

Collier County Fiber Optic Technical Special Provisions

Fiber Optic Cable System

Description

This document is in reference to the Florida Department of Transportation Standard Specifications Section 633 Communication Cable.

The following standards are applicable to this bid item and are hereby incorporated by reference:

Organization	Standard	Applicability
RUS	PE-90	Cable Construction
TIA/EIA	598B-01	Color Coding
TIE/EIA	472D0000	Fiber Optic Cable
Telcordia	GR-20	Optical Characteristics

The Contractor shall furnish and install fiber optic cable as described in the work request and in accordance with the requirements specified herein. The governing Agency for this document is Collier County Traffic Operations (CCTO) department in cooperation with Collier County Information Technology (CCIT) Department. In accordance with interagency agreement the CCTO and CCIT maintain separate networks, but communally share responsibility for the fiber optic system. The contractor working on the fiber optic system shall notify the responsible department CCTO or CCIT for agency related communications. In the case that both departments are on the same fiber pathway both departments must be notified.

All fiber shall be shipped on reels of marked continuous length and shall be provided from the same manufacturer.

All fiber shall be tested on its reel prior to installation. Testing may be omitted only if the manufacturer has tested the cable prior to shipment, and has provided Optical Time Domain Reflectometer (OTDR) traces and a table of attenuations for each strand in the fiber optic cable. All fiber used for Collier County fiber projects must meet the minimum standards set by Collier County Traffic Operations in accordance with Florida Department of Transportation standards.

No splices shall be permitted within the fiber jacket.

No point discontinuities of greater than 0.08 dB per mile shall be permitted, and if using metric standard no point discontinuities greater than .05 dB per kilometer.

After installation, each run of fiber optic cable shall be marked within one foot of each splice and/or termination with the location that the cable goes to. This nomenclature shall be submitted to the agency for approval prior to its use. The same nomenclature shall be used on the Optical Time Domain Reflectometer (OTDR) sweep test results specified separately.

The fiber cable shall meet or exceed the Florida Department of Transportation Standard Specifications Section 633.

All fiber optic glass shall meet or exceed TIA/EIA-492CAAA, International Electrotechnical Commission (IEC) Publication 60793-2, and Telcordia GR-20-CORE.

The operating, shipping and storage range of the cable shall be -40° F to +158° F.

The installation temperature range of the cable shall be -22° F to +158° F.

Installation

All fiber shall be installed in underground conduit. The contractor will use 2 inch diameter Orange HDPE conduit. All fiber conduits must be installed with sweeps equal to less than 45 degrees.

Pulling in place shall be by hand or by an approved mechanical pulling machine. If a mechanical pulling machine is used, it must be equipped with a monitored or recording tension-meter.

At no time shall the manufacturer's recommended maximum pulling tension be exceeded.

Where pulling through pull boxes, approved pulleys and sheaves shall be used or the excess cable must be coiled in a figure eight and fed by hand.

If sheaves are to be used, the cable should never be pulled through a radius less than the manufacturer's minimum bending radius.

Fifty feet (50') of fiber slack shall be looped neatly in all pull boxes. One hundred feet (100') of fiber slack shall be looped at all splice locations, Fifty feet (50') of length on either side of the splice enclosure.

At each termination point, one hundred feet (100') of fiber slack shall be looped neatly within the cabinet or in an adjacent pull box. This fiber is for future additions or repairs to the fiber network.


Building Entrance Point and Inside Fiber Pathways

A service loop of 100' will be left at every building entrance.

At no time shall an Outside Plant rated cable be ran inside a building unless it is encased in rigid metal conduit (2" Electrical metallic tubing (EMT) unless otherwise specified).

Fire-Stopping

All penetrations into fire-walls or core holes between floors must be properly fire-stopped in accordance with the guidelines in BICSI TDM 95 Chapter 20. Fig. 11 and must also conform to any related NEC, Federal, State and local requirements for Fire-stopping.

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-40
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

Penetrations into the surface of any Firewall or presumed Firewall should be only slightly larger than the cable or cables that will need to pass through it. This will make Fire-stopping easier and allow the wall to maintain a better overall structural integrity.

Proper Fire-stopping should be performed on any hole and/or penetration of a firewall or solid wall. This may include the Contractor installing Mineral Wool in the space between the sheet rock walls and then installing a sheet rock patch on both sides before installing the Fire-Stopping Material. The contractors will Fire-stop any transitions between floors using or not using conduit or sleeve.

When using Fire-stopping Putty in a conduit or sleeves between floors a section of Fire-resistant Mineral Wool must be inserted to create the proper base for the putty. Making a form out of cardboard is not acceptable.

Fire-stopping pillows are also acceptable to seal an opening that may need to be reentered at a later time.

Single-Mode Cable

All fiber optic cable shall be single mode (SM).

This cable shall consist of 12, 24, 36, 48, 96 or 144 strands as described in the work request, arranged in color-coded buffer tubes of six individually color coded fibers except for the 48, 96 and 144 fiber cables, which shall consist of 12 fibers per buffer.

When less than six buffer tubes are required for the number of fibers, polyethylene filler rods shall be used to maintain cable integrity.

Each buffer tube shall be filled with a non-hygroscopic gel for protection of the fibers from impact and moisture ingress.

Aramid strength members shall be bundled with the buffer tubes and the filler rods and the jacket shall also contain non-hygroscopic gel.

The entire cable shall conform to RUS Specification PE-90, unless the cable manufacturer's recommendation is more stringent.

The exterior of the fiber optic cable jacket shall be manufactured with a color-coded stripe. The purpose of the color coding is for internal control as well as ease of identification after installation. No fiber optic cable shall be accepted that does not conform to the color coding below:

BCC Agency	Color Stripe	Label
Information Technology	YELLOW	"Collier County BCC IT" every 3 feet
Traffic Operations	GREEN	"Collier County BCC Traffic" every 3 feet

The minimum bend radius of the cable shall be 14 times the cable diameter.

The maximum tensile strength shall be at least 2700 Newtons (600 pound force) short-term and 601 Newtons (135 pound force) long-term.

Inside Fiber Pathways

All pathways will consist of inner-duct, conduit or a combination of both.

If broken or split, this inner-duct shall be spliced with the proper fittings.

Inner-duct and fiber cable ran through Plenum airways will be Plenum rated.

Where it enters a junction box or slack box the inner-duct will be connected to the wall mount box with the proper fitting to securely fasten the inner-duct to the enclosure.

Cables and inner-duct shall be rated according to TIA/EIA and NEC codes for the environment in which they are installed.

Support for inner-duct or conduit shall be no greater than 4' intervals.

All inner-duct or conduit will have a pull string provided for future use.

Indoor Pull-points

Pull points shall be installed or used at intervals not to exceed the manufacturer's specifications for the cable being placed.

No service loops shall be left at indoor pull points.

Service loops shall be installed only where a cable leaves a building or is terminated.

Removal of Fiber Optic Cable

Cable removal may be performed by hand or by machine. If the cable is to be relocated or reused the cable must meet all Florida Department of Transportation requirements set forth in Standard Specifications Section 783.

Fiber Optic Cable Splicing


General Requirements

All fibers shall be spliced by the fusion method.

The Contractor shall use a fusion splice machine for this purpose.

The splice machine shall be equipped with a method for estimating the achieved splice loss. Either the "Local Injection Detection" or "Core Alignment Loss Estimation" system is acceptable.

The machine used shall be new from the factory or serviced and certified by the factory or its authorized representative within the previous six months from the commencement of its use on the

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-4I
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

project. The Contractor shall provide to the agency a letter from the manufacturer or his authorized agency certifying that this requirement is met.

Splice loss shall not exceed a bi-directional average of 0.1 dB per splice for a complete fiber run or a maximum of 0.1 dB bi-directional averages for any single splice at 1310 and 1550 nanometers. Repair or replace splices that exceed allowable attenuation at no cost to the County.

At each splice location, one hundred feet of fiber shall be coiled (on each side of the splice – two hundred feet in total) to allow for future access to the cable at a distance from the splice point to accommodate a van or tent for the purpose of keeping the splice machine and craft-person out of the weather.

When a fiber cable is accessed, only the buffer tube containing the fiber(s) to be accessed shall be opened. Only the actual fiber to be accessed shall be cut.

If a fiber end is not to be used at the time, it shall be cut to a length equal to that of the fiber to be used and the spare neatly laid into the splice tray.

At least one and one-half revolutions of the splice tray of fiber shall be left on each end of fiber after splicing.

Splice Materials

At each splice point, splice organizer trays shall be provided to contain and protect the bare fibers and splices.

Splice trays shall be easily attachable and accessible. Splice tray raceways shall include a raceway for excess fiber storage that will accommodate the minimum bend radius of single-mode fiber without causing excessive signal losses due to bending or fiber damage.

The splice trays shall have a means to affix the buffer tube rigidly in place, and space & guides to allow “race tracking” of the fiber, and guides to locate the splice protectors.

The splice trays shall be layered above the transition/storage compartment and shall be easily slipped into place on two studs and secured with a hold down strap. Splice trays shall have fixed rigid slots for fiber placement.

Enclosures shall have provisions for storing fiber splices, non-spliced fiber and buffer tubes. Each tray shall be made of injection-molded plastic and have a hinged clear plastic cover for maximum fiber protection that allows for visible inspection of the fibers. The covers shall have a lock mechanism to hold them in place.

All splices shall be protected with a heat-shrink sleeve containing a stainless steel strength rod or protective sleeve and housing. Completed splice protectors shall be held in place with RTV silicone or adhesive tape. No more than 12 splices shall be placed in one tray.

All splice trays to be installed in surface level pull boxes

Buffer tubes only in the patch panel tray – tray must be able to slide out, without impacting fiber, for patching.

A minimum of 200 feet of slack shall be supplied at all splice points (100 feet of slack from each side; in and out).

Splices must be labeled using non-destructive tags with permanent markings.

Fiber Optic Terminations

General Requirements

All terminations to fiber optic cable shall be made with type SC connectors to single fiber break-out cable.

Where access to a trunk fiber or local fiber cable is made, a length of single fiber break-out cable shall be spliced onto the trunk fiber by the fusion splice method.

Nowhere shall a fiber be terminated directly.

Where single fiber break-out cable is used, it shall be marked within six inches of the connector with appropriate nomenclature to identify it.

All single-mode break-out cable shall be yellow in color.

The Contractor shall utilize the color codes and the splice diagrams as described in the work request for the termination of all cables.

Termination enclosures should only contain buffer tubes; the tray must be able to slide out, without impacting fiber, for patching.

Termination enclosures should also be labeled with each fiber optic strand’s buffer tube and strand colors.


Terminations and splices need to be completed using industry standard color coding scheme (TIA/EIA-598-A).

A machine printed not a hand written layout card will be attached to each patch panel indicating the layout of the fiber strands within the panel.

Fiber Optic Connectors

All SC type connectors shall conform to the NTT-SC and Telcordia 326 Specifications for SC connectors.

The connectors shall be applied by the adhesive and polish method. At least two grades of polish film shall be used and the fiber visually inspected after polishing.

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-42
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

Any marks on the fiber core or on the cladding within a core diameter from the core shall be cause for rejection and re-termination of the fiber.

The fiber strength member shall be affixed to the connector by crimp ring or by epoxy. If a crimp ring is used, it shall be crimped with a ratcheting tool that ensures correct crimp pressure.

The completed termination shall exhibit a loss of no more than 0.25 dB per mated pair when tested with an OTDR and a standard test cable. This requirement applies equally to field terminations and factory terminated pigtailed.

Fiber Optic Splicing & Termination Hardware

General Requirements

Provide a splice plan showing the location and configuration of splices in the system for approval by Collier County Traffic Operations. Perform all splicing according to the plan. Document each splice location and identify the source and destination of each fiber in each splice tray. Document all fiber colors and buffer jacket colors used during installation, and develop a sequential fiber numbering plan as required in the TIA/EIA-598-A standard for color-coding in the documentation.

Ensure that cables, buffer tubes, or strands are neatly routed, secured and terminated in a patch panel. Ensure all cable termination points include documentation regarding the identification, route, and function of each fiber installed at that location. Ensure that at least one copy of this information is placed alongside the installed equipment (for instance, in a document pouch or drawer within a field cabinet).

Fiber Optic Cable Tests

General Requirements

The OTDR used in testing shall be checked to ensure that it has the capability to measure fiber attenuation and transmission loss between any two points along the fiber optic cable plant. The OTDR shall also be able to measure insertion loss and reflectance of any optical connection.

The Contractor shall test all fiber optic cable prior to installation.

Cable delivered to the job site shall be tested on the reels prior to installation.

This test shall consist of a single direction sweep of each individual fiber with an Optical Time Domain Reflectometer (OTDR) that has been calibrated for the index of refraction of the fiber to be tested.

Verification of the fiber length and attenuation shall be made.

Attenuation shall not exceed 0.56 dB per mile at 1310nm and 0.19 dB per mile at 1550nm.

No discontinuities greater than 0.1 dB over a distance of less than 300 feet shall be allowed inside a building or structure.

If the cable fails to meet these requirements, the Contractor shall replace the entire reel at no additional cost.

Print-outs of the OTDR trace with the identification of the fiber and the attenuation and length noted on the print-out shall be provided.

This test may be eliminated at the Contractor's option if the manufacturer has done these tests at the factory and after the cable is placed on the reel and provides a typical OTDR trace together with a table of all attenuations and lengths of each fiber on a reel.

If the Contractor elects to forgo this test, it shall in no way relieve him of the obligation to replace any cable that, after installation and testing, proves not to meet the specifications.

Cable replacement shall be done at no additional cost to the Collier County.

Post-installation Test

After installation, the Contractor shall test all fibers from both end points with an Optical Time Domain Reflectometer (OTDR) at wavelengths of 1310 and 1550 nm. Test optical fibers that are not terminated at the time of installation using a bare fiber adapter. Present the results of the OTDR testing (i.e., traces for each fiber) and a loss table showing details for each splice or termination tested to Collier County Traffic Operations in an approved electronic format. Ensure all OTDR testing complies with the EIA/TIA-55-61 standard.


A pair of traces for each fiber shall be placed in a physical note book and electronic format. These traces will be presented to Collier County Traffic operations and the Collier County Information Technology departments.

A loss table shall be included with each trace showing each splice or termination.

No active devices shall be connected for this test and all SC connectors shall be capped.

The Contractor shall investigate any discontinuities greater than 0.20 dB/300 feet inside a building or structure, and repair them or replace the cable section at no additional cost to the agency.

The required traces shall also be delivered on CD or DVD. All traces must be arranged in logical directories with a printed list of directories and filenames referenced to the fiber location provided. The Contractor shall provide (at no additional compensation) licensed software compatible with Microsoft Windows Operating Systems (latest versions) to allow viewing and printing of the traces.

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-43
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

Communications Conduit

General Requirements

Exterior conduit applications will use 2 inch diameter HDPE

Interior conduit applications will use 2 inch EMT. All joints are to use industry standard connectors.

All unused conduits in outdoor pull boxes will be properly plugged with removable watertight plugs.

Mule tape and or Tracer wire will be installed in all conduits for future use as pull strings.

Conduit installation by Trench or Directional Bore

All new conduits connecting to existing conduit shall be of the identical size as the existing conduit.

No reducing couplings or reduction in the inside diameter of conduit shall be permitted.

Any conduit installed which is new from end to end (i.e. not coupled to an existing conduit), shall be a two-inch conduit.

Rigid couplings shall be used to join two or more conduits. Adhesive appropriate for and recommended by the manufacturer of the conduit may be used to assure a complete and durable seal at the coupling points.

At no time shall tape or any other adhesive be used in place of rigid couplings when two or more conduits are joined together.

At the agency's request, the contractor shall excavate a window at any point along a conduit trench so that couplings may be inspected.

Directional bore logs will be provided by the contractor to Collier County Traffic Operations prior to inspection for verification of communication conduit depth. Any communication conduit not meeting the required minimum depth will be replaced or repaired at no additional cost to the agency.

All new conduit installed and all existing conduit used under this Contract shall be blown and/or rodded clean to the satisfaction of the contracting agency prior to the installation of any cable or wire in that conduit.

All underground conduit installed by open trenching and directional bore methods shall be identified by a 12-gauge solid copper wire (tracer wire) installed in the conduit. Wire is preferred. All tracer wire is to be Blue in color to readily distinguish it from ground wire.

Conduit and Locate Systems must comply with Florida Department of Transportation Standard Specifications Section 633.

A #12 AWG blue insulated solid or approved equivalent, locate/pull wire shall be installed in all conduits, spare conduits, or conduits shown on the plans that are to receive cable at a future date.

At least five feet of locate/pull wire shall be accessible at each conduit termination and secured within the pull box or place of termination.

The tracer wire shall be installed for the entire length of conduit(s).

The tracer wire shall contain a means of being located by a metallic cable detector.

Identification tape shall also be installed above conduit installed by open trenching.

Identification tape shall be colored in accordance with American Public Works Association orange for communications and shall be continuously emblazoned with black non-fading ink with the message "CAUTION FIBER OPTIC" in minimum one-inch high block letters.

One length of identification tape shall be installed for all parallel conduits within one foot of each other; parallel conduits more than one foot apart shall have two or more identification tapes as needed.

The identification tape shall be continuous from conduit termination point to termination point and shall enter pull boxes with the conduit. For new conduit, the identification tape shall be at a depth of one foot above the installed conduit.

Sidewalk restoration shall be full width by section for all sidewalks five feet wide or narrower. For sidewalks eight feet or wider, the restoration may be in half-width sections or to the nearest existing seam or joint as approved by the agency's Engineer. Sidewalks between five and eight feet wide may be replaced to the nearest seam or joint only if existing and approved by the agency's Engineer.

Aesthetic sidewalk and/or pavement (brick, brick paver, paver block, colored concrete, granite, slate, etc.) shall be replaced entirely and the Contractor shall match color and texture in accordance with the local municipality's or owner's requirements.

Underground conduit shall generally be installed in non-pavement areas if possible. The Contractor shall install underground conduit in the grass utility strip if such a strip is available.


Conduit installation across driveways shall be accomplished by directional bore.

Under no circumstances shall the open trench exceed three feet in width.

All underground conduits must be installed no less than 30 inches below the surface. The optimum depth range is 30 to 60 inches below the surface.

All conduit(s) that are placed deeper than fifteen feet or 180 inches must have prior approval by the county. Deep conduit must then be marked in a manner consistent with Collier County standards so that it can be easily located in the future.

Must meet PUD construction standards and inspections – see the Collier County Public Utilities Standards Manual located at the following URL : <https://www.colliercountyfl.gov/your-government/divisions-f-r/public-utilities-planning-and-project-management/utilities-standards-manual>

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-44
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

Road crossings should be done no closer than 100 feet from an intersection.

Conduit Installation into Existing Pull Boxes

All conduit, required as described in the work request, installed into existing pull boxes shall be installed in accordance with the requirements for conduit installation into new pull boxes.

The Contractor shall maintain the existing pull box and shall restore the surrounding area to a condition equivalent to that prior to when work began.

The Contractor shall immediately notify the agency if the Contractor determines that the existing pull box is unacceptable for reuse.

If the existing pull box needs to be temporarily removed or otherwise disturbed for the new conduit installation, new gravel shall be installed in the base of the reinstalled existing pull box as required for new pull boxes.

Communications Pull Boxes and Splice Boxes

General Requirements

Pull boxes used for communications cable shall be, at minimum, sufficient to house the communication cable(s) without bending the cable(s) to less than 14 times the outside diameter(s) or as shown on the Plans (or as described in the work request).

The minimum allowable inside dimensions for the communications pull box are 24 inches wide by 36 inches long. The Collier County standard depth of fiber optic pull boxes shall be 36 inches.

Use splice boxes at all fiber optic splice locations, as shown in the plans, and at other locations as approved by the Engineer. Ensure that all splice boxes have an open bottom. Ensure that the splice box is equipped with a nonskid cover secured by hex head bolts; cable racks and hooks; pulling eyes; and any other miscellaneous hardware required for installation or as shown in the in the plans.

Ensure that the splice box size is approximately 2.5 feet wide by 5 feet long by 4 feet deep or as shown in the plans. Ensure that the splice box is large enough to house fiber optic cable without subjecting the cable to a bend radius less than 14 times the diameter of the cable.

Install all pull boxes and splice boxes according to the manufacturer’s recommendations; as shown in the plans; and in compliance with FDOT Standard Specifications Section 635 and Design Standards Index No. 17700. Complete the installation of pull boxes, splice boxes, and conduit prior to cable installation. Provide all pull boxes and splice boxes a final finish grade elevation as shown in the plans. Excavate pull box and splice box installation sites to a depth of 1 foot below the bottom of the box, and replace with a 1 foot bed of pearock or crushed stone at the excavation base prior to installing the box. Ensure that the box cover is flush with the existing finish grade after installation. Taper the finish grade contour to provide drainage from the splice box.

Do not place the pull boxes in roadways, driveways, parking areas, swales, or public sidewalk curb ramps. Avoid placing pull boxes and splice boxes on steep slopes where the cover cannot be leveled within a tolerance of 1 inch of drop to 1 foot of grade or in low-lying locations with poor drainage.

All pull boxes and splice boxes supplied shall have the word “COMMUNICATIONS” integrally cast into the covers.

All pull boxes in the public right-of-way must be registered on the Florida Department of Transportation’s Qualified Products List (QPL).

The maximum distance between pull boxes is 1000 feet, or less, if specified by the contracting agency.

Where underground conduit crosses a paved roadway or a major driveway, a pull box is required within 20 feet of each side of the paved area.

A pull box is required at the apex of any point where underground conduit turns in a 90 degree radius, or where two or more conduits meet at a “T” junction.

The Contractor shall be responsible for properly sizing each pull box to ensure that all communications cable, including spare cable, is safely stored without violating the recommended bending radius of the communications cable.

Provide and store fiber optic cable at each pull box and splice box to allow for future splices, additions, or repairs to the fiber network. Store the fiber optic cable without twisting or bending the cable below the minimum bend radius. Store 100 feet of spare fiber optic cable in all pull boxes and store a total of 200 feet of fiber optic cable in splice boxes, with 100 feet of cable on each side of the cable splice point or as shown in the plans.

Removal of existing pull box and furnishing and installing of new pull box


Where described in the work request or directed by the agency, the Contractor shall remove existing pull boxes and furnish and install new pull boxes such that the completed installation is in accordance with details specified herein.

The Contractor is responsible for ensuring that the pull box cover is flush with the finished grade or sidewalk. An even layer of gravel must be installed in the bottom of all outdoor pull boxes.

At no time should the Contractor install pull boxes in roadways, driveways, parking areas, ditches or public sidewalk curb ramps.

For all types of existing pull boxes, the Contractor shall excavate and remove the existing pull box and lid, adjust the pull box footing, adjust conduit terminations, add gravel, furnish and install a new pull box and lid and restore the surrounding grade surface.

The Contractor shall furnish and install all materials necessary to complete this work.

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-45
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

Splice Enclosures

The fiber optic splice enclosures shall be capable of accommodating splice organizers to facilitate fiber management and shall accept mechanical, single fiber fusion splices.

The splice enclosure shall provide fiber optic cable penetration end caps on one end, to accommodate at least two trunk fiber optic cables and two branch fiber optic cables.

Water blocking techniques shall be used to ensure that the enclosure and cable entry locations do not leak when immersed in 19 feet of water for 30 days.

The enclosure end caps should be factory drilled to the proper diameter to accept and seal the fiber optic cable entry(ies).

Cable entry locations shall accommodate an assortment of fiber optic cable outer diameters ranging from 0.45 inches to 0.55 inches (+10 percent) without jeopardizing its waterproof characteristics.

Hinged splice enclosures with stainless steel latching devices shall be utilized.

All fiber optic splice enclosures shall meet the requirements of Telcordia Technologies GR-711-CORE and shall comply with all applicable NEC requirements.

Splice enclosures may encounter high water table conditions. Splice enclosures shall be non-filled (no encapsulate), airtight and prevent water intrusion, able to accommodate pressurization, and have the capability to be reentered without requiring specialized tools or equipment.

Splice enclosures shall also be supplied with all hardware necessary to provide solid mounting to the wall of the pull box in which it is to be housed.

All enclosures (both underground and aboveground) and associated facilities provided under this Contract shall include a quality assurance / quality control inspection for materials, workmanship and compliance of the product to meet these specifications.

The Contractor shall provide to the agency an executed Certificate of Compliance from the manufacturer indicating that the splice enclosures meet the requirements included herein.

All splice enclosures must employ a complete fiber management system consisting of splice trays and a stress relief system.

Each enclosure shall be designed to accommodate future expansion and contain modular splice organizers / trays capable of handling splices in a neat and distinguishable fashion.

Splicing capacity for 100 percent expansion shall be provided.

Trays shall be easily attachable and accessible.

Tray raceways shall include a raceway for excess fiber storage that accommodates the minimum bend radius of single-mode fiber without causing excessive signal losses due to bending or fiber damage.

Splice enclosures shall have provisions for storing fiber splices and non-spliced fiber / buffer tubes.

Fiber optic cable marker

Fiber optic cable markers must be supplied by the Contractor.

Markers are to be placed at all pull boxes.

Markers are to be made of composite reinforced thermoplastic, and be white and orange in color.

Fiber optic cable markers will be Tri-View with the message 'WARNING FIBER OPTIC CABLE' clearly viewable in all direction. Fiber optic cable markers will be a minimum of 72 inches long by 2-7/8 inches wide. Only markers that meet Collier County Traffic Operations approval should be placed in conjunction with the Collier County's fiber network. Any markers that do not meet Collier County Traffic Operation requirements will be replaced prior to final inspection at no cost to the agency.

Installation should be adequate so that marker cannot be pulled out or removed manually.

Install a marker at each point along the fiber optic cable path where a 45-degree or greater change in direction occurs.

Install all markers within 24 inches of the actual placement of the conduit or fiber optic cabling. When placed next to a pull box or splice box the marker must be mid-way along the lengthwise side, so it will not interfere with the opening or closing of the box's lid.

Install markers no later than 3 days following the installation of conduit to contain fiber optic cables, or of direct buried fiber optic cables.

Safeguard the conduit and cables during the installation of the markers.


Remove and replace any conduit or cables that are damaged during marker installation at no additional cost to contract.

EQUIPMENT WARRANTY

Until final acceptance, the Contractor shall be responsible for the function and operation of each component proposed.

The Contractor's responsibility includes, but is not limited to, all pickup and delivery of defective, repaired or replacement components.

Each component that is a vendor-supplied component and is covered wholly or partially by a manufacturer's warranty shall include the provision that the warranty is subject to transfer to the

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-46
04-29-19	PMB	Minor revision - Changed Section 783 to 633							

maintaining agency as named by Collier County Traffic Operations prior to final acceptance of the Contract.

The Contractor is responsible for ensuring that the vendor or manufacturer supplying the component and providing the equipment warranty recognizes the agency's designee as the original purchaser and owner of the component.

Service maintenance contract

The Contractor shall provide a service maintenance contract that completely covers each component installed as shown on the plans (or as part of the work request).

The Contractor is responsible for ensuring that the supplier of the service maintenance contract recognizes the Department's designee as the original purchaser and owner of the component as new.


The Contractor shall submit to the agency for approval copies of the proposed service maintenance contract prior to the commencement of testing.

The service maintenance contract shall be provided by the Contractor for a period of one calendar year to begin not more than 15 days prior to final acceptance of the project by the Department.

The service maintenance contract shall cover all parts, labor and other costs associated with the diagnosis, adjustment, removal, transportation, repair and reinstallation of any component.

The service maintenance contract shall provide for complete on-site service with a maximum on-site response time of one working day after request for service.

Payment to the Contractor for the service maintenance contract shall be included in the unit bid price for the units covered by the service maintenance contract and no additional compensation will be provided by the Department.

REVISIONS						 Collier County Traffic Operations 2885 South Horseshoe Drive Naples, Florida 34104 Phone: (239) 774-8192 Fax: (239) 213-5868	COLLIER COUNTY GROWTH MANAGEMENT DIVISION	FIBER OPTIC TECHNICAL SPECIAL PROVISIONS	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				TSP-47
04-29-19	PMB	Minor revision - Changed Section 783 to 633							