



# **Placing Lashed Optical and Metallic Aerial Cable**

## **Moving Reel Method**

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**PLACING LASHED OPTICAL AND METALLIC  
AERIAL CABLE  
MOVING REEL METHOD**

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## 1. GENERAL

- 1.01 This practice provides information for placing aerial cable containing metallic or fiber conductors using the moving reel method. Paragraphs that deal with optical cable have been highlighted with a bar in the left-hand margin.
- 1.02 This practice is reissued to include information on lashing optical cable to a strand already occupied by a metallic conductor cable or another optical cable. This procedure is usually called overlashing or double lashing. For the purpose of this practice, the definition of terms is as follows:
- (a) Overlashing - when a cable is lashed to an existing cable and support strand.
  - (b) Double lashing - two lashing wires are used when lashing cable to a support strand.
- 1.03 The moving reel method of placing lashed aerial cable can be used in situations where a cable reel trailer or aerial lift truck can be moved along the pole line and there are no obstructions to prevent raising the cable to the suspension strand. This method may be used when placing an initial cable on suspension strand or when lashing to an existing lashed cable and strand. Placing optical cable on the same strand with metallic conductor cable is permitted under certain conditions. Placing optical cable on the same strand with another optical cable is permitted by some cable manufacturers if the strand is at least one size larger than that required for a single optical cable.
- 1.04 The following Practices contain information that should be used in conjunction with this practice:
- (a) Placing Lashed Optical and Metallic Aerial Cable - General (Bellcore Practice BR 627-320-011).
  - (b) Bonding and Grounding Aerial Plant (Metallic Conductor and Optical Fiber Cable) General (Bellcore Practice BR 627-020-005).
  - (c) Lashed Aerial Cable, Arrangements of Supports (Bellcore Practice BR 627-340-205).
  - (d) Coaxial Cable Placing (Bellcore Practice BR 627-320-210).
  - (e) Lashed Aerial Cable Placing, Stationary Reel Method (AT&T Practice 627-320-206).
  - (f) Aerial Lift Trucks (AT&T Practice 649-352-101).
  - (g) Minimum Approach Distances to Exposed Energized Power Conductors (AT&T Practice 620-100-011).
  - (h) Suspension Strand Placing Methods (AT&T Practice 627-230-201).
  - (i) Suspension Strand Tension and Sags, Copper Conductor Cable (AT&T Practice 627-210-018).
- 1.05 The moving reel method of placing all types of lashed aerial cable has advantages over the stationary reel method. The moving reel method is preferred because placing loads are lower and corner pulls can be avoided. When ever possible, the moving reel method should be used.
- 1.06 If trees or other obstructions prevent the use of the moving reel method, use the stationary reel method to pull the cable past the obstruction to the end of the run. The remainder of the cable-placing operation may then be completed using the moving reel method.
- 1.07 Double lashing of optical cable to a support strand is recommended.

1.08 When an aerial route is being planned for optical cable, consideration should be given to the following:

- (a) Vehicle traffic patterns in relation to the pole line.
- (b) Activity associated with existing cable plant.
- (c) Overall condition and class of pole line.
- (d) Road clearances, midspan, and vertical separations from power conductors.

Advance planning of the placing operation is essential, and a through field survey should be made before starting construction. Poor planning could result in an unnecessary optical fiber splice, which may affect the planned transmission capability of the fiber.

## 2. PRECAUTIONS

### A. Placing

2.01 Before placing the cable, observe the following precautions:

- (a) Protect the work location by placing warning signs, flags, or other warning devices at appropriate points to alert vehicle drivers and pedestrians to the presence of obstructions and technicians working in the area.
- (b) Whenever practical, cable placing should be done with the motor vehicle moving in the direction of traffic.
- (c) Inspect cable reels for flange protrusions, irregularities, or structural damage that may be a hazard to the cable sheath.
- (d) Inspect cable reels for obstructions that might interfere with the cable.
- (e) Use a cable reel brake to control the rotation of the cable reel to prevent excessive free running of the reel.
- (f) Inspect suspension strand for condition and proper size.
- (g) Avoid abrasion to cable sheath. Do not drag the cable over obstructions that will damage the sheath.
- (h) Avoid bending the cable sharply. The minimum bending radius for optical cable is 10 times the diameter of the cable when the cable is *not* under load and 20 times the diameter when the cable is under load.
- (i) Do not permit vehicular traffic to pass over cable.
- (j) After the suspension strand has been properly tensioned, the cable suspension clamps must be tightened at least one span ahead of cable-lashing operations. This is necessary to keep tension from building up in the strand as lashing progresses. When an aerial lift truck is being used, all clamps should be tightened before cable placing begins.

### B. Cutting

2.02 **DANGER:** Electrical shock can occur when plastic-sheath cable is cut. An electrical charge on the metallic shield of the cable can be produced by friction between the jacket and the cable guide (or other equipment) while the cable is being placed. An ac voltage may also be induced from parallel energized power wires. An electrical shock can occur if body contact is made between the metallic cable shield and the strand or between the metallic cable shield and any other ground. Since a voltage may exist, a ground shall be maintained during the cutting operation.

2.03 Ground the cutting tools with lashing wire or test clips to a grounded strand or other suitable ground before cutting. **Insulating gloves must be worn when cutting the cable.**

### C. Aerial Lift Truck

2.04 **DANGER:** Should the vehicle accidentally become electrically charged by contact with power wires, bear in mind that the entire truck and its contents will also be electrically charged. In such cases, immediately caution anyone nearby not to attempt to enter or leave the truck, nor in any way come in contact with the vehicle or its contents until after the contact has

**been broken.** The following precautions should be observed when using aerial lift trucks.

- (a) All technicians using an aerial lift truck must be thoroughly familiar with the operating instructions covered in the 649 Division, Layers 351 and 352.
- (b) The technician in the aerial lift truck bucket will be responsible for directing all operations required in placing the lift into working position, using the lift, and restoring it to travel position. The operator of the motor vehicle will operate the truck only as instructed by the technician working aloft. Radio voice communications must be used between the driver and the technician in the bucket.
- (c) The technician working aloft in an aerial lift truck bucket will face in the direction of movement of the bucket when the lift unit or vehicle is being operated. This technician will be watchful in all directions and will wear a body belt, safety strap, safety headgear, and eye protection.
- (d) Extreme caution must be exercised not to exceed the safe weight and work limitations of the aerial lift unit as recommended by the manufacturer.
- (e) Before operating the aerial lift, make certain that in raising, swinging, or otherwise operating it, there will be no interference from nearby objects and structures. Be particularly alert for the possibility of a power contact. Minimum approach distances to exposed energized power conductors must be observed. Approach distances are covered in AT&T Practice 620-100-011.

### 3. MOUNTING THE REEL

- 3.01 Before loading a cable reel, check the size, fiber count, gauge, type, and length of the cable with the information given on the work print. Check for any cable damage that might have occurred during shipment. If the cable is pressurized check for positive air pressure.
- 3.02 The reel of cable can be mounted on a cable trailer or reel carrier to pay out cable from the top or bottom of the reel. Generally when a cable trailer is used the preferred method is from the top. This decreases the possibility of the cable being damaged by contact with the ground and eliminates reverse bending of the cable.
- 3.03 When the cable is loaded on a reel carrier of an aerial lift truck, the preferred method (unless restricted by the truck design) is to pay out the cable from the bottom of the reel. Where applicable, the bottom feed should always be used when placing optical cable using an aerial lift truck (Figure 1). This will eliminate reverse bending the cable as it passes thru the truck bull wheel.

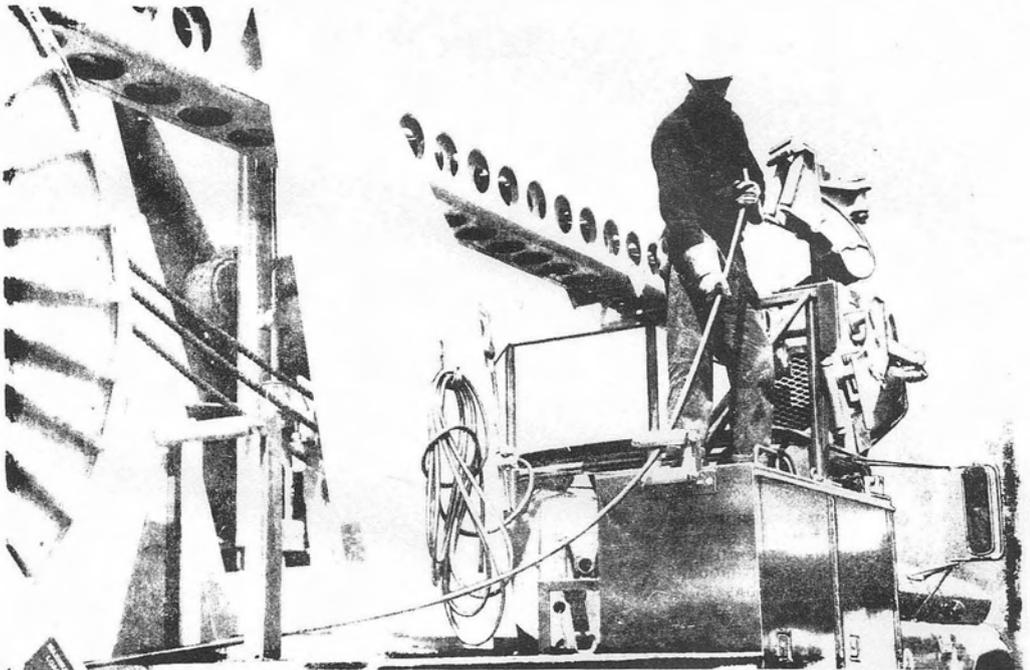


Figure 1. Threading Optical Cable Through Guides (Bottom Reel Feed)

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#### 4. PLACING CABLE - MOVING REEL METHOD

##### A. General

4.01 Complete all preliminary work in connection with placing and tensioning the support strand. Strand associated with optical cable should be brought up to the same tension as required for copper conductor cable. Observe all precautions before beginning the cable placing operation. For metallic conductor cable, maintain a moderate amount of tension in the cable ahead of the lasher. **There should be no tension ahead of the lasher for optical cable.**

##### B. Placing Cable Without Aerial Lift Equipment

4.02 If aerial lift equipment is *not* being used, or if it has been decided to feed the cable directly from the cable carrier of the aerial lift, position the cable reel approximately 30 to 50 feet ahead of the first pole. See Figure 2.

4.03 Pull enough cable from the reel to allow the end to be raised into lashing position.

4.04 Position the cable guide on the suspension strand and pass a line through the throat of the guide. This line will be used to raise the cable end. The cable guide also provides a smooth radius curve for optical cable. Do not raise optical cable over a cable block. The cable guide must be capable of handling the weight and size of the cable involved.

4.05 Advance the cable guide into the span far enough to provide sufficient room for the cable lasher. See Figure 3.

4.06 Position the cable lasher on the strand and adjust for the proper size cable as outlined in AT&T Practice 627-310-205.

4.07 Separate pulling lines are attached to the cable guide and cable lasher to facilitate transferring them from one span to the next and to provide control during the lashing operation. The cable guide and cable lasher are pulled along the strand. The lead angle of the lashing machine pull line should *not* be excessive, normally 40° to 45°. Excessive pull angle will cause the lashing machine to slip. For metallic conductor cable the cable guide and the lasher should be about 4 feet apart with the cable guide in the lead. For optical cable, the cable guide should be approximately 6 feet ahead of the lasher.

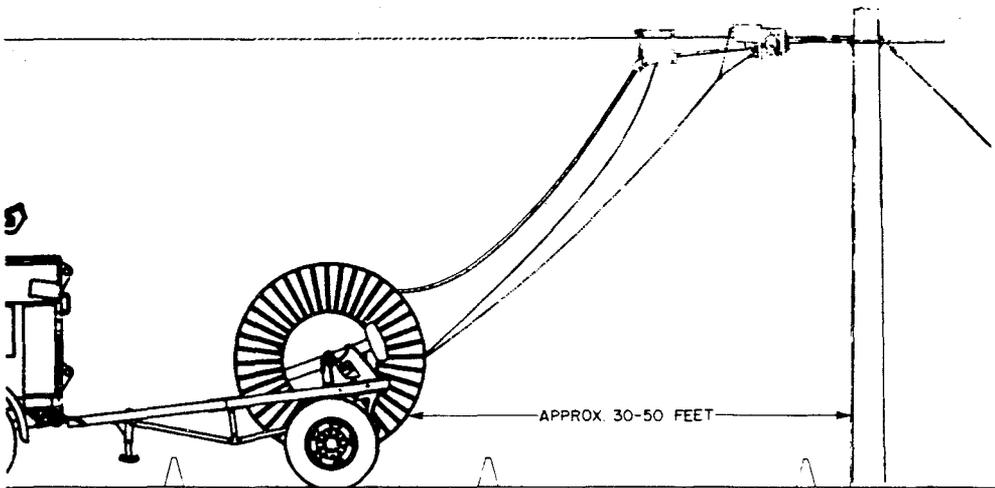
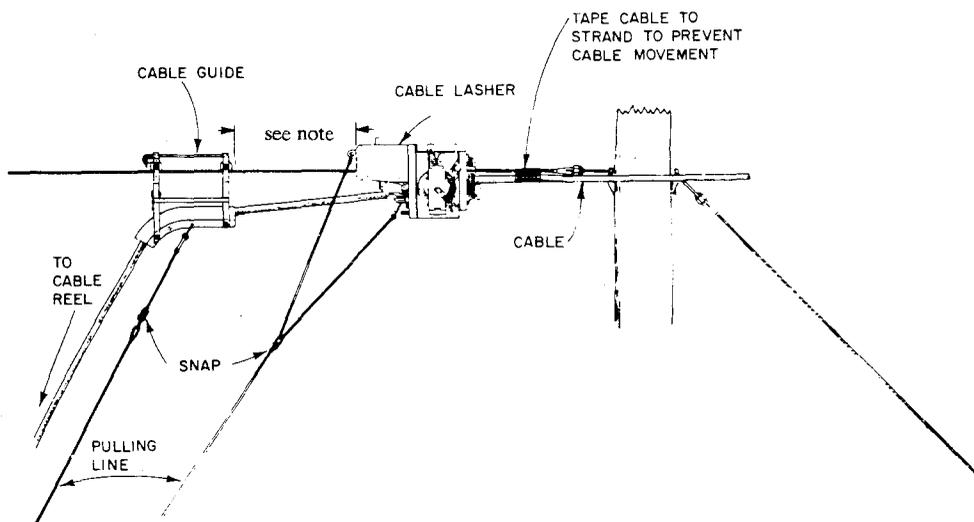


Figure 2. Positioning Cable Reel

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NOTE: Approximately 4 feet for metallic conductor cable, and 6 feet for optical cable

Figure 3. Typical Arrangement of Cable Lasher and Cable Guide

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- 4.08 Drive the motor vehicle as close to the pole line as possible, at a speed that is slow enough to permit complete control of the whole cable-lashing operation. Surging and swinging of the cable and strand should be kept to a minimum throughout the operation.
- 4.09 If the angle between the cable reel and strand becomes excessive, the lashing operation should be stopped. The cable reel can move forward while the cable is payed out on the ground inline with the strand. Lash the cable up to a point where the reel is more inline with the strand before resuming the normal lashing operation.
- 4.10 The lashing operation should be stopped when there is approximately 3 to 4 wraps of cable remaining on the cable reel. Disconnect the end of the cable from the reel so that it can freely pay off. To control the end of the cable, a tag line can be secured to the cable end. When placing optical cable, allow the cable to pass freely from the reel to eliminate the possibility of over tensioning the cable.
- 4.11 A splice alignment bar (Figure 4) is used to position the ends of connectorized optical cable at splice locations.
- 4.12 At midspan cable splice locations, the cable guide and lasher should be handled as follows: (See Bellcore Practice BR 627-340-205 for optical fiber cable splice locations and arrangements of supports).
1. Pull the cable guide and lasher forward until the guide clears the end of the cable.
  2. Place a ladder behind the lasher and guide at the approximate location of the splice.
  3. Clamp the lashing wire to the strand, pull out sufficient wire for a permanent termination, and then cut it off.
  4. Tape the cable to the strand on the splice side of the cable lashing clamp.
  5. Pull the cable lasher forward until it clears the cable end.
  6. Pull the end of the next section of cable up through the cable guide so that a proper overlap is obtained.
  7. When placing connectorized lightguide cable, use the splice alignment bar to ensure proper alignment and position of the cable ends.
  8. Position the cable in the lasher and close the cable lifters.
  9. When placing metallic conductor cable, tape the overlapping cable ends securely to each other and to the strand with a double layer of half-lapped 2-inch friction tape.
  10. Permanently terminate both ends of the lashing wire and proceed with the lashing operation.

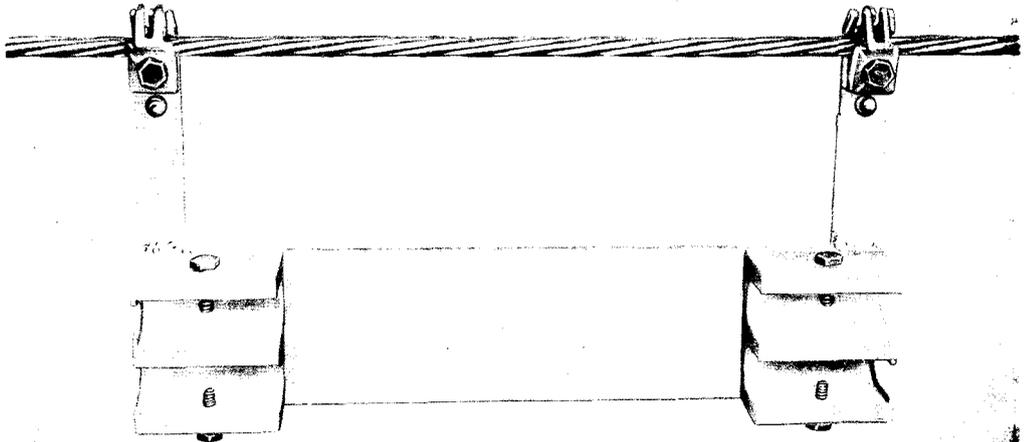


Figure 4. Typical Splice Alignment Bar

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### C. Placing Cable With Aerial Lift Equipment

- 4.13 If aerial lift equipment is used for placing cable, follow the recommendations of the manufacturer as well as the additional precautions outlined in 2. PRECAUTIONS.
- 4.14 Special considerations are required when placing optical cable with an aerial lift and using the truck mounted cable rollers and bull wheel. It should be determined that the particular cable design is compatible with this method.
- 4.15 Generally, the cable is fed by hand from the reel to the cable guide through a system of sheaves on the truck body. The placing method is essentially the same as that described in paragraphs 4.02 through 4.10 of this document. The cable guide and cable lasher are positioned by adjustment of the pulling lines so that the technician in the bucket can reach the strand from a point about 4 feet ahead of the cable guide to a point about 4 feet behind the lasher by positioning the bucket as required. The pulling lines for the cable guide and the cable lasher are attached to the truck body. **Do not attach the pulling lines to the boom or bucket.**
- 4.16 When placing optical cable, the brake pressure on the cable reel should be at a low setting. Excessive reel brake pressure can cause over tensioning of the optical cable.
- 4.17 Optical cable should not be placed in the bucket fairlead during the placing operation. When slack is required at a pole or other location, it should be pulled from the cable reel by hand or the truck can move forward (and then backed-up) at the direction of the bucket operator.
- 4.18 The use of aerial lift equipment for placing aerial cable permits the following operations to be completed (from the bucket) without climbing poles or using a ladder in the span.
  - 1. Transferring the cable guide and lasher.
  - 2. Changing coils of lashing wire.
  - 3. Rearranging drop wire attachments.
  - 4. Observing the lashing operation closely.
  - 5. Securing cable ends at midspan splice locations.

## 5. TRANSFERRING AROUND POLES

- 5.01 If the technician is on the pole as the cable guide approaches, the technician should take a position on the opposite side of the pole from the strand.
- 5.02 To transfer the cable guide around a pole from one span to the next, refer to Figure 5 and proceed as follows:
1. After the cable guide is pulled close to the cable suspension clamp, the technician can take a position on the cable side of the pole, disengage the snap in the tow rope and pass the end of the short tow rope over the shoe and through the supporting framework.
  2. Engage the snap on the strand in the next span. This will prevent the guide and cable from falling if accidentally dropped during the transferring operation. With a large cable, it may be necessary to raise the cable past the pole to a horizontal position and temporarily support it there.
  3. Disengage the snap hook from the locking device permitting the locking gate to open.
  4. Lift the cable guide clear of the suspension strand and pass the guide around the pole.
  5. Reinstall the cable guide on the strand in the next span.
  6. Close the locking gate and secure the snap hook.
  7. Disengage the tow rope snap from the strand, position the tow rope in the original towing position, and attach it to the guide pulling line in the proper towing position.
  8. Advance the cable guide far enough forward to permit transferring the cable lasher.
- 5.03 With large heavy cable, disengage the retaining pin or chain from the front arm and pull the guide past the suspension clamp. Push the front arm up to engage the roller with the strand and lock into position.

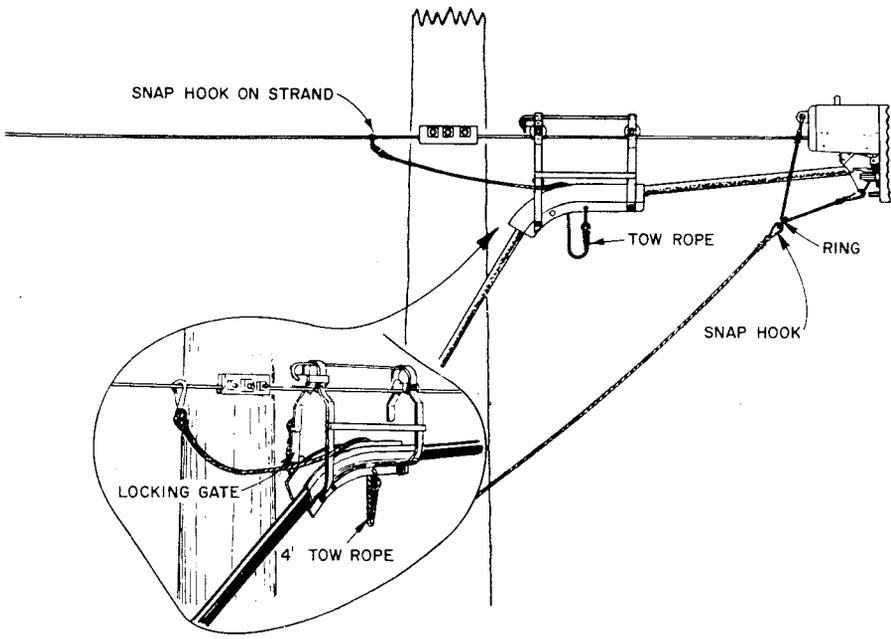


Figure 5. Transferring Cable Guide

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**6. LASHING ADDITIONAL CABLE TO AN EXISTING CABLE AND STRAND**

- 6.01 Some optical fiber cable manufacturers allow:
- (a) Lashing of an optical cable to existing strand occupied by a metallic conductor cable (overlashing).
  - (b) Placing more than one optical cable on the same support strand.
- 6.02 The following recommendations should be considered before overlashing optical cable to existing metallic conductor cable or lashing two optical cables to the same support strand:
- (a) Minimum strand size for storm loading areas is given in Table A for ribbon type cable and in Table B for stranded type cable.
  - (b) Do not place more than one optical cable on the same support strand unless the strand is one size larger than shown in Tables A and B.
  - (c) When overlashing, the combined load of the cable combination must not exceed the strand limits under storm load conditions.
  - (d) **The lashing of a metallic conductor cable to an existing optical cable is not recommended.**
- 6.03 General information on lashing two or more cables to one suspension strand is covered in Bellcore Practice BR 627-320-011 and should be referred to before beginning placing operations.
- 6.04 When lashing an additional cable to an existing lashed cable and strand, follow the same procedure as outlined for lashing one cable to a suspension strand, with the exception of the cable guide and lasher which must be capable of passing over the existing cable and lashing wire.

**Table A. Maximum Permissible Span Lengths Ribbon-Type Lightguide Cable**

TABLE A					
STORM-LOADING REGION	SPAN LENGTHS IN FEET PER STRAND SIZE				
	6.6M	6M	10M	16M	25M
Heavy	150	250	350	500	900
Medium	300	500	700	1000	1600
Light	300	500	700	1100	1900

Table B. Maximum Permissible Span Lengths Stranded Lightguide Cable

TABLE B					
STORM-LOADING REGION	SPAN LENGTHS IN FEET PER STRAND SIZE				
	6.6M	6M	10M	16M	25M
Heavy	200	300	400	600	1000
Medium	400	650	800	1200	1900
Light	350	600	800	1200	2500

NOTE: Tables A and B apply to optical fiber cable lashed to an unoccupied strand or a strand occupied by a metallic conductor cable.