ITEM 680.96050304 - SPLICE, FIBER OPTIC CABLE

DESCRIPTION
This work consists of fusion splicing of optical fiber to optical fiber in cables located in splice/pull boxes, cross connect cabinets, within buildings and the environmental encasing of the splices at locations as shown on the Plans and as directed by the Engineer. This item covers all splicing performed at a single location, regardless of the number of fibers spliced.

MATERIALS
Splice Enclosure
The splice enclosure shall be air tight, water tight, corrosion resistant and re-enterable. The splice enclosure shall be manufacturer certified for outside plant, direct burial installation, underground and installation in splice/pull boxes.

The splice enclosure shall have sufficient capacity for 192 single fusion splices.

The splice enclosure shall not exceed 30 inches in length.

The splice enclosure shall have the capacity to accommodate four cables and field expandable to accept eight cables.

Splice trays shall be installed in each splice enclosure for holding, protecting and organizing the optical fiber. Splice trays shall provide sufficient space for coiling of optical fibers to prevent micro bending and have the capability to pass express fibers through the splice enclosure. The splice tray shall provide protection for the bare fusion splice of an optical fiber.

Splice enclosure kits must provide for a means to ground the fiber optic cable shield with waterproof isolation.

Shield bonding connectors shall be as specified by the cable manufacturer. Shield bonding conductors shall be equivalent to a 6-gage single conductor cable and of a bimetallic design to prevent corrosion.

Grounding conductors shall be solid, bare, copper wire equivalent to a 6 gage conductor.

Wall mounting brackets shall be provided for splice enclosures mounted within buildings. Hook-and-eye assemblies shall be provided to suspend splice enclosures vertically in pull boxes.

Identification Labels, Tags and Marking Tape
Fiber optic cable identification labels shall be non-conductive, non-corrosive, chemical resistant water-resistant tag and legend and attached with self-locking cable ties or an approved fastening method.

Equipment drop cables, route makers/ fiber count identification labels – black legend with yellow background, minimum size of the legend shall be 5/16 inches wide x ½ inches high.

Fiber optic cable tags – shall have a permanent embossed legend “CAUTION NYSDOT FIBER
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OPTIC CABLE” or, for the Monroe County cable, “CAUTION MONROE COUNTY PURE WATERS FIBER OPTIC CABLE 760-7600” – black legend with orange background, minimum size of the tag shall be 3 3/4 inches wide x 2 ½ inches high.

Marking tape shall be a color vinyl tape that will resist moisture, alkanes, acids commonly found in the splice/pull box environment. The required colors for the tape are as shown on the Plans.

CONSTRUCTION DETAILS
All fiber optic cablecraft persons (splicers) to perform the optical fiber splicing for this Contract shall have an industry recognized certification and with at least two years experience in fusion splicing of optical fiber. The names of the splicers with documentation indicating they meet the above requirement will be submitted to the Engineer for approval.

Required optical fiber splicing shall be as shown on the Plans and as directed by the Engineer.

All optical fiber splices shall only be the fusion type. Mechanical splices shall not be permitted.

The cable manufacture’s recommendations concerning bending radius shall be observed for the fiber optic cable, buffer tubes and optical fiber. The Contractor shall furnish all manufacturers’ specifications to the Engineer prior to beginning the fiber optic cable splicing operation.

The handling preparation of the fiber optic cable for splicing shall be in accordance with cable and splice enclosure manufacture’s recommendation and Rural Utilities Service (RUS) Bulletin 1753F-401 (PC-2).

A single splice tray shall be used for no more than the maximum number of optical fiber splices as specified by the manufacturer. Sufficient splice trays shall be provided with each splice enclosure to accommodate the required splices. The placement of the bare optical fiber in the splice tray shall be such that there is no discernible tensile force on the optical fiber.

Optical fiber splices shall be made in areas where temperature, humidity and cleanliness can be controlled.

The optical fiber splices shall be encased in a splice enclosure at all locations identified on the Plans and as directed by the Engineer. For splices in pull boxes, all cables must enter the same end of the enclosure.

Bonding and grounding will be in accordance with the splice enclosure manufacturer’s recommendations.

All connections to ground rods will be accomplished by an exothermic welding process and in accordance with manufacturer’s instructions.
To insure the quality of the optical fiber splices the fusion splicing machine(s) to be used in this Contract shall automatically control the fusion and fiber positioning processes. The fusion splicing machine shall be maintained in accordance with the manufacture’s recommendations.
Once all splicing and the installation of the splice enclosure has been accomplished the splice enclosure shall be mounted using the mounting brackets (in buildings) or hook-and-eye assembly (in pull boxes).

All excess cable will be neatly coiled.

All cables will be identified, tagged and marked with color tape as shown on the Plans and as directed by the Engineer.

System Acceptance Testing of the fusion splicing will be accomplished in other sections of these Specifications, the minimum acceptance criteria for fusion splicing of optical fiber shall be:

- Splice loss: \( \leq 0.1 \text{dB} \)
- Return loss: \( \geq 40 \text{ dB} \)

Testing and documentation shall be as specified in these Contract documents.

**METHODS OF MEASUREMENT**
Fiber Optic Cable – Splice will be measured for payment as each location shown on the plans where splicing is performed, and any other location where the Engineer directs splicing to be performed.

**BASIS OF PAYMENT**
The unit bid price for each Fiber Optic Cable – Splice shall include the cost of furnishing all labor, tools, materials, equipment and incidentals as necessary to complete the work.

The cost for identification labels, tags, marking tape, splice enclosures, splice trays, mounting hardware, and all other incidental equipment is to be included in the unit bid price.

If the Contractor splices at additional locations for his own convenience, the splicing shall be in accordance with this specification but no additional payment will be made.

Testing and documentation will be paid under a separate bid item.

Progress payment will be made as follows:
Fifty percent (50%) of the bid price for each item will be paid when all splices at the location have passed their tests. Twenty percent (20%) of the bid price for each item shall be paid when all fiber segments involved in the cable splice have passed their segment tests. Twenty percent (20%) of the bid price for each item will be paid upon successful completion of the System Acceptance Test. Ten percent (10%) of the bid price for each item will be paid upon successful completion of the Final Acceptance Test.