OBSTRUCTION LIGHTING, ANTENNA HEATER SUPPLY CIRCUITS, AND PROVISION OF LOCAL TALKING CIRCUIT FOR SYSTEM STANDARD GUYED AND SELF-SUPPORTING TOWERS

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1. GENERAL

1.01 This section deals with the installation of permanent air obstruction lighting for System Standard Guyed and Self-supporting Towers. (Information on temporary warning lights is contained in Section AG25.220.) Lighting kits for Standard Guyed Towers can be used with practically any guyed tower; however, lighting kits for the Standard Self-supporting Towers may not contain sufficient material to be used with other types of self-supporting towers. In addition, this section also contains information regarding the provision of an antenna heater supply circuit and a talking circuit for these towers. The general approach to these problems should also be applicable to other microwave towers.

2. OBSTRUCTION LIGHTING

2.01 Obstruction lighting is required by government regulations to warn aircraft of the presence of air obstructions at night or under poor visibility conditions. Standard kits to meet prescribed government requirements have been made available for all System Standard Guyed and Self-supporting Towers. These lighting kits may be obtained through the Western Electric Company.

2.02 The standard lighting kits provide for all wiring to be run in conduit. They contain sufficient material to install the number and type of lights required by F.C.C. Rules 17.24, 17.25, or 17.26 (depending upon the particular kit ordered) and to terminate the wires in a junction box at the base of the tower. Provision to extend wire and conduit from the base of the tower to the building must be made locally. As a rule, the conduit size and the number and kinds of wire will be the same as those entering the bottom junction box.

2.03 All conduit, junction boxes, and fixtures (other than the 620-watt beacon) are fastened to the tower with a stainless steel tape marketed under the trade name of "Wraplock". Fig. 1 shows the method of applying this material, which is supplied with the standard lighting kit. Wraplock ties should be placed not further than 10 feet apart on vertical runs of conduit. Ties should be placed adjacent to junction boxes and lighting fixtures. Note the tie required at the top of the tower when the double 107-watt obstruction lighting fixture is used. (See Figs. 2, 2A, 3, and 3A.) When the dual 620-watt beacon is used (F.C.C. 17.25 and F.C.C. 17.26 Lighting), the fixture is bolted to the top of the tower; a single Wraplock tie is used at the top of the conduit run. The base of the 620-watt beacon is fabricated with four symmetrically spaced holes to match four holes in the plate on top of the tower so that it can be oriented in any of four different positions. It should be oriented so that the beacon may be opened without mechanical interference from the lightning rod. The bolts, nuts, and lockwashers provided should be used to fasten the beacon in place.

2.04 As may be seen from Figs. 2 through 9, the air obstruction lights are protected against lightning damage by a lightning rod. The rod is a specified length of conduit equipped with a cap at the top and screwed into a pipe flange at the bottom. The pipe flange is bolted to a flat plate on top of the tower. The lightning rod is to be cut and threaded on the job. If the light fixture is the dual 107-watt variety, 1/2-inch rigid conduit provided with the kit is used for this purpose. If the 620-watt beacon is used on the top of the tower, the lightning rod

should be made from the 3/4-inch rigid conduit provided. Note that the lightning rod is needed only if the tower is to be equipped with air obstruction lights. For this reason, material for making the lightning rod is supplied with each of the standard lighting kits (AT-7871 and AT-7872).

2.05 Figs. 4, 4A, 5, 5A, 6, 7, 8, and 9 show the details of wire and conduit, number, and type of fixtures for both guyed and self-supporting towers employing one-level, two-level, and three-level lighting. (F.C.C. 17.24, 17.25, and 17.26) Note that all installations, regardless of height, are equipped with a breather fitting at the top and a breather or drain at the bottom. These items are provided to take care of condensation which would otherwise collect in the conduit system. Lighting kits shipped under Specifications AT-7871 and AT-7872 contain sufficient material for installations as shown in the abovementioned sketches. They are intended to work with lighting control equipment described in Section A401.580.

2.06 Conduit is shipped in 10-foot sections with the ends threaded and capped. Some cutting and threading will have to be done on the job. Conduit locknuts are furnished and should be installed at points where conduit enters the junction boxes, the breather, and the drain fittings. The 1/2-inch conduit used with F.C.C. 17.24 (one-level) lighting installations requires a 1-inch to 1/2-inch reducer in order to attach to the dual 107-watt obstruction light. Use conduit locknuts in this connection. Conduit locknuts are not required when the 620-watt beacon is used, as it bolts direct to the tower and is fed by a short piece of flexible cord, rather than conduit.

2.07 Locations for the conduit runs have been chosen so as to avoid having either the conduit or the side obstruction lights interfere with the use of the step bolts. Side obstruction lights should be located so that the center of the fixture is a minimum of 6 inches beyond the nearest tower leg, but not further than 12 inches. This enhances their visibility to aircraft, yet maintains them within convenient reach of maintenance workers. The elevation of these lights is approximate; when possible they should be located about 4 feet above a horizontal crossmember, thus providing a footing for the workers.

2.08 Wire should be pulled in from bottom to top, taking care not to damage the insulation. If necessary, wire joining or splicing should be done in the junction boxes or fixtures, since it is difficult or impossible to pull spliced wire into the conduit without damage to its insulation. On towers where intermediate junction boxes are used between lighting levels, the wire should be routed through the wire support in the boxes. Conductors should be checked for grounds and crosses after installation. This should be done before energizing and before installing the lamps.

3. ANTENNA HEATER CIRCUIT

3.01 The conduit for antenna heater circuits, its associated hardware, and wiring (AT-8060) shall be installed in accordance with the same practices as those outlining the installation of the conduit for tower lighting. See Figs. 4 to 9 and Part 2 of this section.

3.02 To facilitate maintenance and installation, the heater conduit run should generally parallel the lighting conduit, except that it shall be routed in the most direct manner from top to bottom. The base junction box shall be located at the same level as that for the lighting circuit. The upper box shall be in approximately the same horizontal plane as the junction box on the antenna is when mounted.

3.03 The junction boxes at the top and bottom of the run shall be equipped with breather and breather or drain fittings respectively, as shown in lighting circuit drawings Figs. 4 to 9 of this section. The junction box at the top of the tower shall be equipped to accommodate a maximum of four heater circuit connections.

3.04 Weatherproofed flexible conduit, which is required between the junction box at the top and the junction box of the antenna, its associated wiring, and the conduit and wiring from the base of the tower to the power source, shall be ordered separately as required, in accordance with the antenna used.

3.05 Splices in wiring other than in the junction boxes shall not be permitted.

4. PROVISION OF LOCAL TALKING CIRCUIT

4.01 It has generally been found helpful, and in many cases it is essential, to have alternate means of communication other than

shouting between workmen adjusting antennas or reflectors on a tower, and personnel observing equipment performances in the repeater building. Even with very short towers, say 40 feet, it is well to remember that weather conditions, for example, may make it difficult or uncomfortable to communicate without portable two-way radio facilities or a wire circuit. No attempt will be made to set down hard and fast rules as to whether radio or wire circuits, temporary or permanent, should be employed. However, it should be noted that, whereas wire circuits add directly to the cost of a specific installation, portable radio equipment committed to general use does not.

4.02 Two-way radio facilities, such as provided by the Hand-Carried Radio Units announced in P.E.L. 6933 issued November 8, 1961, are probably the most convenient means of providing communications for this purpose.

4.03 A temporary wire circuit may be provided, using C Drop Wire or C Rural Wire, deadended at both ends. Any temporary circuit should be placed within the confines of the tower to eliminate the possibility of its being blown into contact with nearby power lines. If the circuit is to be left in place more than a few days, the ends of the wire should be grounded to the tower because of the possibility of lightning damage to it.

4.04 A permanent talking circuit may be installed, using either C Drop Wire or C Rural Wire. Generally, it will be found convenient to lash wire to the obstruction lighting conduit. Wraplock steel tape should be applied about every 10 to 20 feet at locations which can be conveniently reached from the tower members. The top and bottom ends of the wire should be terminated in 123A1A-type protector with a 150A cover mounted at convenient locations. The type of instrument used and its circuitry shall be determined according to local need.

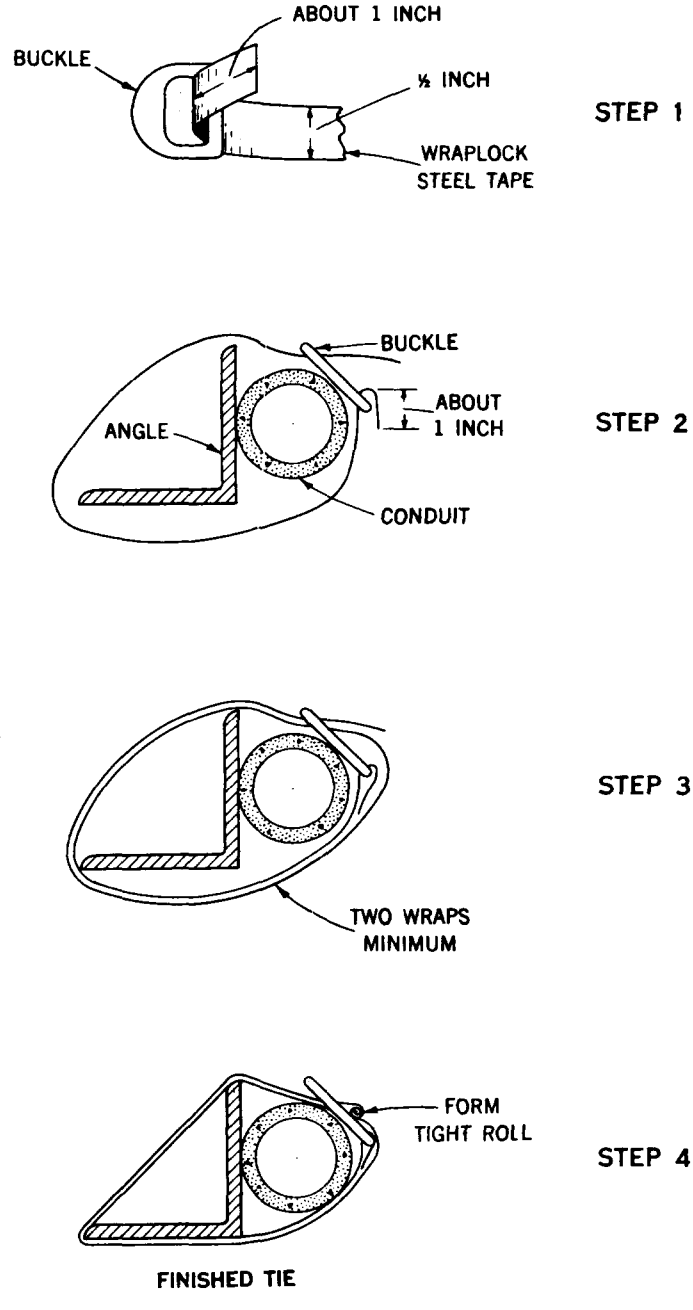

Fig. 1 – Typical Method of Applying Wraplock Steel Tape

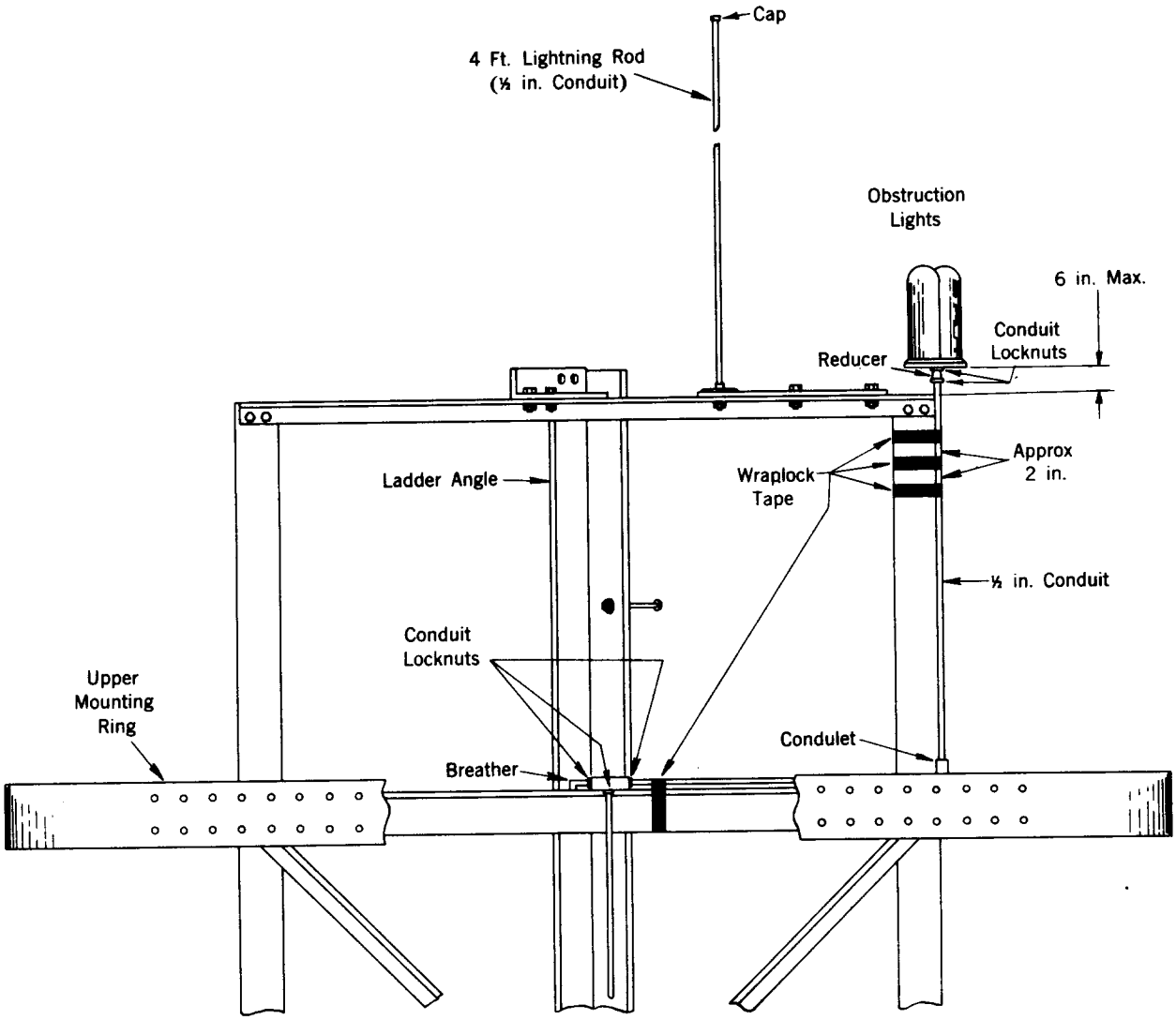

Fig. 2 – Dual 107-Watt Obstruction Lights — B Self-supporting Towers

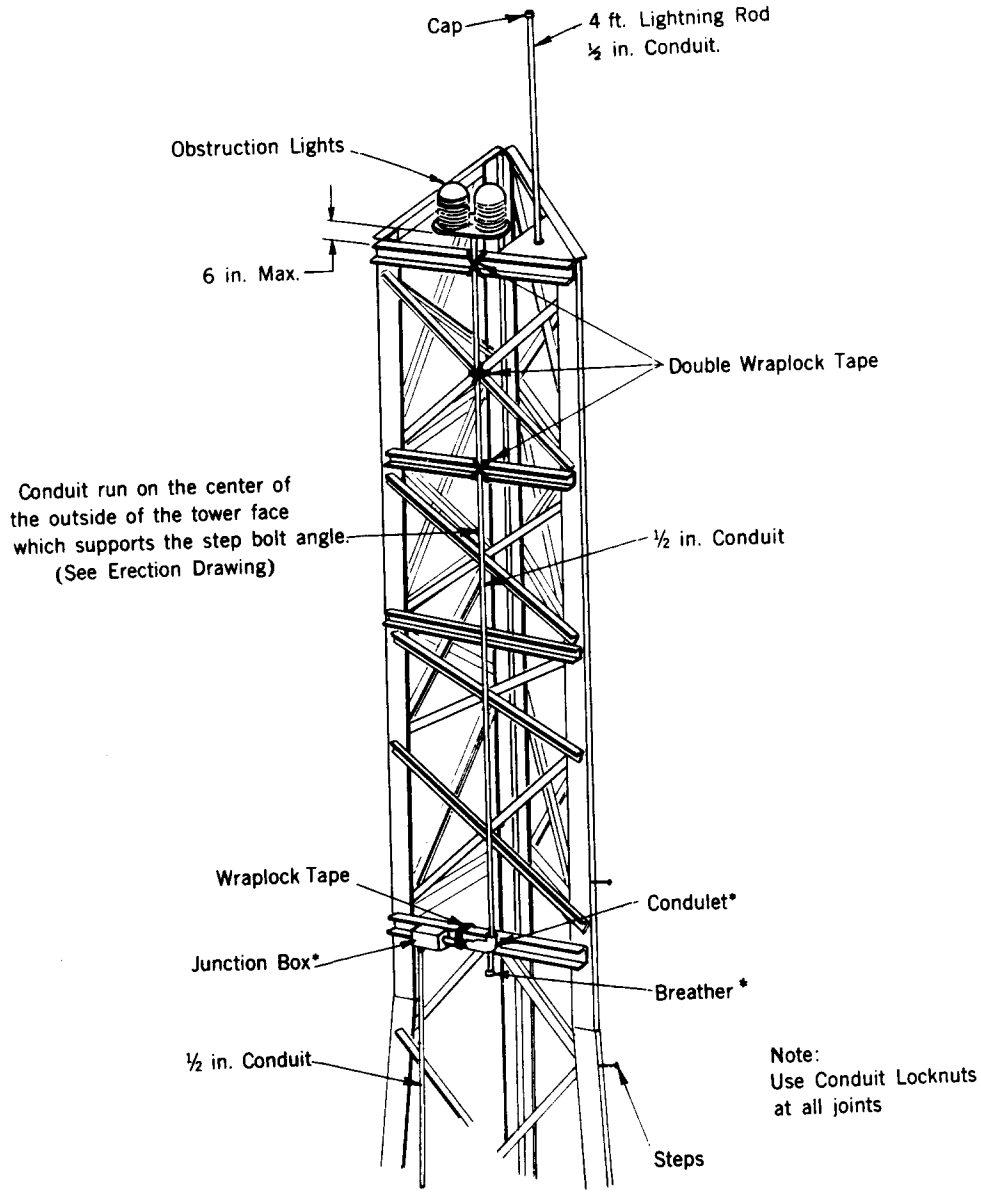

Fig. 2A – Dual 107-Watt Obstruction Lights — C Self-supporting Towers

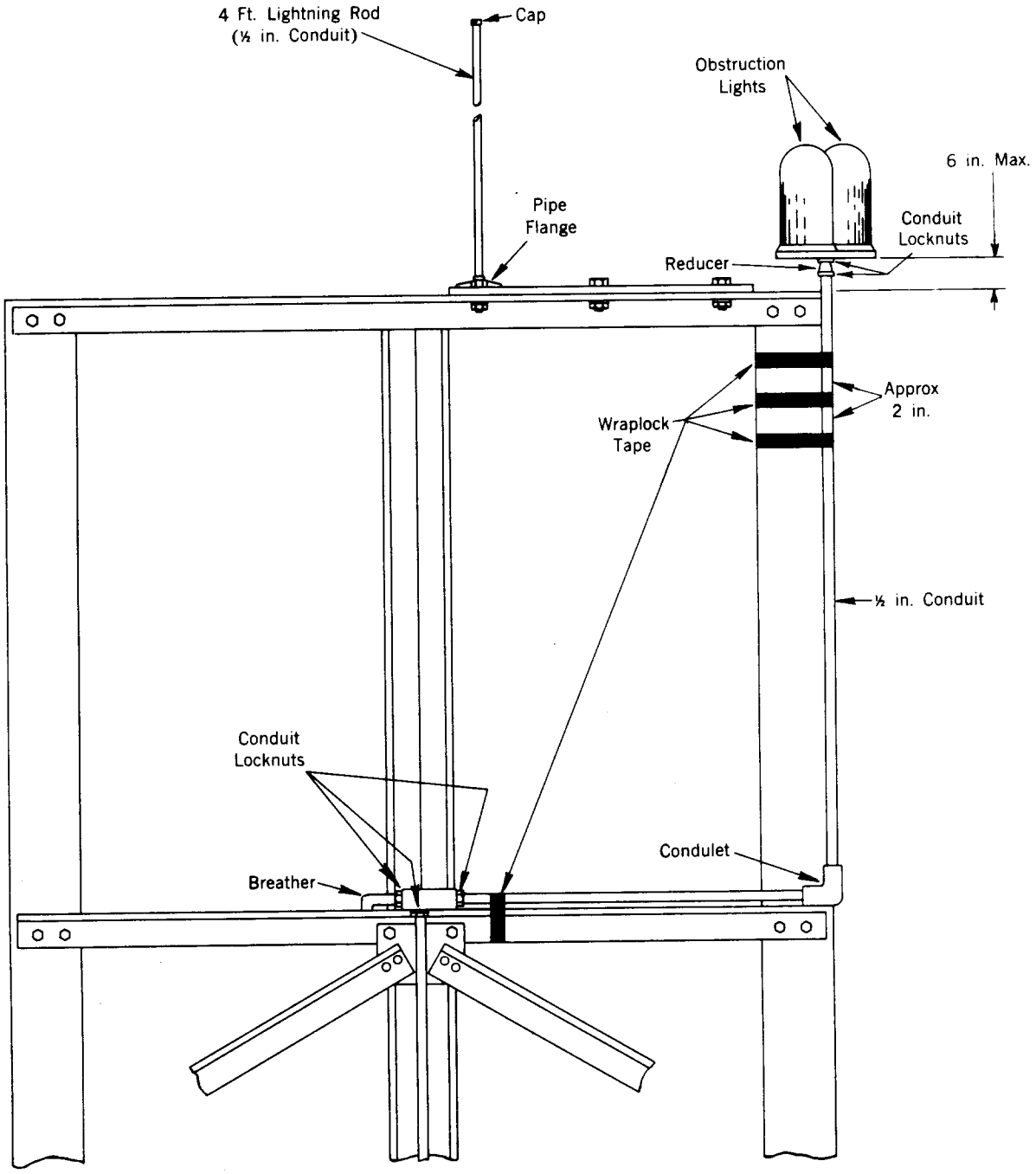

Fig. 3 – Dual 107-Watt Obstruction Lights — B Guyed Towers

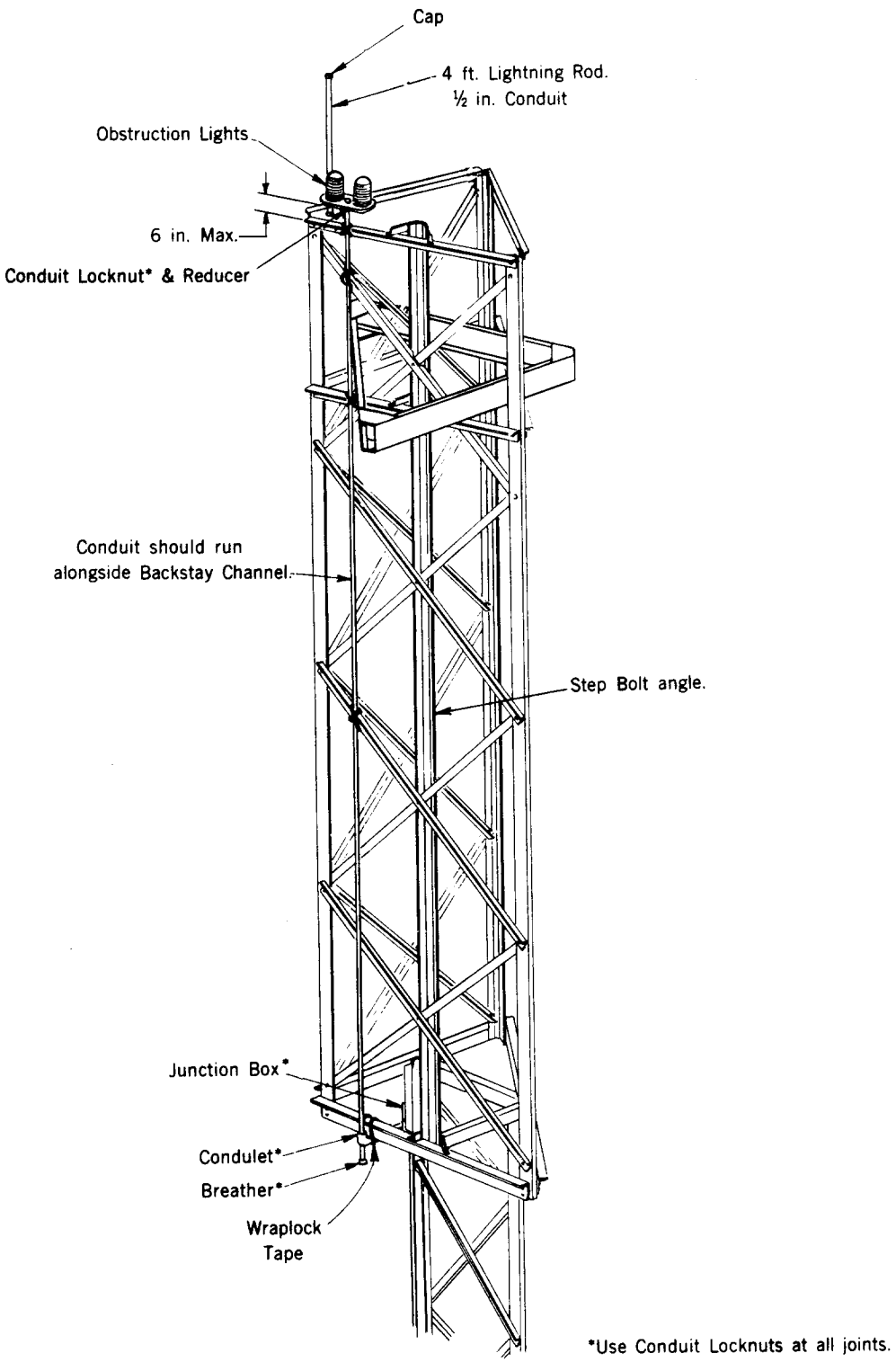

Fig. 3A – Dual 107-Watt Obstruction Lights — C Guyed Towers

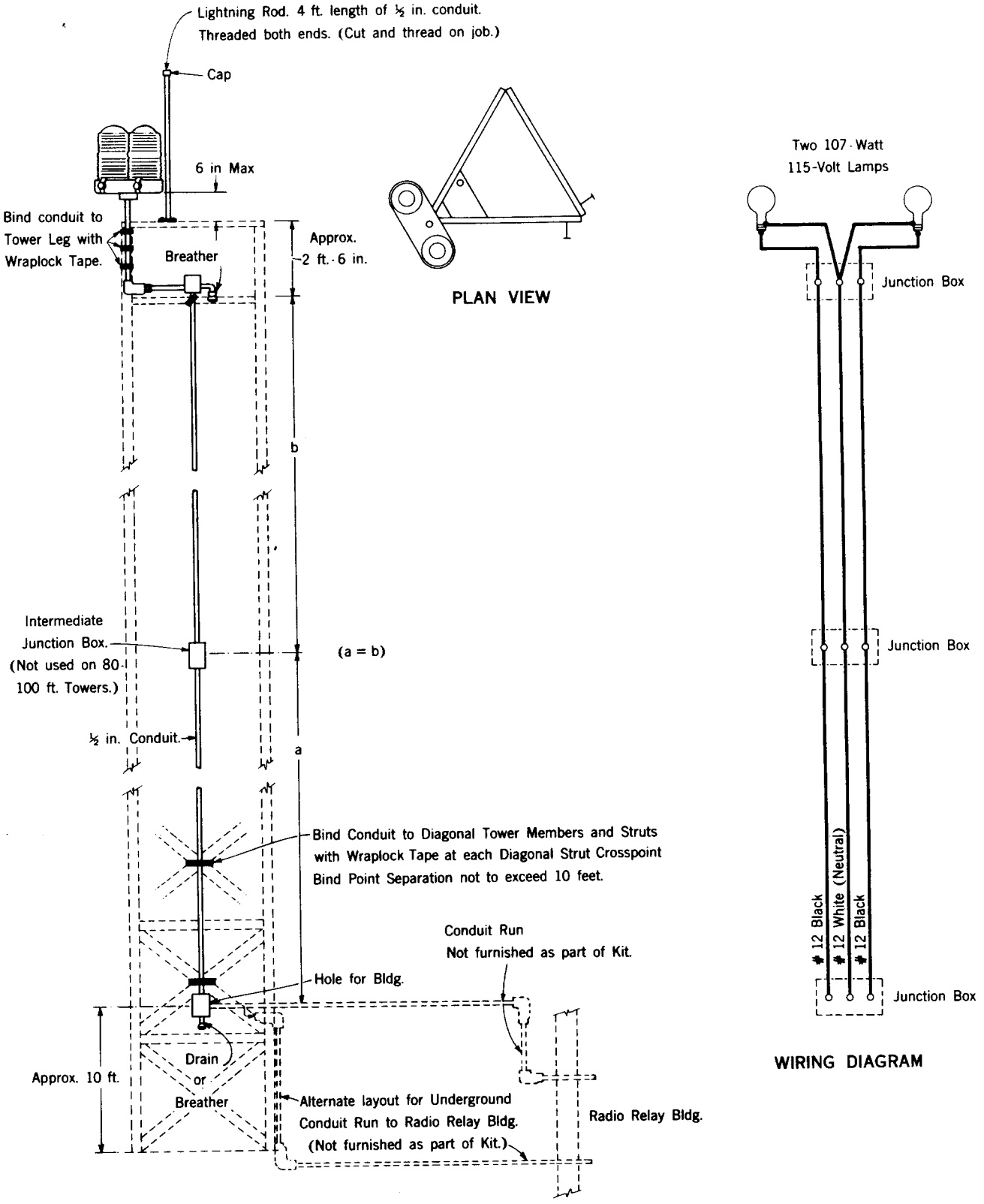

Fig. 4 – F.C.C. 17.24 Lighting — B Guyed Towers

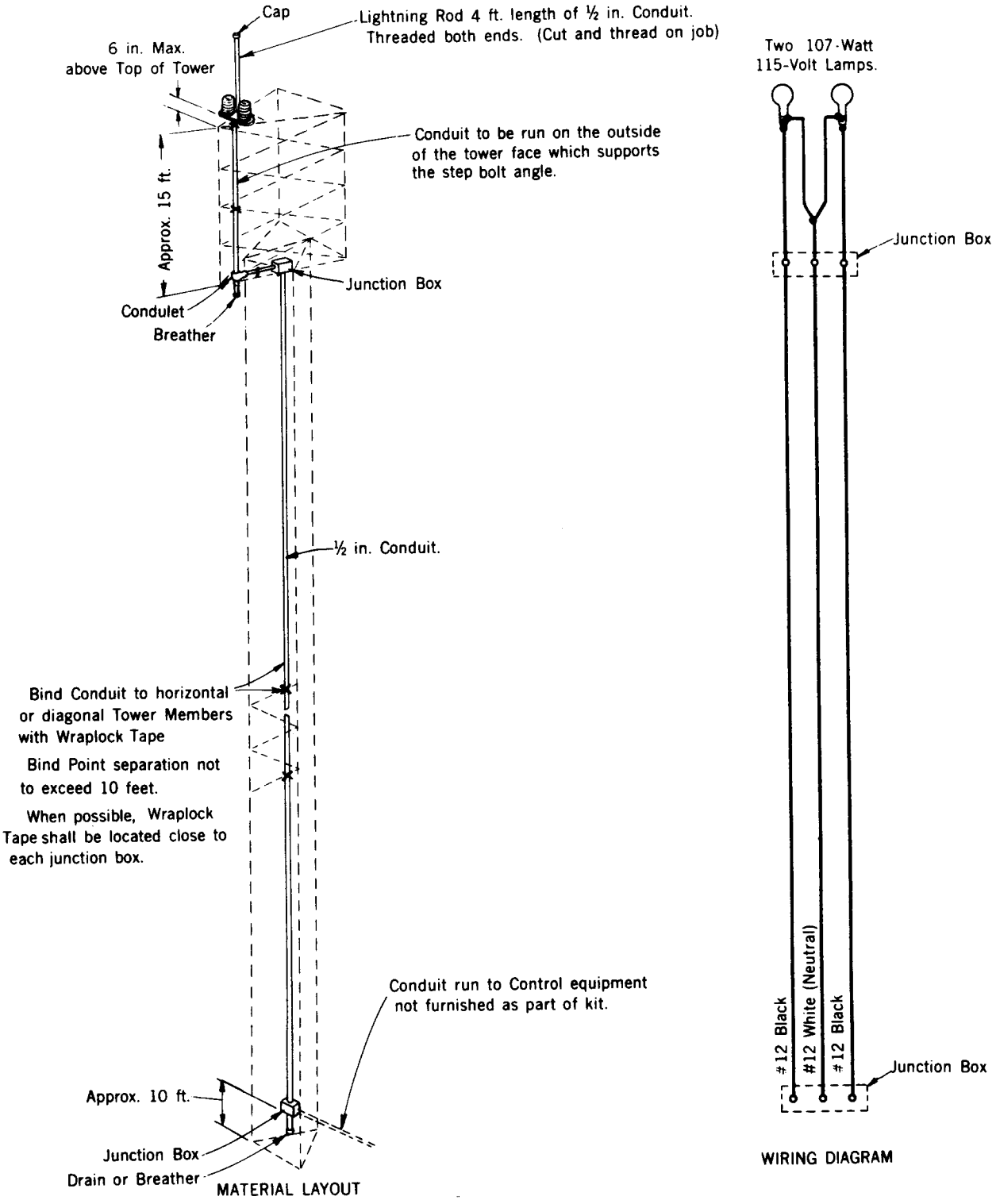

Fig. 4A – F.C.C. 17.24 Lighting — C Guyed Towers

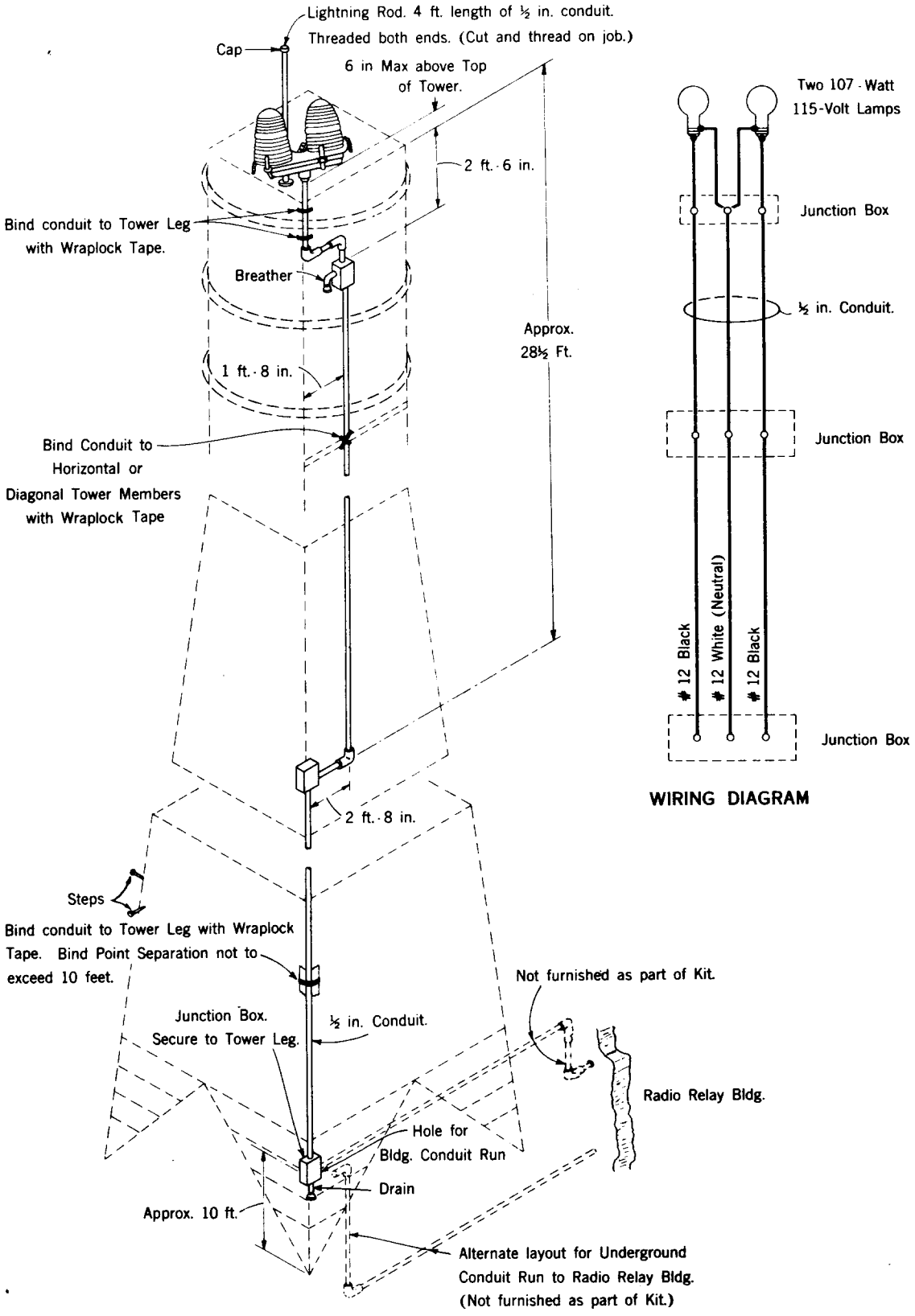

Fig. 5 – F.C.C. 17.24 Lighting — B Self-supporting Towers

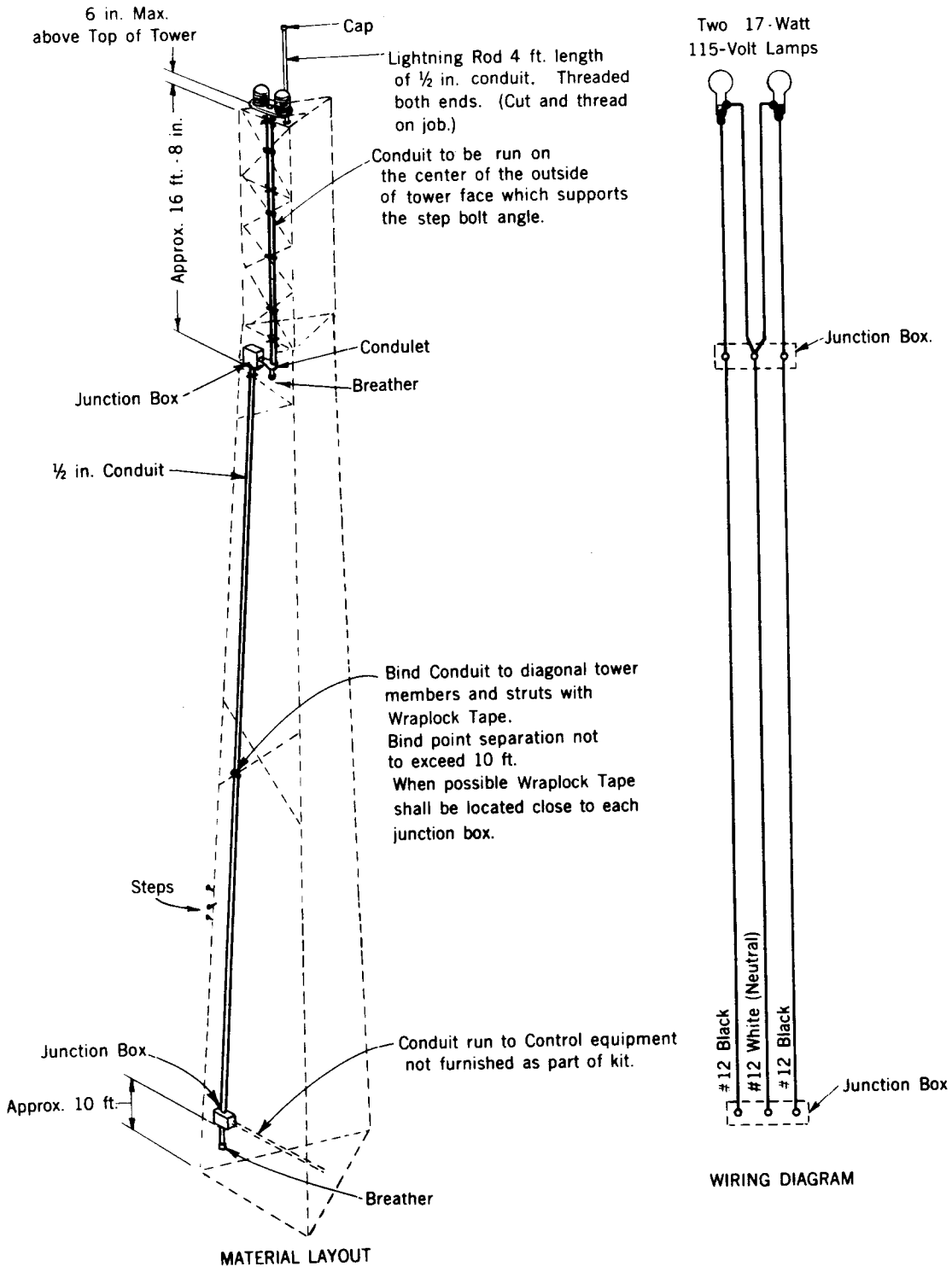

Fig. 5A – F.C.C. 17.24 Lighting — C Self-supporting Towers

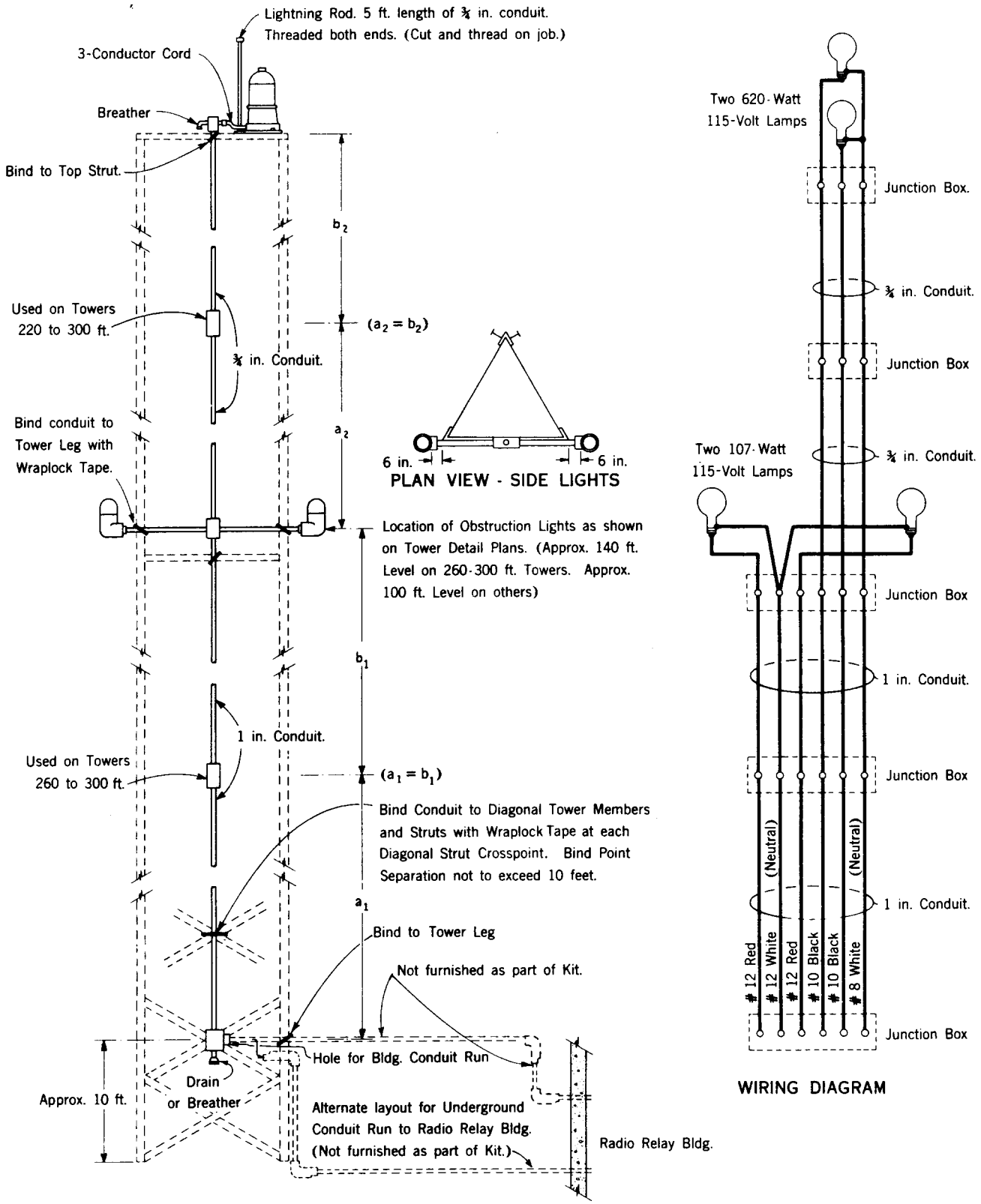

Fig. 6 – F.C.C. 17.25 Lighting — B Guyed Towers

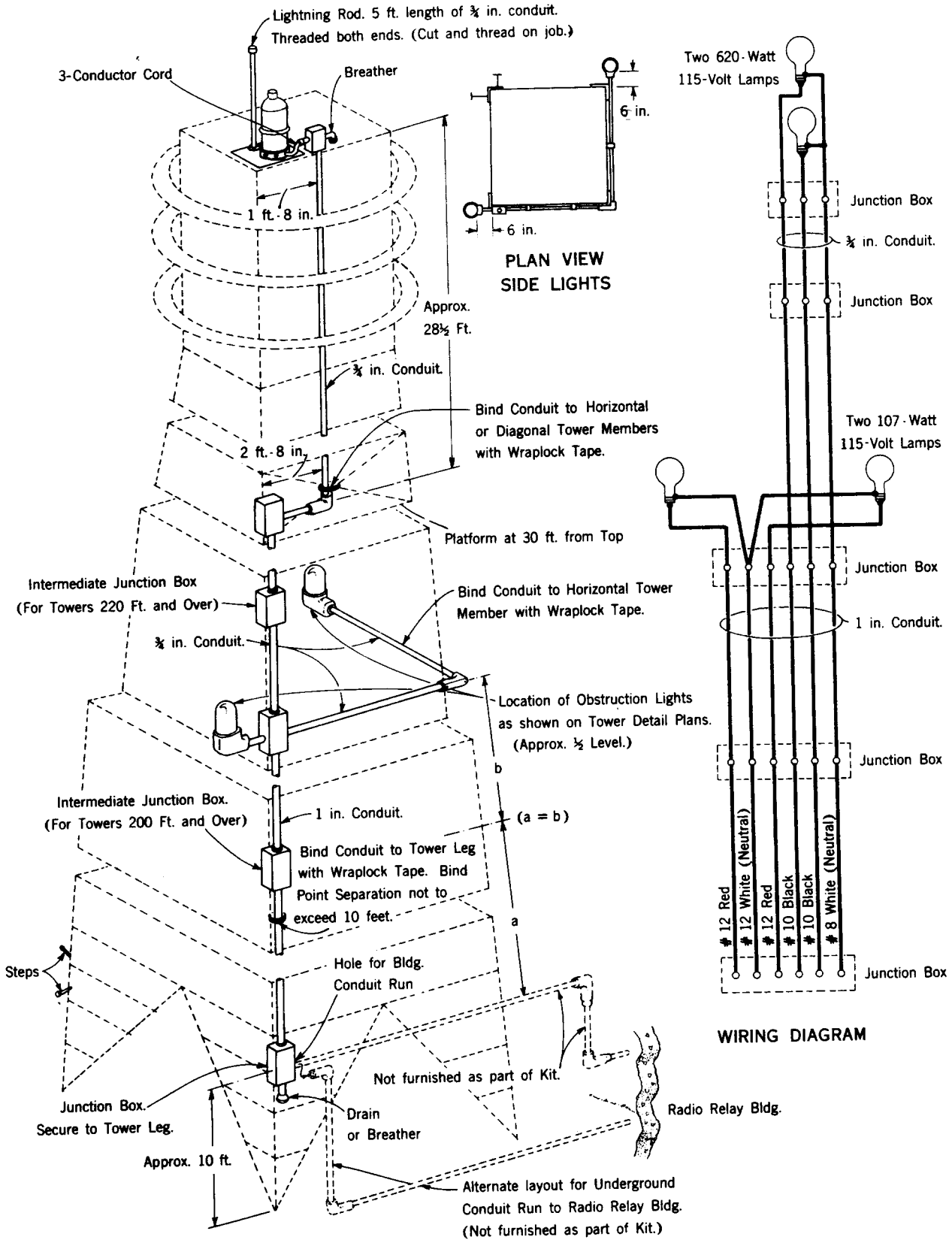

Fig. 7 – F.C.C. 17.25 Lighting — B Self-supporting Towers

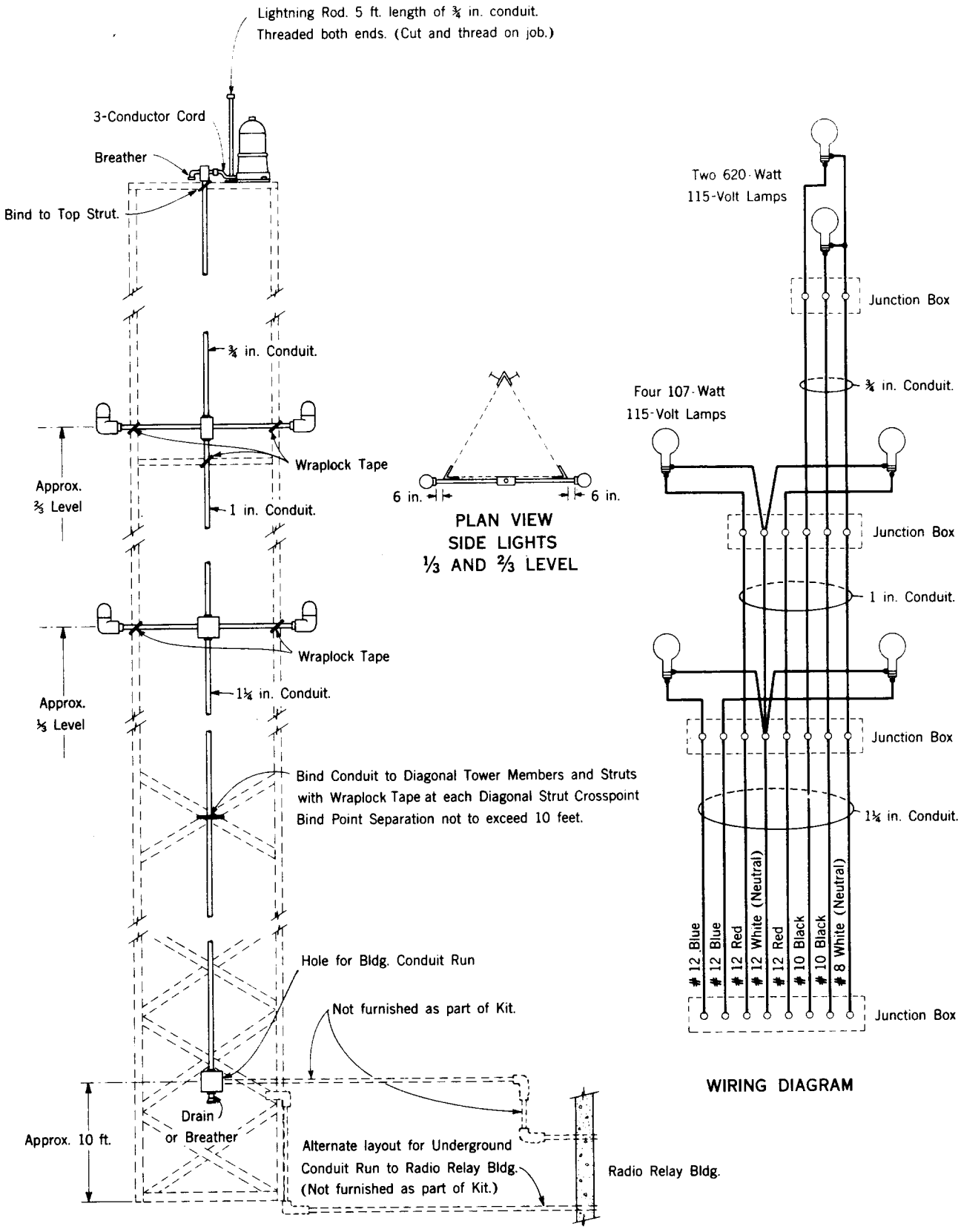

Fig. 8 – F.C.C. 17.26 Lighting — B Guyed Towers

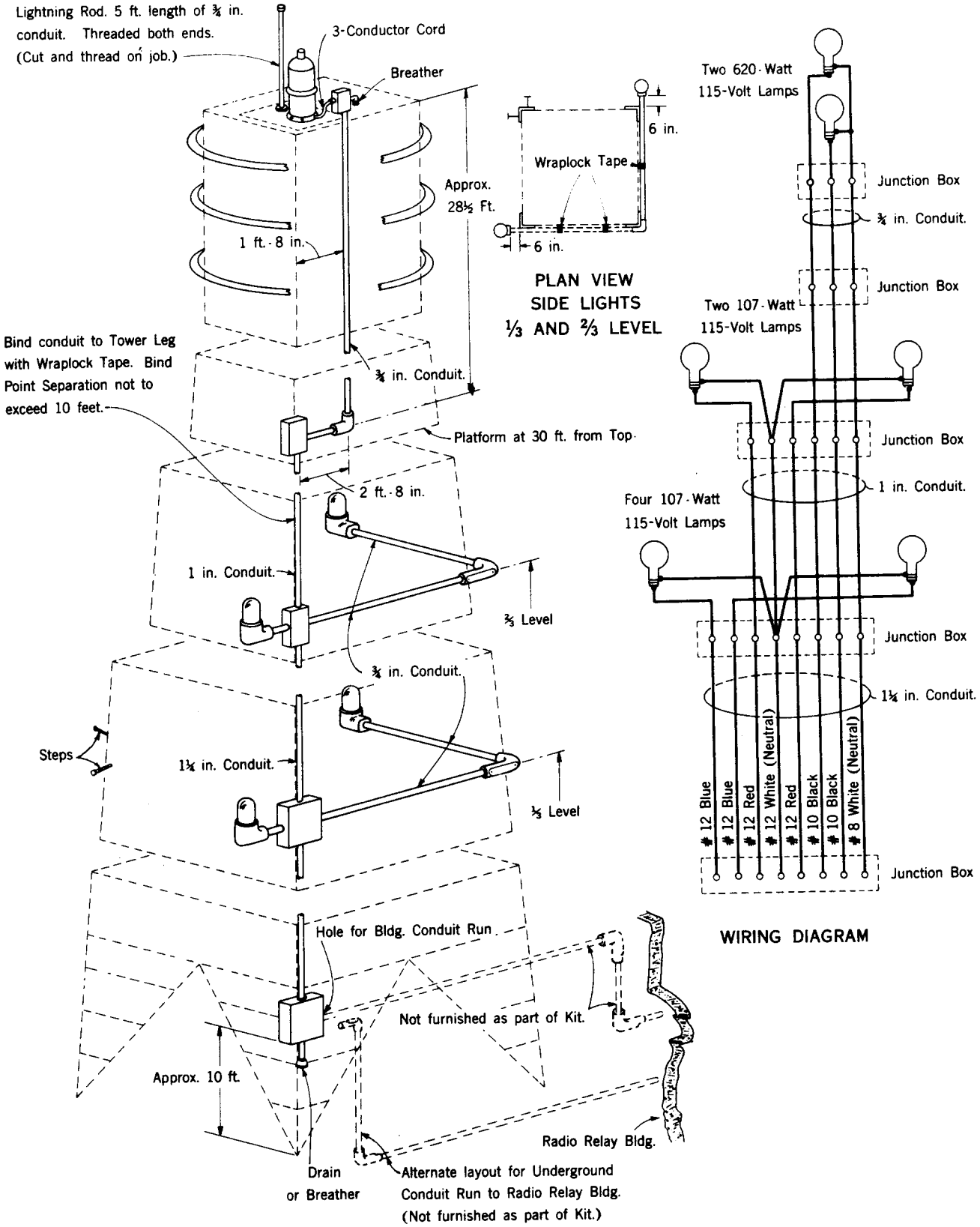

Fig. 9 – F.C.C. 17.26 Lighting — B Self-supporting Towers