or additions in connection with a manufactured home shall be made according to this code and, where not specific, to the **NEC**. External accessories (i.e., accessory buildings, structures, air handling equipment, and water and sewer pumps) may be connected directly to the manufactured dwelling's main distribution panel if there is adequate space and amperage to supply the added loads. Except where otherwise required by Chapter 6 for fuel burning equipment, replacement appliances are not required to be listed for manufactured home use. See Section 4-5 for additional requirements for onsite installed equipment.

4-1.4 Underground Installations. Direct buried cables shall be installed in trenches and protected from damage according to **Table 4-D**. Backfill shall be free of large rocks, paving materials, cinders, large or sharply angular substances, or corrosive material. Backfill around cables with sand or clean soil (**see Figures 4-1.4A and B**). Direct buried cables shall maintain the minimum clearances shown in **Table 4-D**.

Do not install direct burial cables in a common trench with non-electrical utilities unless specifically approved by the electrical utility company or the authority having jurisdiction.

4-1.5 Communication Equipment. Communication cables (i.e. telephone, television, and computer cables) may be installed by the manufacturer, however, if the purchaser did not order the home to be pre-wired, cables will need to be installed on site. Manufactured dwelling floor, wall, and ceiling cavities contain

electrical circuits, plumbing, and ducting. Extreme care should be exercised during drilling through and placing communication cables within these cavities. Communication cables installed in trenches with other electrical conductors shall be separated by a minimum of 12 inches (30 cm) (see **Figure 4-1.4B**).

4-1.6 Clearances. Maintain all clearances to electrical equipment according to the listing of the equipment, the **NEC, Tables 4-C and 4-D**. Electrical equipment or materials shall not obstruct the access to the under-floor area. Homes may not be sited less than eight (8) feet (243.8 cm) from a transformer.

4-1.7 Repairs and Maintenance. All repairs and maintenance of a manufactured dwelling electrical system shall be made according to this code, and where not specific, to the **24 CFR 3280** or to the **NEC**.

4-1.8 Alterations and Additions. All alterations and additions to a manufactured dwelling electrical system shall be made according to this code, and where not specific, to the **24 CFR 3280** or to the **NEC**.

4-1.9 Inspections. All electrical connections shall be accessible for inspections. All excavations containing electrical equipment shall be left open for inspection by the authority having jurisdiction.

4-2 Electrical Feeders.

4-2.1 Approved Feeders. Manufactured dwelling feeder conductors shall consist of one of the following:

- (a) A listed factory installed or provided cord, properly connected. (see **figure 4-2.1A**);
- (b) A permanently installed overhead feeder containing four insulated conductors listed as sunlight resistant and

installed in compliance with **Table 4-A**. (see **figure 4-2.1B**);

(c) A permanently installed overhead feeder containing three insulated conductors listed as sunlight resistant with an “uninsulated” messenger of a factory assembled quadplex cable installed in compliance with the applicable provisions of **NEC Articles 230-24, 321, and 550-5** (see **figure 4-2.1B**);

(d) A permanently installed underground feeder containing four insulated conductors as per **Table 4-B**;

(e) A permanently installed feeder installed by the manufacturer according to DAPIA approved plans when the service equipment is mounted on the manufactured dwelling by the manufacturer at the manufacturing plant; or

(f) A permanently installed feeder containing four insulated conductors, and protected in an approved raceway in or through the floor, wall, or roof or under the chassis when the service equipment is mounted on the manufactured dwelling on site.

4-2.2 Feeder Sizing. Feeders shall be sized according to the following:

(a) The feeder size shall be based on the amperage of the main circuit breaker inside the manufactured dwelling’s main distribution panel which is also indicated on an exterior label located near the feeder and on the manufacturer’s data plate located inside the home.

(b) Feeders shall be sized adequately to carry the combined loads of the manufactured dwelling and all external accessories receiving power from the main distribution panel (i.e. air conditioner, heat pump, accessory buildings, accessory structures, or water and sewer pumps).

(c) Overhead feeders shall be sized according to **Table 4-A**.

(d) Underground feeders and conduit shall be sized according to **Table 4-B**.

4-2.3 Feeder Installations. Feeder conductors shall be installed according to

the following and, where not specific, to the **NEC**:

(a) Cord connected feeders shall consist of one listed 50 ampere power-supply cord attached to the main distribution panel or a junction box. **(see Figure 4-2.1A)**;

(b) Overhead feeders shall be provided with the clearances required in **Table 4-C**. **(see figure 4.2.1B)**;

1. When roof additions are installed on a manufactured dwelling, the height of the overhead feeder shall be extended to provide the required clearances above the roof addition; and

(c) Underground feeders shall be provided with the clearances required in **Table 4-D**, and where not specific, to **NEC Table 300-5**;

(d) Conduit shall be sized according to **Table 4-B**;

(e) Conduit shall be installed and secured at the intervals required in **Table 4-E**;

(f) The feeder shall be connected to the electrical service disconnect within view of the manufactured dwelling and within 30 feet (914 cm) of the manufactured dwelling exterior wall. The 30 foot (914 cm) measurement applies to the service disconnect only. If the meter is not part of the service disconnect, the meter is not required to be within 30 feet (914 cm) or within view of the manufactured dwelling.

4-2.4 Grounding. The green colored insulated conductor of the feeder shall be connected to the grounding bus inside the main electrical distribution panel and to the grounding bus inside the service entrance equipment located on or adjacent to the manufactured dwelling. The neutral bar shall be isolated from the ground bar inside the main distribution panel or inside any junction boxes used in conjunction with the manufactured dwelling branch circuit or feeder.

4-2.5 Temporary Feeder Installations.

When a manufactured dwelling is installed for display purposes only on a manufacturer's, dealer's or distributor's lot or facility, or at a show the electrical

feeders may be installed according to the following:

(a) Temporary feeders may be reduced in size and amperage adequate to supply only the equipment being used during the display;

(b) Temporary feeder disconnects are exempt from requirements to be within view and within 30 feet (914 cm) of the manufactured dwelling exterior wall;

(c) Temporary feeders supplying only 120 volt circuits may be made up of three insulated conductors and may use service entrance (SE) cable;

(d) Temporary feeders shall provide a means of grounding the manufactured dwelling to an approved electrical ground; and

4-3 Electrical Service Equipment.

4-3.1 Service Equipment. A manufactured dwelling shall be provided power through electrical service equipment installed according to this code and, where not specific, to **NEC Article 230** and **550-23** of the **National Electrical Code (NEC)**.

4-3.2 Service Equipment Installations.

Service equipment shall be provided for a manufactured dwelling by one of the following methods:

(a) Service equipment may be installed on the manufactured dwelling by the manufacturer at the manufacturing plant during the initial construction **(see Figure 4-3.2A)**;

(b) The service equipment may be field installed on the manufactured dwelling at its final installation site **(see Figures 4-3.2A)**;

(c) The service equipment may be installed on a pole or as an approved pedestal adjacent to the manufactured dwelling; or

(d) When service equipment is installed on a permanent detached structure (i.e. garage, cabana, or accessory building) on the same site it must be within 30 feet (914 cm) and in sight of the manufactured dwelling, or a disconnect means may be

provided within 30 feet (914 cm) and in sight of the manufactured dwelling.

4-3.2.1 Factory Installed Service Equipment. Service equipment installed on a manufactured dwelling by the manufacturer in the factory shall comply with the following:

- (a) Service equipment may be installed by the manufacturer at the manufacturing plant during the initial construction;
- (b) The neutral conductor shall be connected to the system grounding conductor on the supply side of the main disconnect; and
- (c) Service equipment shall be site specific and sized adequately to carry the combined loads of the manufactured dwelling.

4-3.2.2 Field Installed Service Equipment. Service equipment installed on a manufactured dwelling at the manufactured dwelling site shall comply with the following:

- (a) Service equipment shall be installed in a manner acceptable to the authority having jurisdiction;
- (c) Service equipment and conductors shall be sized adequately to carry the combined loads of the manufactured dwelling.
- (d) The neutral conductor shall be connected to the system grounding conductor on the supply side of the main disconnect; and
- (e) Location of the service metering equipment shall be site specific according to the requirements of the local utility company.

4-3.2.3 Detached Service Equipment. Service equipment installed on a manufactured dwelling site and not attached to the manufactured dwelling shall comply with the following:

- (a) Service equipment shall be installed on a pole or as an approved pedestal or installed on a permanent structure adjacent to the manufactured dwelling (i.e. garage, cabana, or accessory building);

- (b) Service equipment and conductors shall be sized adequately to carry the combined loads of the manufactured dwelling and all external accessories on the manufactured dwelling.

4-3.3 Service Location and Clearances. All service equipment shall be located according to the following:

- (a) Service equipment shall be located according to the site's electrical service as designated by the applicable electrical utility company or if in a park, according to the electrical service designed for the park;
- (b) Overhead service conductors shall maintain the clearances required in **Table 4-C; (See Figure 4-2.1B)**
 1. When roof additions and ramadas are installed on a manufactured dwelling, the height of the overhead service shall be extended to provide the required clearances above the roof addition.
- (c) Underground service conductors shall maintain the clearances required by the serving utility;
- (d) The electrical service disconnect shall be within view of the manufactured dwelling and within 30 feet (914 cm) of the manufactured dwelling exterior wall;
- (e) Service disconnect shall be located so the bottom of the enclosure containing the disconnecting means is not less than 2 feet (61 cm) above finished grade or the base flood elevation when the manufactured dwelling is located in a flood hazard area;
- (f) The center of the meter shall be located a minimum of 4 feet (122 cm) and a maximum of 6 feet (183 cm) above grade or a working platform;
- (g) Service disconnect shall be located so the center of the grip of the operating handle, in its highest position, is not more than 79 inches (201 cm) above the finished grade or a working platform; and
- (h) The front of the service equipment shall be provided with a working clearance of 30 inches (76 cm) wide by 36 inches (91 cm) deep.

4-3.4 Service Equipment Requirements. All service equipment shall be installed according to the following:

(a) All service equipment shall be installed according to this code and, where not specific, to **NEC Article 230 and 550-23**;

(b) All electrical service equipment connections shall be accessible;

(c) All service equipment shall contain a means for connecting accessory buildings, accessory structures, or additional electrical equipment located outside a manufactured dwelling by a fixed wiring method; and

(d) When there is multiple electrical service equipment on the same lot, space, or site, each service disconnect shall be identified with a permanent, prominently displayed identification label indicating what structure or accessory the service disconnect controls (i.e. manufactured dwelling, accessory building, air handling equipment, and water and sewer pumps)

4-3.5 Grounding. Where service equipment is mounted on the manufactured dwelling and the manufactured dwelling is supported by a poured-in-place concrete footing or slab, the service equipment may be grounded to a concrete encased electrode according to **NEC Article 250-50 (see Figure 3-8.2.1 and 3-8.2.2)**. Where a poured-in-place concrete footing or slab ground is not available, the manufactured dwelling service equipment shall be grounded to ground rod(s) or other methods according to **NEC Article 250-50 or 250-52**.

4-4 Electrical Crossover Connections.

4-4.1 Crossover Connection. Multiple sections (i.e. side by side or stacked sections) of manufactured dwellings shall have the electrical circuits connected at the marriage line according the following:

(a) All electrical crossover connections shall be a minimum of 12 inches (30 cm) above the base flood level;

(b) All electrical crossover connections shall be made with approved connectors and contained within junction boxes or within wall or floor cavities;

(c) All electrical crossover connections shall remain accessible; and

(d) Electrical crossover connections at the marriage line shall be made according to Section 4-4.2 or 4-4.3 of this chapter.

4-4.2 Component Interconnection Devices. When provided by the manufactured dwelling manufacturer, multiple sections of a manufactured dwelling may be connected through listed and approved component interconnection devices (i.e. AMP®, Molex®, or equal connectors) according to the following (**see Figures 4-4.2A**):

(a) Each component interconnection device shall be matched with a similar connector identified by the manufacturer with corresponding colors, numbers, letters, or other marks;

(b) Each pair of component interconnection devices shall be connected and locked according to the device manufacturer's installation instructions;

(c) The connected pair of component interconnection devices shall be pushed back inside the floor or wall cavity; and

(d) The access panel on the wall or floor shall be replaced and secured in place.

4-4.3 Hard Wire Connections. When provided by the manufacturer of the manufactured dwelling, multiple sections of a manufactured dwelling may be connected through junction boxes according to the following:

(a) The cables shall be inserted into the junction boxes and secured with approved clamps where required;

(b) Each cable shall have the sheathing stripped back exposing the conductors and each conductor shall have the insulation stripped back exposing the bare wire;

(c) Each cable, containing three to four conductors, shall be matched with another cable identified by the

manufacturer with corresponding colors, numbers, letters, or other marks;

(d) The conductors of each matched circuit shall be joined together according to their identification with appropriately sized wire nuts. There shall not be any exposed bare conductors showing outside the wire nuts except for the grounding conductor **(see Figure 4-4.3A and 3B)**;

(e) The bare conductors and green conductors (grounding conductors) of all circuits shall be joined together with a wire nut or other approved device;

(f) Where the junction box is metal, it shall be bonded to the grounding conductors inside the box;

(g) Wire nut connections shall be checked to make sure there are no loose conductors;

(h) The conductors shall be pushed into the box and the junction box cover secured in place.

(i) All exposed cables shall be inside the wall or floor or shall be protected in an approved conduit; and

(j) Split circuits provided by the manufacturer shall be connected according to the color-coding or other coding provided by the manufacturer **(see Figure 4-4.3B)**.

4-4.4 Bonding Crossover. Multiple sections of manufactured dwellings shall be bonded at each marriage line according to one of the following methods:

(a) Each steel chassis shall be bonded to the adjacent chassis with a solid or stranded, green insulated or bare number 8 copper conductor secured to connectors supplied by the manufacturer **(see figure 4-4.4A)**; or

(b) Each steel chassis shall be bonded to the adjacent chassis with bolts or rods capable of conducting current from one chassis to another. Star washers or similar paint penetrating devices shall be used to provide an effective bonding path between each chassis **(see figure 4-4.4B)**.

4-5 Electrical Equipment.

4-5.1 Site Connections. All site installed or connected electrical equipment shall be installed according to this code and, where not specific, to the **National Electrical Code (NEC)**.

4-5.2 Shipped-Loose Fixtures. Electrical equipment and fixtures (i.e. ceiling fans, chandeliers, exterior lights, and mechanical equipment) that are shipped-loose with the manufactured dwelling shall be installed on site according to the equipment manufacturer's installation instructions.

Wiring connections of shipped-loose electrical equipment or fixtures shall be properly connected to the corresponding color coded or marked conductors of the manufactured dwelling branch circuit conductors. When fixtures are located on a combustible surface (i.e. hardboard, wood, logs, vinyl, etc.) install a flash ring between the electrical device and the combustible surface.

4-5.3 Site Installed Electrical Equipment. All site installed electrical equipment and the electrical connections shall comply with the following:

(a) Outdoor fixtures and equipment shall be listed for use in wet locations, except they may be listed for use in damp locations if located on the underside of the home or located under roof extensions or similarly protected locations;

(b) Exterior air handling equipment (i.e. air conditioners, heat pumps, and evaporative coolers) installed on the outside of the manufactured dwelling shall be connected to an adequately sized circuit;

(c) Connections from the branch circuit junction box to exterior air handling equipment shall be made through liquid tight flexible conduit with the proper termination fittings;

(d) Added accessories (i.e. accessory buildings, accessory structures, air handling equipment, and water and sewer pumps) not provided for by the manufacturer may be connected to the

manufactured dwelling's main distribution panel if there is adequate space and amperage to supply the additional branch circuit loads;

(e) Circuit breakers and conductors for added accessories or appliances shall be sized adequately according to the load imposed;

(f) Additional 120 volt, 15 or 20 ampere receptacles shall be permitted for connection of electrical equipment located outside the manufactured dwelling if protected by a listed ground fault circuit interrupter;

(g) When a manufactured dwelling is located in a flood hazard area, all electrical appliances and connections shall be a minimum of 12 inches (30 cm) above the base flood level;

(h) Under-floor or under-chassis line-voltage (120 volts, nominal or higher) wiring shall be protected from damage in an approved conduit closely routed against and secured to the floor or chassis;

(i) Electrical raceways shall be supported according to **Table 4-E**; and

(j) All electrical appliances, equipment, and connections shall be accessible and removable.

4-5.4 Electrical Ground. All site installed or connected electrical equipment shall be grounded according to the following:

(a) All 240 volt cooking ranges and clothes dryers shipped-loose or purchased separately by the homeowner, shall have the bonding strap, if any, between the ground and neutral conductors removed before installation.

(b) Cord sets used on 240-volt appliances (i.e. cooking ranges and clothes dryers) shall have four conductors and four prongs when connected to a manufactured dwelling.

(c) Cord sets for permanently installed 110-volt appliances (i.e. built in microwave ovens, pellet-fired appliances, window air conditioners, etc.) shall have three conductors and three prongs when connected to a manufactured dwelling.

4-5.5 Heat Tape Installation. Heat tape, when used, shall be connected to the heat tape receptacle outlet under the manufactured dwelling near the main water inlet. Heat tape shall be listed for manufactured home use and installed according to the heat tape manufacturer's installation instructions.

4-6 Electrical Testing.

4-6.1 Required Tests. Each manufactured dwelling shall be tested by the person making the electrical feeder connection. When tests indicate faults, correct or report such failures to the manufacturer's service department immediately.

4-6.2 Polarity Tests. After all electrical connections have been made; the manufactured dwelling shall be tested according to the following:

(a) All 120 volt electrical receptacle outlets shall be subjected to a polarity test to determine that connections have been properly made;

(b) All shipped-loose electrical fixtures shall be subjected to a polarity test to determine that connections have been made properly; and

(c) All shipped-loose 240-volt electrical appliances shall be visually checked or tested to assure the ground and neutral conductors have been isolated.

4-6.3 Continuity Test. After all electrical connections have been made; the manufactured dwelling shall be tested with the power off according to the following:

(a) All applicable metal parts in or on a manufactured dwelling shall be tested for continuity to ensure they are properly bonded; and

(b) All grounding and bonding conductors installed or connected during the manufactured dwelling installation shall be tested for continuity.

4-6.4 Functional Tests. After all electrical connections have been made; the manufactured dwelling shall be tested

with the power on according to the following.

(a) Each ground fault circuit interrupter (GFCI) shall be tested by pushing the test button and then reset by pushing the reset button. All receptacles protected by a GFCI shall be tested with a GFCI receptacle tester to assure it is connected and in working order; and

(b) Each smoke detector shall be tested to assure it is connected and in working order.

4-6.5 Test Failures. Upon failure of any of the above tests, check all applicable field connections, correct any faults, and re-test. If tests continue to fail, notify factory authorized service personnel immediately and report failures. Other than during testing, do not energize the manufactured dwelling until all faults in the electrical system have been corrected.

TABLE 4-A
OVERHEAD FEEDER CONDUCTOR SIZING

AMPERAGE OF HOME	CONDUCTOR USE	NUMBER OF CONDUCTORS	WIRE SIZE (COPPER)	WIRE SIZE (ALUMINUM)
50 AMPS	UNGROUND	2	# 8	# 8
	GROUND	1	# 10	# 10
	GROUNDING	1	# 10	# 8
100 AMPS	UNGROUND	2	# 4	# 3
	GROUND	1	# 6	# 4
	GROUNDING	1	# 8	# 6
150 AMPS	UNGROUND	2	#2	# 1/0
	GROUND	1	# 3	# 1
	GROUNDING	1	# 6	# 4
200 AMPS	UNGROUND	2	# 1/0	# 3/0
	GROUND	1	# 1	# 1/0
	GROUNDING	1	# 6	# 4
225 AMPS	UNGROUND	2	# 2/0	# 4/0
	GROUND	1	# 1/0	# 3/0
	GROUNDING	1	# 4	# 2

NOTES: Insulation type shall be limited to type THW, THWN, and THHN only.

2. This table is not all-inclusive, see Section 4-5 of this chapter and the **National Electrical Code** for further information.

TABLE 4-B

UNDERGROUND FEEDER CONDUCTOR AND CONDUIT SIZING

AMPERAGE OF HOME	CONDUCTOR USE	NUMBER OF CONDUCT- ORS	WIRE SIZE (COPPER)	WIRE SIZE (ALUMINUM)	CONDUIT SIZE (COPPER)	CONDUIT SIZE (ALUMINUM)
50 AMPS	UNGROUND	2	# 6	# 4	1 INCH INSIDE DIAMETER	1 INCH INSIDE DIAMETER
	GROUND	1	# 8	# 6		
	GROUNDING	1	# 10	# 8		
100 AMPS	UNGROUND	2	# 4	# 2	1 INCH INSIDE DIAMETER	1-1/4 INCH INSIDE DIAMETER
	GROUND	1	# 6	# 3		
	GROUNDING	1	# 8	# 6		
150 AMPS	UNGROUND	2	#1	# 2/0	1-1/4 INCH INSIDE DIAMETER	1-1/2 INCH INSIDE DIAMETER
	GROUND	1	# 2	# 1/0		
	GROUNDING	1	# 6	# 4		
200 AMPS	UNGROUND	2	# 2/0	# 4/0	1-1/2 INCH INSIDE DIAMETER	2 INCH INSIDE DIAMETER
	GROUND	1	# 1/0	# 3/0		
	GROUNDING	1	# 6	# 4		
225 AMPS	UNGROUND	2	# 3/0	250 MCM	2 INCH INSIDE DIAMETER	2 INCH INSIDE DIAMETER
	GROUND	1	# 2/0	# 4/0		
	GROUNDING	1	# 4	# 2		

NOTES:

1. Insulation type shall be limited to type USE, UF, THW, THWN, and THHN only.
2. Conduit sizes are based on Schedule 40 PVC only.
3. This table is not all-inclusive, see Section 4-5 of this chapter and the **National Electrical Code** for further information.

TABLE 4-C

ABOVE GROUND FEEDER CONDUCTOR CLEARANCES

LOCATION	MINIMUM HEIGHT
Above Roof Surface	8 Feet
Above Roof Ridge	3 Feet
Above Pedestrian Access	10 Feet
Above Private Driveways	12 Feet
Above Public Driveways	18 Feet
Above Alleys and Streets	18 Feet

NOTES:

1. Exceptions to Article 230-24 of the National Electrical Code.

- a.) The area above a roof surface subject to pedestrian or vehicular traffic shall have a vertical clearance from the roof surface in accordance with the clearance requirements of Section 230-24(b).
- b.) Where the voltage between conductors does not exceed 300 and the roof has a slope of 4 in. (102 mm) in 12 in. (305 mm), or greater, a reduction in clearance to 3 feet (914 mm) shall be permitted.
- c.) Where to voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof not less than 18 in. (457 mm) shall be permitted if (1) not more than 6 ft. (1.83 m) of service-drop conductors, 4 ft. (1.22 m) horizontally, pass above the roof overhang, and (2) they are terminated at a through-the-roof raceway or approved support.
- d.) The requirement for maintaining the vertical clearance 3 ft. (914 mm) from the edge of the roof shall not apply to the final conductor span where the service drop is attached to the side of the building.

2. This table may be not all-inclusive, see Section 4-5 of this chapter and the National Electrical Code for further information.

TABLE 4-D

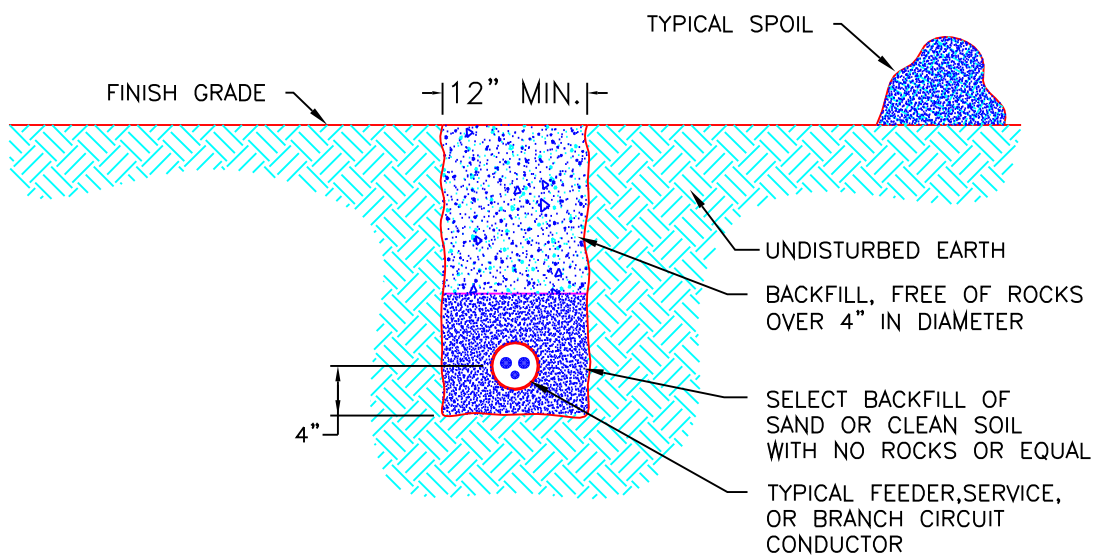
UNDERGROUND FEEDER CONDUCTOR CLEARANCES

LOCATION OF WIRING METHOD	DIRECT BURIAL CABLE	RIGID METAL CONDUIT	RIGID NON- METAL CONDUIT	BRANCH CIRCUITS MAX 20 AMP
All Locations not Specified Below	24"	6"	18"	12"
Trench with 2" thick concrete cover	18"	6"	12"	6"
Under 4" concrete slab extending 6" over wiring	18"	4"	4"	6"
Under Streets & Driveways and Parking Lots	24"	24"	24"	24"
1 & 2 Family Driveways and Parking Areas	18"	18"	18"	12"
<p>NOTES:</p> <p>This table may be not all-inclusive, see the National Electrical Code for further information.</p>				

TABLE 4-E

ELECTRICAL RACEWAY SECUREMENT SCHEDULE

CONDUIT TYPE	FROM TERMINATION POINT (J-BOX)	INTERMEDIATE SUPPORT
Electrical Metallic Tubing	3 Feet	10 Feet
Electrical Nonmetallic Tubing	3 Feet	3 Feet
Flexible Metal Conduit	12 Inches	54 Inches
Intermediate Metal Conduit	3 Feet	10 Feet
Liquidtight Flexible Metal Conduit	12 Inches	54 Inches
Liquidtight Flexible Nonmetallic Conduit	12 Inches	3 Feet
Rigid Metal Conduit	3 Feet	16 Feet ⁽¹⁾
Rigid Nonmetallic Conduit	3 Feet	5 Feet ⁽¹⁾
<p>NOTES:</p> <p>1. Spacing of supports is based on 2 inch diameter conduit only and will vary for smaller or larger sizes according to the National Electrical Code.</p> <p>2. Raceways shall have hangars, slings, clamps or brackets which do not compress, distort, cut, or abrade the raceway.</p> <p>3. This table is not all-inclusive, see the National Electrical Code for further information.</p>		

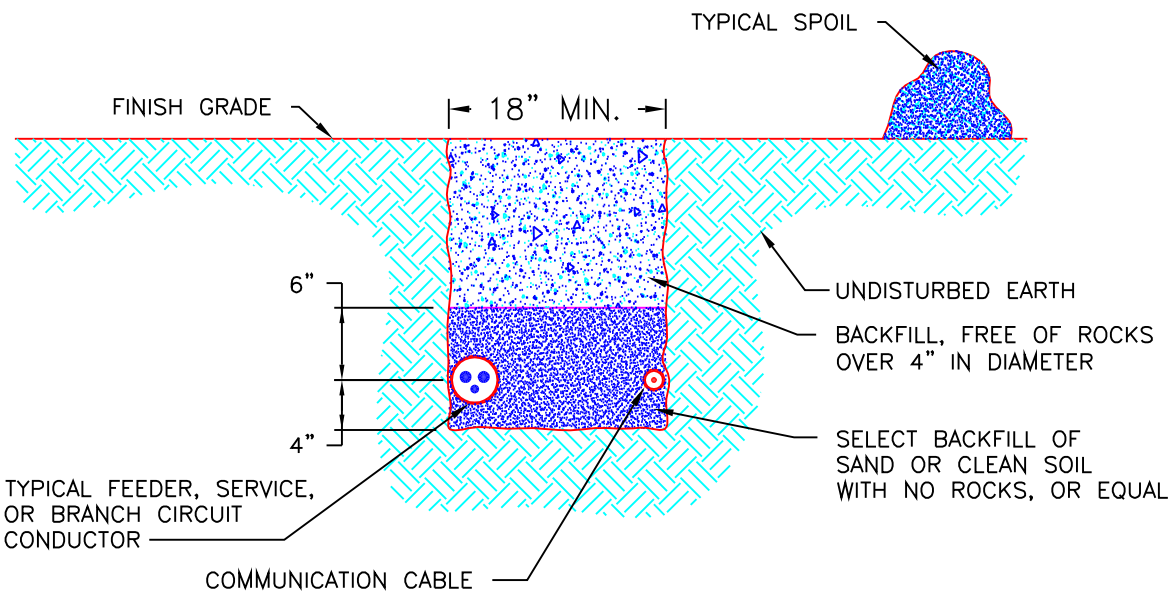


NOTE: SEE TABLE 4.D

NOTE: DO NOT INSTALL ELECTRICAL CONDUCTORS IN A COMMON TRENCH WITH NON-ELECTRIC UTILITIES SUCH AS WATER, GAS, AND SEWER, UNLESS APPROVED BY THE UTILITY COMPANIES.

TYPICAL ELECTRICAL BURIAL TRENCH

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-1.4A

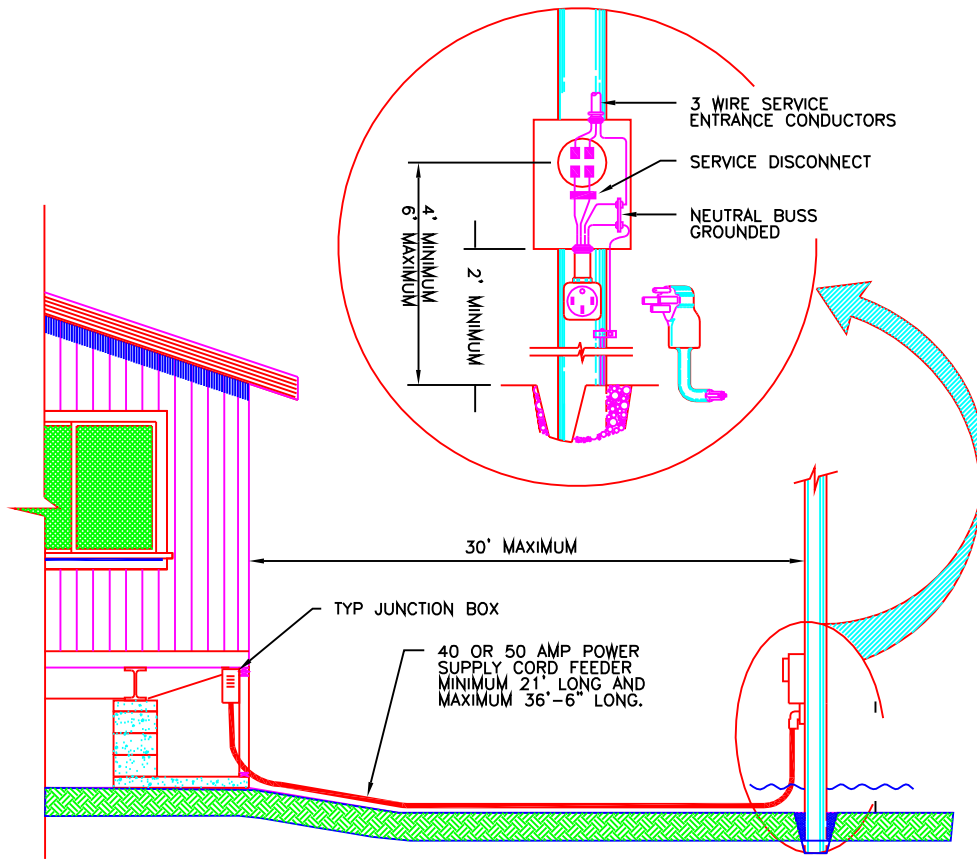


NOTE: SEE TABLE 4.D

NOTE: DO NOT INSTALL ELECTRICAL CONDUCTORS IN A COMMON TRENCH WITH NON-ELECTRIC UTILITIES SUCH AS WATER, GAS, AND SEWER, UNLESS APPROVED BY THE UTILITY COMPANIES.

TYPICAL JOINT USE ELECTRICAL BURIAL TRENCH

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-1.4B

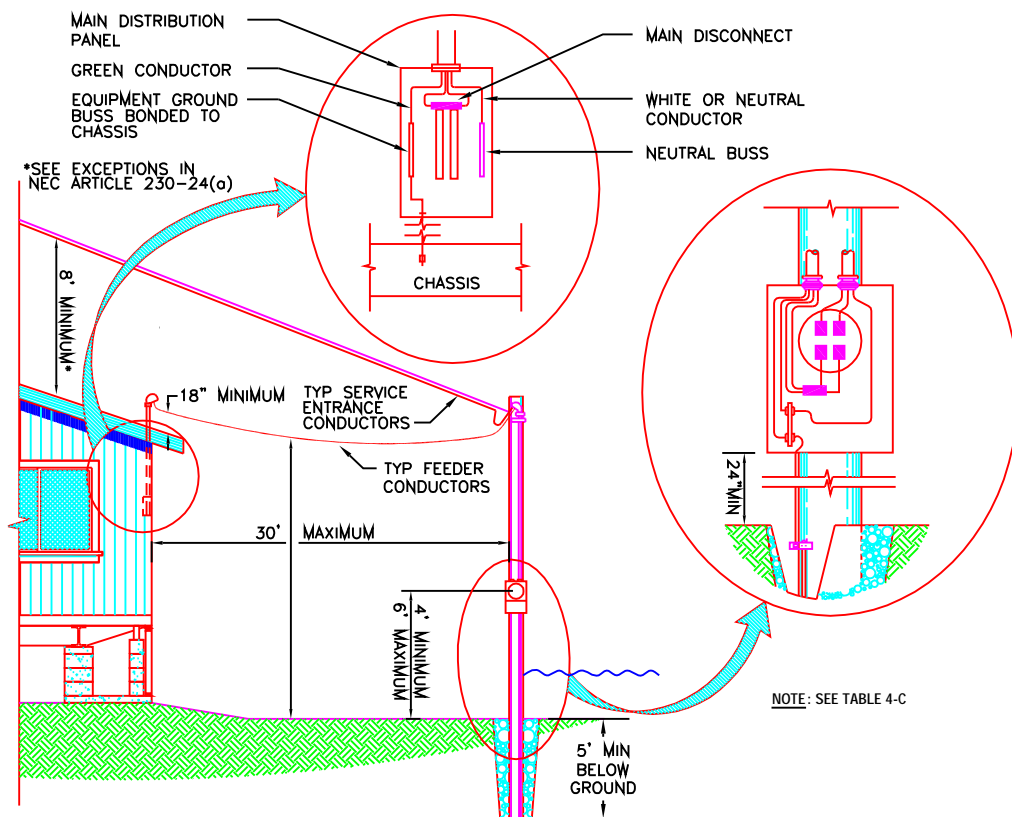


TYPICAL CORD CONNECTED FEEDER INSTALLATION

REV. 12/01/01 RHW

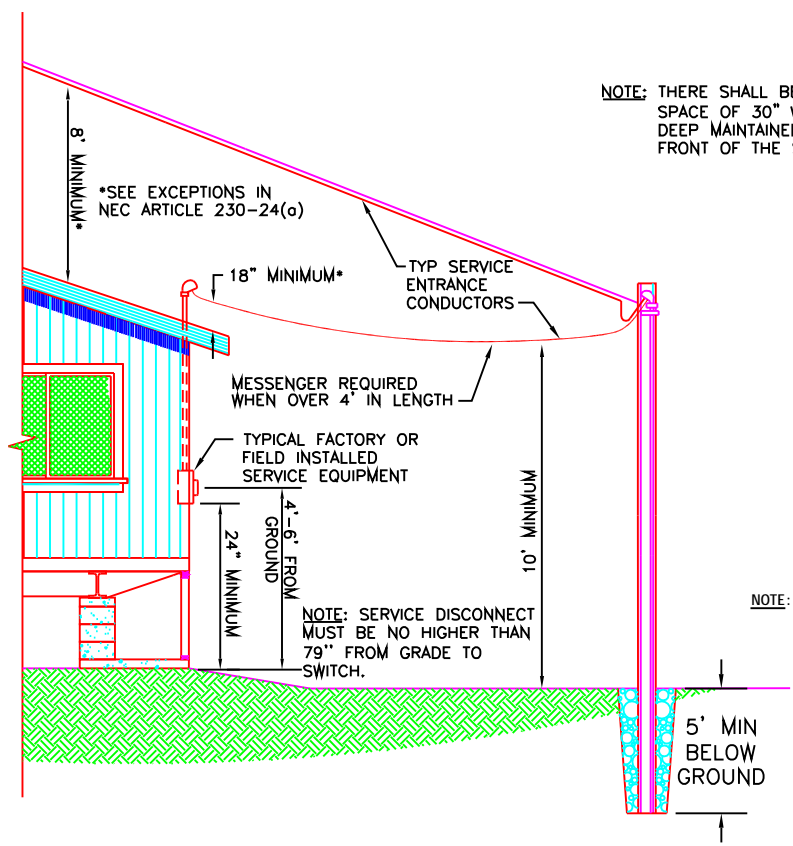
MANUFACTURED STRUCTURE
AND PARK SPECIALTY CODES

CHAPTER 4
FIGURE 4-2.1A



TYPICAL OVERHEAD FEEDER INSTALLATION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-2.1B



NOTE: THERE SHALL BE A WORKING SPACE OF 30" WIDE & 36" DEEP MAINTAINED DIRECTLY IN FRONT OF THE SERVICE EQUIPMENT.

*SEE EXCEPTIONS IN NEC ARTICLE 230-24(a)

18" MINIMUM*

TYP SERVICE ENTRANCE CONDUCTORS

MESSENGER REQUIRED WHEN OVER 4' IN LENGTH

TYPICAL FACTORY OR FIELD INSTALLED SERVICE EQUIPMENT

4'-6" FROM GROUND

24" MINIMUM

10' MINIMUM

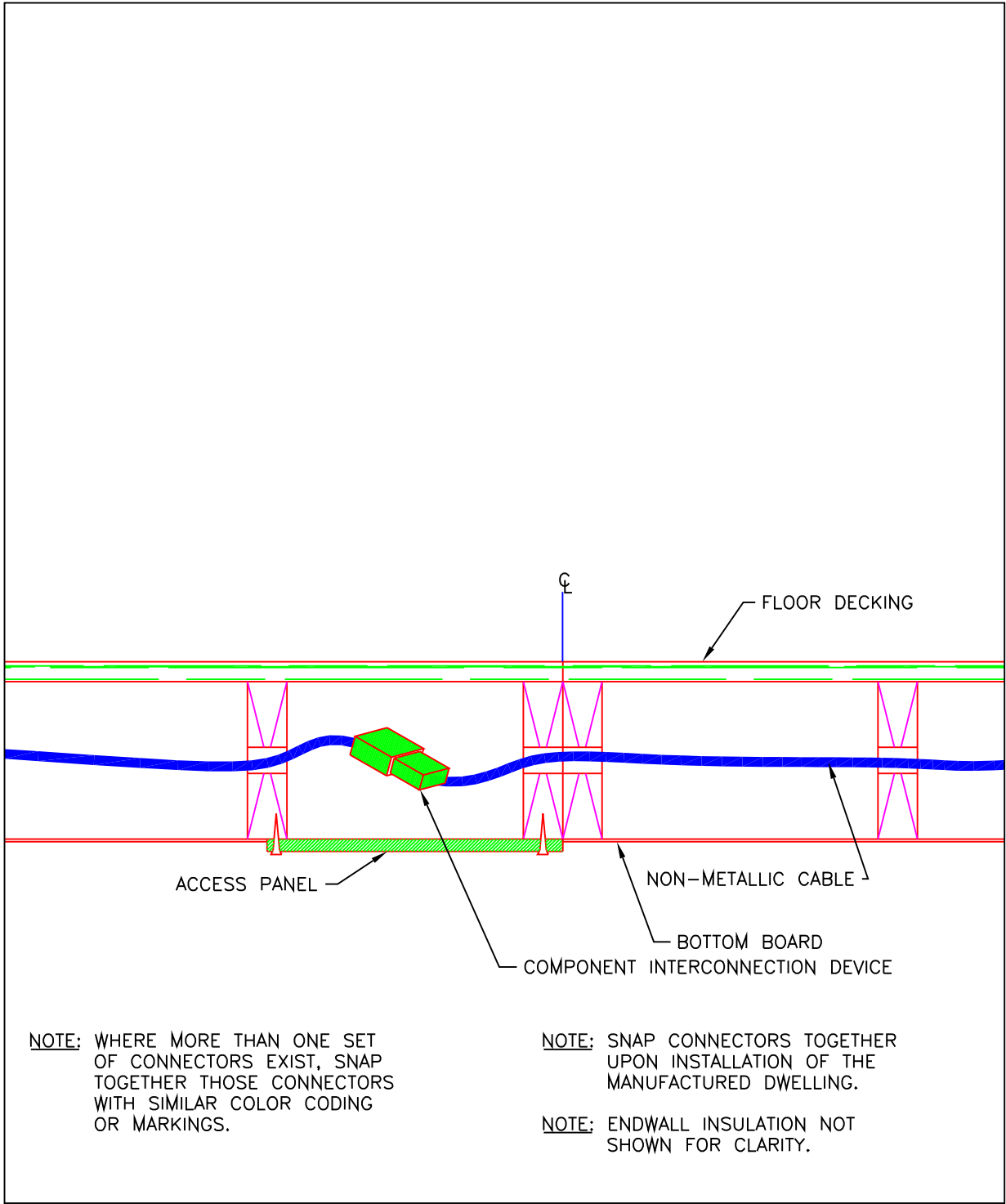
NOTE: SERVICE DISCONNECT MUST BE NO HIGHER THAN 79" FROM GRADE TO SWITCH.

NOTE: SEE TABLE 4-C

5' MIN BELOW GROUND

TYPICAL OVERHEAD SERVICE EQUIPMENT INSTALLATION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-3.2A

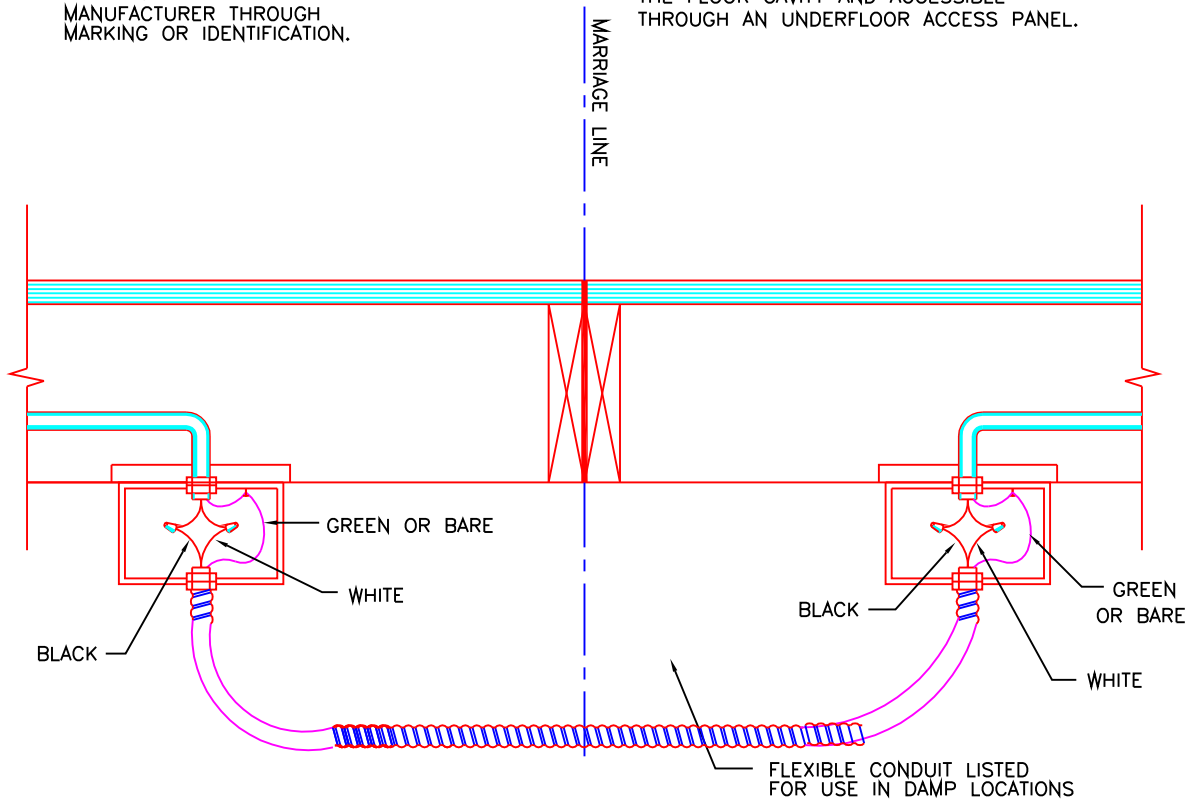


TYPICAL COMPONENT INTERCONNECTION CROSSOVER IN FLOOR

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-4.2A

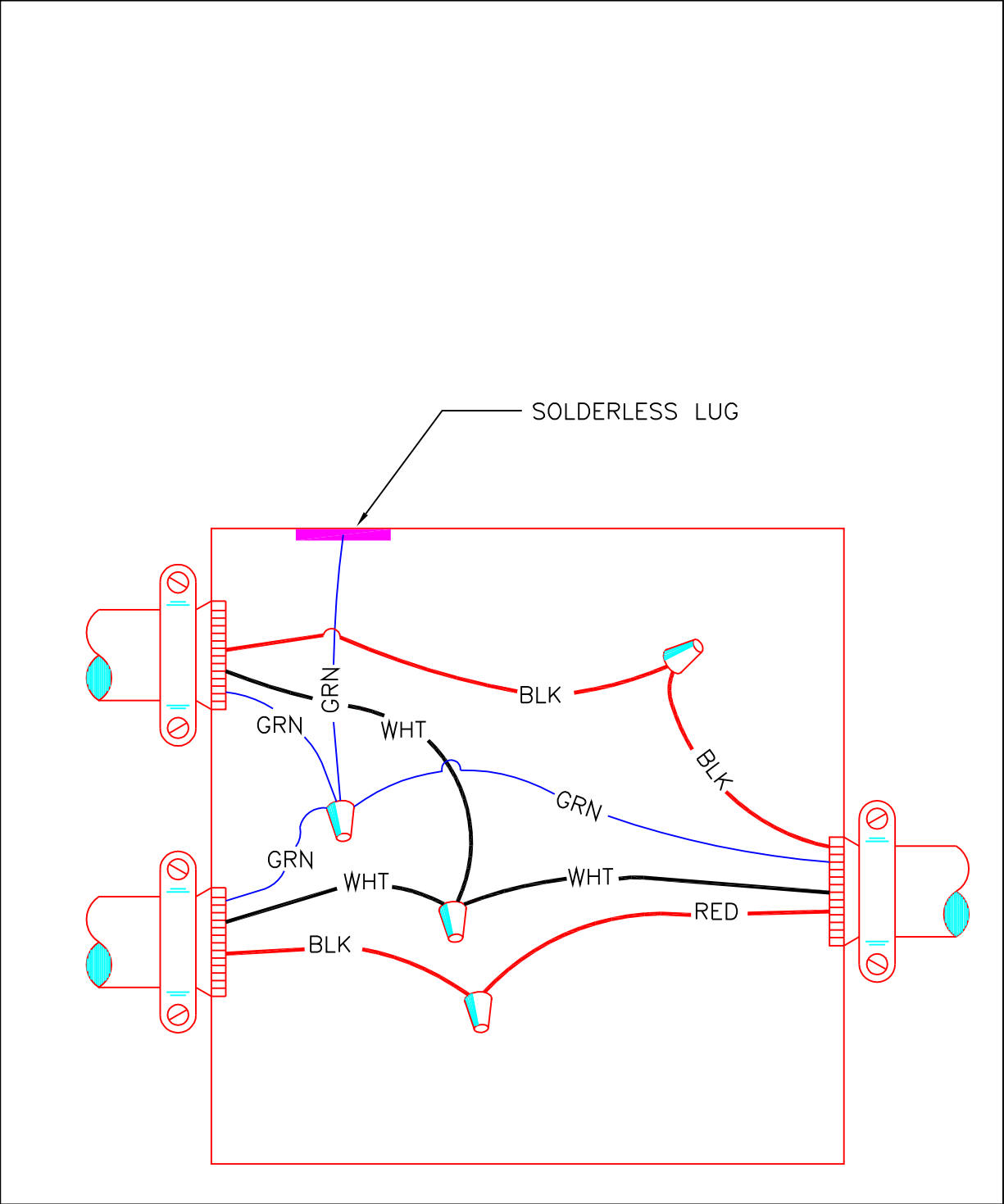
NOTE: ALL ELECTRICAL CROSSOVER CONNECTIONS SHOULD BE IDENTIFIED BY THE MANUFACTURER THROUGH MARKING OR IDENTIFICATION.

NOTE: SOME ELECTRICAL CROSSOVER CONNECTIONS ARE CONTAINED WITHIN THE FLOOR CAVITY AND ACCESSIBLE THROUGH AN UNDERFLOOR ACCESS PANEL.



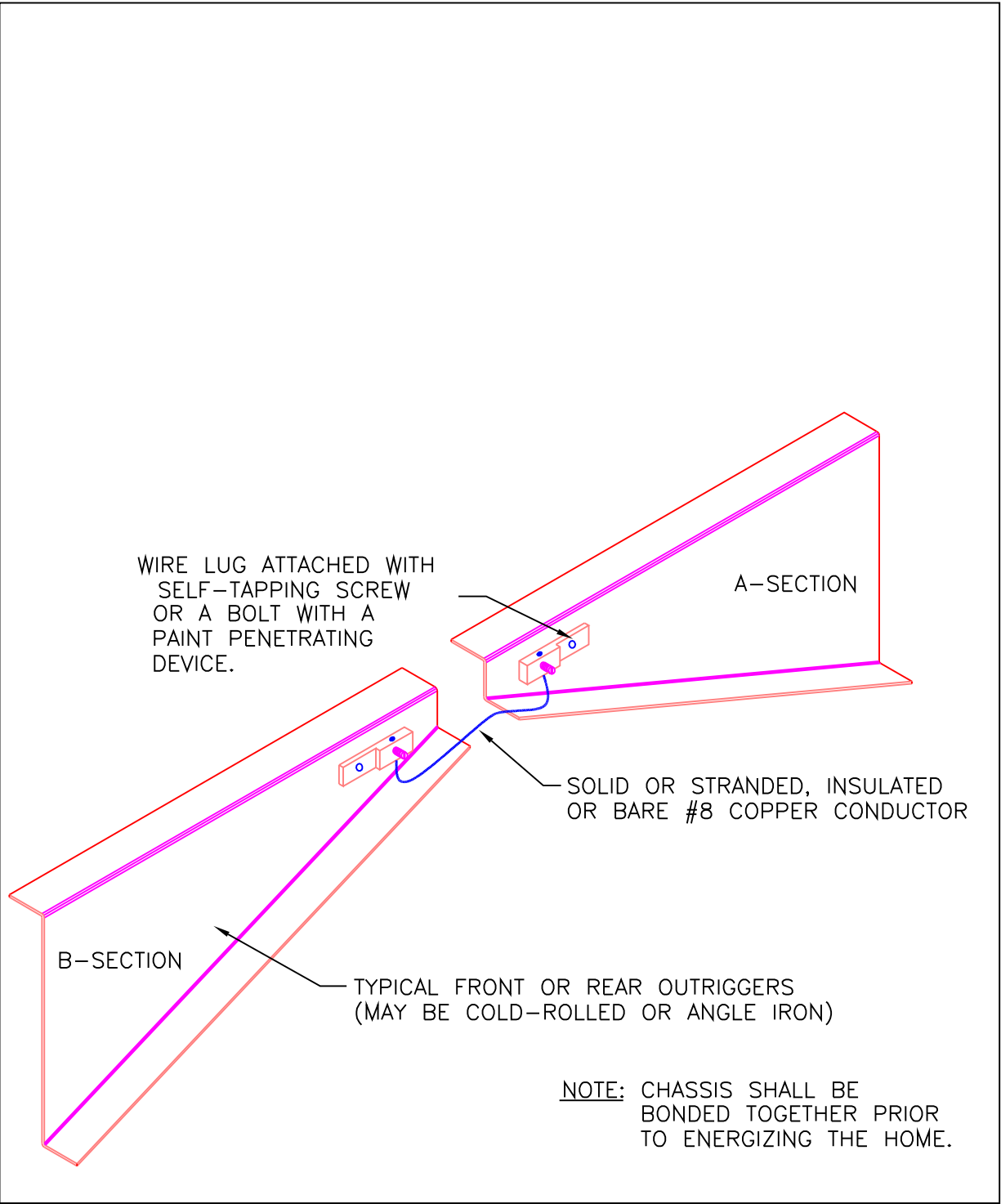
TYPICAL HARDWIRED ELECTRICAL CROSSOVER CONNECTION

REV. 12/01/01 RHW	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4 FIGURE 4-4.3A
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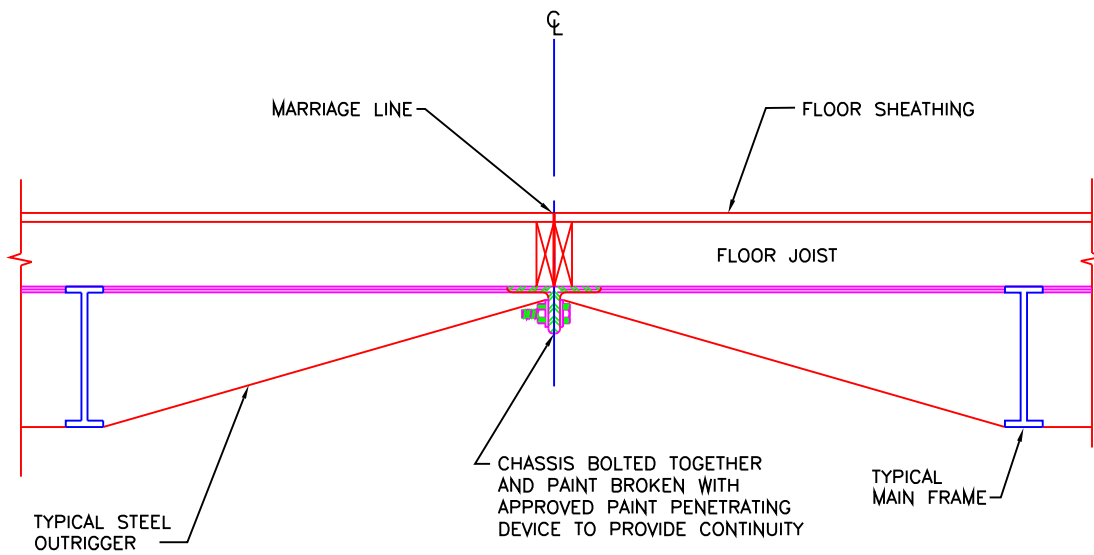


TYPICAL SPLIT CIRCUIT ELECTRICAL CROSSOVER CONNECTIONS

REV. 12/01/01 RHW	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4 FIGURE 4-4.3B
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TYPICAL BONDING CROSSOVER CONDUCTOR CONNECTION		
	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-4.4A



TYPICAL CHASSIS BONDING CROSSOVER CONNECTION

	MANUFACTURED STRUCTURE AND PARK SPECIALTY CODES	CHAPTER 4
REV. 12/01/01 RHW		FIGURE 4-4.4B