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ITEM 632 INTERCONNECT, MISC.: FIBER OPTIC TERMINATION TOOL KIT

A TERMINATION TOOL KIT SHALL INCLUDE ALL TOOLS AND MATERIALS LISTED BELOW NECESSARY TO TERMINATE THE CONNECTORS USED AS PART OF THIS PROJECT. TERMINATION KITS SHALL INCLUDE A HOT MELT OVEN, CRIMP TOOL, ONE-STEP LAP FILM, POLISHING JIG, POLISHING PAD, COOLING STAND, CONNECTOR HOLDER, STRIPPING COLLAR, SCRIBE CARBIDE, BOTTLE OF 99% ISOPROPYL ALCOHOL, SNIPS, CABLE STRIPPER, NO-NIK STRIPPER, VIEW SCOPE, LINT-FREE CLOTH AND PIPE CLEANERS, JEWELERS LOUPE, POCKET RULER AND INSTRUCTION MANUALS. THE CONTRACTOR SHALL PURCHASE A PRE-ASSEMBLED TERMINATION TOOL KIT THAT MEETS THIS SPECIFICATION, SIMILAR TO 3M 6150-A TERMINATION KIT, SIECOR TKT-025 OR APPROVED EQUAL, TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTENANCE OF THE FIBER SYSTEM. THE ENTIRE KIT SHALL COME IN A HARD SIDE CARRYING CASE.

PAYMENT SHALL BE MADE AT THE PRICE BID OF ITEM 632, INTERCONNECT, MISC.: FIBER OPTIC TERMINATION TOOL KIT.

ITEM 632 INTERCONNECT, MISC.: OPTICAL TIME DOMAIN REFLECTOMETER (OTDR)

(THIS OTDR NOTE IS REQUIRED IF THE PLAN REQUIRES THE CONTRACTOR TO PROVIDE THE MAINTAINING AGENCY WITH AN OTDR FOR FUTURE MAINTENANCE WORK AT PROJECT COST.)

THE CONTRACTOR SHALL PURCHASE AN OPTICAL TIME DOMAIN REFLECTOR (OTDR) THAT MEETS THE FOLLOWING REQUIREMENTS AND TURN IT OVER TO THE MAINTAINING AGENCY FOR THEIR USE AT THE CONCLUSION OF THE PROJECT.

THE OTDR SHALL BE SUPPLIED WITH THE FOLLOWING FEATURES AS A MINIMUM:

1. FIELD INTERCHANGEABLE SOURCE MODULES FOR SINGLE MODE AND MULT-MODE FIBER ANALYSIS OF OPTICAL LINKS FROM 300 FEET (100 M) TO 15,000 FEET (5 KM) IN LENGTH.
2. MINIMUM OF 3 USER SELECTABLE PULSE WIDTHS PER WAVELENGTH
3. AUTO MODE BUTTON FOR ONE BUTTON TESTING
4. AUTO MODE OR SIMPLIFIED MODE FOR TRACE NAMING AND STORING
5. DUAL TRACE ANALYSIS MODE
6. EVENT TABLE DISPLAY
7. INTERNAL HARD DRIVE FOR TRACE STORAGE
8. 3.5" FLOPPY DISK DRIVE (1.44 MEG)
9. PERIPHERAL SUPPORT FOR KEYBOARD, MOUSE, VGA MONITOR AND PRINTER
10. INDIVIDUAL AND BATCH PRINTING MODES
11. PC BASED EMULATION SOFTWARE FOR WINDOWS 95 OR DOS (TO BE INCLUDED WITH OTDR)
12. SYSTEM SHALL BE SOFTWARE UPGRADEABLE
13. INTERNAL BATTERY IWTH AC ADAPTER/BATTER CHARGER
14. INTERNAL OR EXTERNAL PRINTER
15. BI-DIRECTIONAL ANALYSIS THROUGH EMULATION SOFTWARE OR INTERNAL TO OTDR

PAYMENT SHALL BE MADE AT THE PRICE BID OF ITEM 632, INTERCONNECT, MISC.: OPTICAL TIME DOMAIN REFLECTOMETER (OTDR).

ITEM 632 INTERCONNECT, MISC.: CLEAVE TOOL

CLEAVE TOOLS ARE USED DURING SPLICING TO CUT THE INDIVIDUAL SM OR MM FIBERS AS CLOSE TO A PERFECT 90 DEGREE ANGLE AS POSSIBLE, THUS ALLOWING THE HIGHEST CORE TO CORE ALIGNMENT AND THEREFORE THE LOWEST DB SPLICE LOSS. THE MANUFACTURERS OF CLEAVE TOOLS HAVE ESTABLISHED "END ANGLE" CLEAVE AVERAGES THAT ARE BASED ON A MINIMUM OF 150 CUTS UTILIZING A MINIMUM OF 10 CUTTERS. BASED ON THESE TEST RESULTS CLEAVE TOOLS SHALL HAVE MINIMUM END ANGLE AVERAGES AS FOLLOWS: <0.70 DEGREE AVERAGE WITH NO CUT OF THE 150 CLEAVES EXCEEDING 1.5 DEGREE WILL BE ALLOWED. PRIOR TO THE SPLICING OF ANY FIBER CABLE, THE CONTRACTOR SHALL SUBMIT THE PART NUMBER AND MANUFACTURER OF THE CLEAVE TOOL ALONG WITH AN "END ANGLE" DISTRIBUTION CHART WHICH DEMONSTRATES THE ACTUAL 150 CUT END ANGLES, SUCH AS SIECOR PART NUMBER FBC-005 OR ALCOA FUJIKURA C012 OR EQUAL. THE CONTRACTOR SHALL PURCHASE A CLEAVE TOOL THAT MEETS THIS SPECIFICATION TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTENANCE OF THE FIBER SYSTEM.

PAYMENT SHALL BE MADE AT THE PRICE BID OF ITEM 632, INTERCONNECT, MISC.: CLEAVE TOOL.

ITEM 632 INTERCONNECT, MISC.: MECHANICAL SPLICE TOOL KIT

A MECHANICAL SPLICE TOOL KIT SHALL INCLUDE ALL THE TOOLS NECESSARY FOR THE ASSEMBLY OF A MECHANICAL SPLICE. THE TOOLS SHALL ALLOW FOR EASY COMPLETION OF CABLE PREPARATION, REMOVAL OF FIBER COATING, CLEANING AND CLEAVING, PRIOR TO COMPLETING THE SPLICE. MECHANICAL SPLICE KITS TYPICALLY INCLUDE A CONNECTOR ASSEMBLY TOOL, CLEAVE TOOL, NO-NIK FIBER STRIPPER, MICRO-STRIP PRECISION STRIPPER, CABLE STRIPPER, TELECOMMUNICATION SNIPS, 20X MAGNIFIER, LINT-FREE CLOTH, PROTECTIVE CARRYING CASE AND MANUAL.

A CLEAVE TOOL SHALL BE INCLUDED IN THE MECHANICAL SPLICE KIT IN ADDITION TO THE ONE WHICH WILL BE PURCHASED SEPARATELY. THE CONTRACTOR SHALL PURCHASE A PRE-ASSEMBLED MECHANICAL SPLICE KIT THAT MEETS THIS SPECIFICATION, SIMILAR TO 3M 2530 FIBER SPLICE PREPARATION KIT, SIECOR TKT-100-02 OR APPROVED EQUAL, TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTENANCE OF THE FIBER SYSTEM.

PAYMENT SHALL BE MADE AT THE PRICE BID OF ITEM 632, INTERCONNECT, MISC.: MECHANICAL SPLICE TOOL KIT.

ITEM 632 INTERCONNECT MISC.: FUSION SPLICER

(THIS FUSION SPLICER NOTE IS REQUIRED IF THE PLAN REQUIRES FUSION SPLICING IN LIEU OF MECHANICAL SPLICING AND THE MAINTAINING AGENCY WISHES TO BE SUPPLIED WITH A FUSION SPLICER FOR FUTURE MAINTENANCE WORK AT PROJECT COST .) THE FUSION SPLICER USED AS PART OF THIS PROJECT SHALL BE PURCHASED NEW BY THE CONTRACTOR AND TURNED OVER TO THE MAINTAINING AGENCY IN GOOD WORKING ORDER AT THE CONCLUSION OF THE PROJECT. THE FUSION SPLICER SHALL PROVIDE A VIDEO OF DISPLAY OF THE FIBERS AND SHALL UTILIZE A DIRECT CORE LIGHT INJECTION SYSTEM (LID), PROFILE ALIGNMENT, 3 AXIS FIBER ALIGNMENT OR V-BLOCK AND SHALL BE CAPABLE OF AUTOMATICALLY CLEANING, POSITIONING (GAP) AND FUSING FIBERS AT THE TOUCH OF A BUTTON. THE SPLICE UNIT SHALL BE CAPABLE OF SPLICING EITHER MULTI-MODE OR SINGLE MODE FIBERS AND SHALL BE ABLE TO INSTANTLY CALCULATE SPLICE LOSS AND DISPLAY THE RESULTS IN AN EASILY UNDERSTOOD MANNER. THE FUSION SPLICE UNIT SHALL INCLUDE AN ATTACHABLE HEAT SHRINK OVEN AND CRIMP & GO TYPE SPLICE PROTECTION CRIMPING DEVICE. IT SHALL BE ABLE TO OPERATE ON BATTERY, AC OR EXTERNAL DC POWER. THE ESTIMATOR SHOULD BE ACCURATE TO ± 0.05 DB 100% OF THE TIME. CERTIFICATION AND TESTING PAPERS FOR THE FUSION SPLICER SHALL BE SUBMITTED WITH THE UNIT WHEN IT IS TURNED OVER TO THE MAINTAINING AGENCY. IF THE UNIT CERTIFICATION EXPIRES BEFORE THE PROJECT COMPLETION OR IF THE UNIT IS USED BY THE CONTRACTOR DURING CONSTRUCTION, THE UNIT SHALL BE RE-CERTIFIED AT THE CONTRACTOR'S EXPENSE BEFORE IT IS TURNED OVER TO THE MAINTAINING AGENCY. ALL COSTS TO PURCHASE AND TURN OVER IN GOOD WORKING ORDER A FUSION SPLICER CONFORMING TO THESE SPECIFICATIONS SHALL BE INCLUDED IN THE BID PRICE OF ITEM 632 INTERCONNECT MISC.: FUSION SPLICER.

ITEM 632 INTERCONNECT MISC.: FIBER OPTIC TRAINING PLAN

THE CONTRACTOR SHALL SUBMIT A COMPREHENSIVE FIBER OPTIC TRAINING PLAN FOR APPROVAL WITHIN 15 DAYS OF NOTICE OF SIGNED CONTRACT. THE TRAINING COURSE SHALL TAKE PLACE PRIOR TO INSTALLATION AND MAY BE ATTENDED BY PERSONNEL FROM THE MAINTAINING AGENCY OR THEIR DESIGNEES. THIS TRAINING SHALL BE FOR UP TO TWELVE (12) PERSONNEL TO BE DETERMINED BY THE ENGINEER.

THE TRAINING SHALL BE CONDUCTED BY AN APPROVED INSTRUCTOR WHO CAN DEMONSTRATE A MINIMUM OF 2 YEARS EXPERIENCE IN FIBER OPTICS AND FIBER OPTIC TRAINING. THE INSTRUCTOR(S) SHALL BE FAMILIAR WITH THE CABLE TYPES AND EQUIPMENT BEING INSTALLED ON THIS PROJECT. THE PLAN SHALL BE FOR A MINIMUM THREE (3) DAY FIBER OPTIC TRAINING COURSE, INCLUDING LECTURE, CLASSROOM "HANDS-ON", AND PROJECT FIELD TRAINING. ONE HALF OF THE TOTAL TRAINING COURSE SHALL BE DEDICATED TO VARIOUS CABLE SPLICING AND TESTING EQUIPMENT WORKSHOPS.

THE COURSE SHALL TEACH PERSONNEL FROM THE MAINTAINING AGENCY THE PROCESSES, FINE TUNE TECHNIQUES AND VERIFY A CRAFTSMAN'S ABILITIES TO INSTALL AND INSPECT CABLE , FAN-OUT, TERMINATE, SPLICE (BOTH MECHANICAL & FUSION), AND TEST (HAND HELD, MINI-OTDR AND FULL SIZE OTDR) FIBER OPTIC CABLE. SPECIFIC FOCUS WILL BE ON THE TRAFFIC INTERCONNECT SYSTEMS, WITH EMPHASIS ON "DROP AND INSERT" (CLOSED LOOP) INSTALLATIONS. THE FOLLOWING SUBJECTS SHALL BE COVERED AT MINIMUM. COURSE CONTENT IS NOT LIMITED TO THIS LIST.

SAFETY

FIBER OPTIC THEORY

CABLE TYPES & APPLICATIONS, CABLE MANUFACTURERS OVERVIEW

CABLE PLACEMENT

SHEATH REMOVAL

ARMOR GROUNDING METHODS

DUCT PULLING OPTIONS

AERIAL PULLING OPTIONS

TESTING PROCESSES OVERVIEW (HAND HELD PROCESS, MINI-OTDR, OTDR)

CABLE SPLICING (MECHANICAL & FUSION, SPLICE ENCLOSURE)

SPLICE ENCLOSURE INSTALLATION & SPLICING DISCUSSION AND WORKSHOP

CABLE FAN-OUT W/KITS

CABLE PLACEMENT (DISTRIBUTION BOX)

TERMINATION (FIELD) DISCUSSION AND WORKSHOP

TESTING THE SYSTEM

CLOSURE & SLACK MANAGEMENT

TROUBLE SHOOTING

SYSTEM RESTORATION

THE TRAINING SITE SHALL BE PROVIDED BY THE CONTRACTOR AT A MUTUALLY AGREED LOCATION WITH THE MAINTAINING AGENCY. ALL COSTS ASSOCIATED FOR PROVIDING THE ABOVE TRAINING SHALL BE INCLUDED IN THE PRICE BID OF ITEM 632 INTERCONNECT MISC.: FIBER OPTIC TRAINING PLAN.

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FIBER OPTIC TOOLS AND TRAINING TYPICALS	
CITY OF AKRON DEPARTMENT OF PUBLIC SAFETY/SERVICE TRAFFIC ENGINEERING DIVISION	
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DWG. No. TOOLS	