

## SECTION 634 SPAN WIRE ASSEMBLY

### 634-1 Description.

Install a span wire assembly for supporting traffic signals, signs, and other traffic control devices. Provide fiberglass insulators when required.

### 634-2 Materials.

**634-2.1 General Requirements:** For a single point attachment, use only a catenary wire to support the imposed dead and wind load from the attached signs and traffic signals. For a single point attachment, the catenary wire also supports the signal conductor cables and interconnect cables.

For a two point attachment, the catenary wire is used to support the imposed dead load and a portion of the imposed wind load from the attached signs and traffic signals. The two point attachment also includes a messenger wire to resist a significant portion of the imposed wind load and to support the signal conductor cables and interconnection cables.

Use a tether wire for maintaining the alignment of signal heads when specified in the Plans.

**634-2.2 Wires:** For span wire assemblies, only use wire cables of seven-wire strands manufactured and provided with a Class A zinc coating in accordance with ASTM A475.

Provide Utility Grade catenary or messenger wires. The Contractor may use Siemens-Martin Grade tether wires. Meet the following additional requirements for span wire assembly strands:

| Span Wire Assembly<br>Strand Type    | Nominal Diameter<br>Inch | Required Minimum<br>Breaking Strength<br>Pounds |
|--------------------------------------|--------------------------|-------------------------------------------------|
| Catenary Wire or<br>Messenger Wire * | 3/8                      | 11,500                                          |
|                                      | 7/16                     | 18,000                                          |
|                                      | 1/2                      | 25,000                                          |
| Tether Wire                          | 3/16                     | 1,900                                           |

\*Supply catenary or messenger wire of the nominal diameter as specified in the Contract Documents.

**634-2.3 Hardware and Fittings:** For utility or Siemens-Martin grade wires, use the connection hardware as specified herein. For installations that use other grades of wire, provide the hardware and fittings indicated in the Plans. Provide only hardware and fittings made of galvanized steel or non-corrosive metal unless the fiberglass insulators specified in 634-2.4 are also required. Provide hardware and fittings of sufficient strength to resist the breaking strength of the wire with which they are used.

Use an alloy steel eyebolt meeting the requirements of ASTM F541, Type 2 and a matching heavy hex nut meeting the requirements of ASTM A563, Grade C or D, to connect the automatic compression dead-end clamp of the catenary wire or messenger wire to the wood or concrete strain poles. Eyebolts and hex nuts must be zinc coated in accordance with ASTM A153, Class C. Sizes of eyebolts, supplied with nuts and washers, are as following: Use a 3/4 inch diameter bolt for maximum of one 7/16 inch diameter catenary or messenger wire, or maximum of two 3/8 inch diameter catenary or messenger wires. Use a 1 inch diameter bolt for

maximum of one 1/2 inch diameter catenary or messenger wire, or maximum of two 7/16 inch diameter catenary or messenger wires. Use 1-1/4 inch diameter bolt for maximum of two 1/2 inch diameter catenary or messenger wires. For two point attachments, connect the messenger wire at the lower attachment location. Do not use thimble eye bolts for these connections.

Only use thimble eye and eye bolts, 3/4 inch in diameter, minimum, to connect the automatic compression dead-end clamps of tether wires to wood or concrete strain poles.

Only use "S" hooks, 5/16 inch in diameter, minimum, when connecting the tether wire to all poles.

Ensure that other hardware and fittings, as required for the attachment of a span wire assembly to support poles or structures, are in accordance with the details shown in the Design Standards.

Furnish and install new catenary and messenger wire clamps for steel strain pole retrofit applications.

**634-2.4 Fiberglass Insulators:** Install fiberglass insulators of the length specified in the Plans on span wire assemblies located within 6 feet of overhead electric power lines.

Use a fiberglass insulator of a cylindrical shape, fabricated from epoxy-resin impregnated fiberglass strands and having a breaking strength 50% greater than that of the structural support wire to which it is to be attached. Equip the insulator with thimble eye fittings on each end for attachment of the wire. Furnish all fittings and hardware necessary for the complete installation with the insulator and ensure that such fittings and hardware are of at least equal strength to the insulator.

**634-2.5 Cable Attachment Hardware:** Meet the requirements of 632-2.3.

### **634-3 Installation Requirements.**

**634-3.1 Span Wire Assembly Types:** Use either of the following span wire assemblies as shown in the Contract Documents:

1. Single Point Attachment Assembly: This type of assembly requires a catenary wire with an optional tether wire if specified in the Plans.

2. Two Point Attachment Assembly: This type of assembly requires a catenary wire, a messenger wire and an optional tether wire if specified in the Plans.

**634-3.2 Span Types:** Install span wire assemblies on the following span types:

1. Perpendicular Span: Use this type span at an intersection to support a single span wire assembly upon which traffic signals, signs, and other traffic control devices are attached. Attach the span wire assembly to two support poles or structures, located on opposite sides of the roadway, and extend the assembly across the roadway at an angle of approximately 90 degrees to the roadway approach.

2. Diagonal Span: Use this span type at an intersection to support a single span wire assembly upon which traffic signals, signs, and other traffic control devices are attached. Attach the span wire assembly to two poles, located in opposite quadrants of the intersection, and extend the assembly across the intersection at an angle of approximately 45 degrees to the approach lanes of the intersection. Locate traffic control devices for all approaches at appropriate locations on the span wire assembly.

3. Box Span: Use this span type at an intersection to support a perimeter system of four span wire assembly upon which traffic signals, signs and other traffic control devices for each approach to the intersection are attached. Attach the span wire assembly to four poles, one

located in each quadrant of the intersection, and extend each span wire between two poles at an angle of approximately 90 degrees to the roadway approaches. Place traffic control devices for an approach on the span wire on the far side of the intersection.

4. Special Design Span: Use this span type to support two or more span wire assembly upon which traffic signals, signs and other traffic control devices for one or more roadway approaches are attached. Attach the span wire assembly to three or more poles.

**634-3.3 General Requirements:** Provide a span wire assembly with catenary, messenger and tether wires of one continuous length of wire cable with no splices except when an insulator is required by 634-2.4. Connect the insulator, if required, to the cable with automatic compression dead-end clamps.

Attach the span wire assemblies to the support poles or structures by means of automatic compression clamps and accessory hardware.

Assemble the washer and nut on the oval eye bolt with the flat washer next to the pole. Tighten the nut sufficiently to prevent the oval eye bolt from rotating.

For two point attachments, install the messenger wire with the following tensions per 100 feet. Linearly prorate cable tensions for other lengths from these values:

| Cable Size Inch | Wire Tension Lbs. |
|-----------------|-------------------|
| 3/8             | 340.0             |
| 7/16            | 500.0             |
| 1/2             | 645.0             |

The catenary wire shall be tensioned to provide a 5%, plus or minus 0.5% sag.

Install the span wire assemblies in accordance with the Design Standards, Index No. 17727, and at a height on the support poles which will provide a clearance from the roadway to the bottom of the signal head assemblies as shown in Index 17727.

Connect all span wires to the pole grounding system in accordance with Section 620.

Obtain and meet all provisions of the National Electric Safety Code (ANSI-C2) regarding clearance from electric lines, contacting of utility owners, and safety requirements prior to span wire installation.

Prior to installation of the two point attachment span wire assembly, submit the method of providing the required tension in the messenger wire to the Engineer for approval.

#### **634-4 Method of Measurement.**

**634-4.1 General:** Measurement for payment will be in accordance with the following work tasks.

**634-4.2 Furnish and Install:** The Contract unit price per intersection for Span Wire Assembly and per foot of Fiberglass Insulator, furnished and installed, between supporting poles and structures will include furnishing all materials and hardware as required in 634-2, and all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation.

**634-4.3 Furnish:** The Contract unit price per intersection for Span Wire Assembly and per foot of Fiberglass Insulator, furnished, will include the cost of the required materials and hardware as required in 634-2, and all handling and delivery of these items to the site designated by the Department in the Contract Documents.

**634-4.4 Install:** The Contract unit price per intersection for Span Wire Assembly and per foot of Fiberglass Insulator, installed, will include all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation.

The Engineer will supply all materials and hardware as required in 634-2 for the span wire assembly.

**634-5 Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section. When a tether wire is specified in the Plans, the payment of the tether wire shall be included in the compensation for the span wire assembly.

Payment will be made under:

- |                  |                                        |
|------------------|----------------------------------------|
| Item No. 634- 4- | Span Wire Assembly - per intersection. |
| Item No. 634- 5- | Fiberglass Insulator - per foot.       |