5 BID SPECIFICAITONS

5.1 PRODUCTS

5.1.1 Optical Fiber Backbone Cable:

5.1.1.1

- UL listed OFNP or OFNR as required by installation location; aqua jacket
- Cable shall be reinforced with Aramid yarn, and contain no metallic elements.
- Optical fiber cable shall have an attenuation value not to exceed 3.5 dB per kilometer at 850 nm and 1.5 dB per kilometer at 1300 nm. Minimum Bandwidth 1500 MHz per kilometer at 850 nm and 500 MHz per kilometer at 1300 nm.
- 50 Micron Riser OFNR- OM4 Loose Tube 6 strand multimode
  - ✓ *CORNING | 006TSF-T4190D20 | FREEDM LST(TM) Single-Tube, Gel-Free Cable, Riser, 6 fiber, 50 µm multimode (OM4)Manufacturer # 006TSF-T4190D20 or approved equivalent*

5.1.2 **Optical Fiber Enclosures:** The existing rack mounted Corning Cable Systems LANSCAPE fiber trays and enclosures will be reused. The SC adapter Panels will be removed and replaced with LC Adapter Panels.

- ✓ *CORNING | CCH-CP06-E4 | Closet Connector Housing (CCH) Panel, LC adapters, Duplex, 6 fiber, 50 µm multimode (OM3/4) Manufacturer # CCH-CP06-E4 or approved equivalent.*

5.1.3 Multi-mode Optical Fiber Connectors: for termination on 900 micron buffered optical fiber.

5.1.3.1 **LC Pre-Polished Connectors:** ceramic ferrule, OptiMO, LC multimode connector.

- ✓ *CORNING | 95-050-99-X | Unicam High-performance Connector, LC, 50 µm Multimode (OM3/OM4 Compatible), Ceramic Ferrule, Logo, Single Pack, Black Housing, Aqua Boot Manufacturer # 95-050-99-X or approved equivalent.*

5.1.4 Optical Fiber Patch Cords

5.1.4.1 **Provide fiber optic patch cords:** Lengths and Quantities as listed on the drawings Duplex LC -LC SpaceSaver Cord, 0.5dB Max, 2.4mm Round.

- ✓ *Tripp Lite 10G/100GB Duplex Multimode 50/125 OM4 LSZH Fiber Patch Cable (LC/LC) or approved equivalent.*
- ✓ *Quantity 87/3 meter, Quantity 82/1 meter Patch Cable (LC/LC)*

5.2 INSTALLATION: COMMUNICATIONS INFRASTRUCTURE

5.2.1 Optical Fiber Cable:

5.2.1.1 Provide one six-strand multimode optical fiber cable from the MDF to each IDF.

5.2.1.2 All optical fiber installations shall be installed using open cabling methods. Limit cable-bending radius to 20 times the cable diameter during installation, and 10 times the diameter after installation. Provide all required tools, materials, consumables, and equipment necessary for cleaning and field termination of optical fiber connectors. Label each end of each cable as to source and destination. Terminate optical fibers in consistent, consecutive manner at each end. Label Optical Fiber raceway cable with yellow "Caution Optical Fiber Cable" tags every 10 feet. Leave 10 feet of slack at each fiber termination point. Neatly coil slack optical fiber cable on top of rack above optical fiber patch and splice enclosure at each rack location.

5.2.1.3 Optical fiber cable terminations shall utilize enclosures and components in quantities consistent with the required fiber counts at each end of each segment. During field polish optical fiber connector termination, visually inspect all terminations with a 400-power microscope. Follow all of the connector manufacturer's recommendations. Unacceptable flaws in the terminations will include, but not limited to, scratches, full or partial cracks, bubbles, pits, epoxy residual, dirt, dust, oil, moisture, grinding and sanding debris. The acceptable termination will show a connector tip that is free of all imperfections in 100% of the core and 80% of the cladding. All unacceptable connectors shall be inspected after rework.

5.2.1.4 During installation of optical fiber cable do not allow pulling tension to exceed cable manufacturer's specification for the cable being installed. Only the strength member of the cable shall be subjected to the pulling tension.

5.2.1.5 All optical fiber connector tips shall be cleaned with proper cleaning tools specifically designed for optical fiber prior to inserting them into matting receptacles or bulkheads.

5.3 LABELING

5.3.1 General:

5.3.1.1 All labels shall be permanent, machine generated labels produced by a labeling machine.

5.3.1.2 Labeling information will be reviewed at Pre-Install Meeting, and the Owner shall approve the labeling scheme prior to the installation of any cabling.

5.3.1.3 Surfaces shall be cleaned before attaching labels. All labels shall be attached firmly and vertically plumb on equipment, faceplates, patch panels termination blocks, etc.

5.3.1.4 All labeling of cables, equipment, and components shall be included in as-built documentation, floor plan drawings, and schematic deigns.

5.3.2 Cabling

5.3.2.1 All structured cables (horizontal and backbone) shall be labeled at both ends within 6" of cable termination point. Where voice backbone cables extend behind termination blocks, cable labels shall be placed at a location on the cable where the labels are visible from the front of the termination blocks.

5.3.2.2 Labels shall have an adhesive backing and shall wrap completely around the circumference of the cable jacket. Label and lettering sizes shall be of appropriate size in regards to cable diameter.

5.3.3 Optical Fiber Testing

5.3.3.1 **Pre-installation Testing:** Test each strand of every optical fiber cable on the reel with a light source and a power meter. Obtain the cable manufacturer power meter test results for each real used on the project. Prior to completion of project, turn over the completed optical fiber test form, optical fiber cable reel ID tags and optical fiber cable manufacturer's test results.

5.3.3.2 Acceptance Testing:

- After terminating optical fiber cables the system shall be tested using Tier 1 test format. Tier 1 testing is mandatory. Tier 2 testing, (OTDR testing), is optional.
- Multimode optical fiber attenuation shall be tested on all individual fibers of each cable segment with a nCompass approved certification tester using a LED light source. Test results should include location identification, link attenuation loss, link length and polarity. These tests shall be performed at the 850nm and 1300nm windows in both directions. Test set up and performance shall be in accordance with ANSI/TIA-526-14A, Method B.
- Carefully follow the multimode test procedures as outlined by the nCompass approved certification tester being used. If the optical fiber connector types are the same on both the test equipment and the link under test, a single jumper reference process must be followed as defined in ANSI/TIA-526-14A

5.3.3.3 **Test Results:** Must be completed and turned over to the District prior to active equipment installation. Specific due dates for optical fiber will be established at pre-install meeting.

5.3.3.4 **The Warranty Submittal:** Must be completed online within 10 days of installation completion. Copies of all certification test reports must be submitted as part of the Warranty Submittal. Test results must be kept on file by the registrant to be resubmitted when requested by Supplier. Data must be saved and submitted in raw data and summary formats. The test data shall be submitted via online upload to contractor website. If online upload is unsuccessful, the data can be submitted via e-mail or disc.

5.4 CLEANUP

The communications Contractor shall clean up all debris related communications cabling installation on a regular basis. Protect all equipment from damage during construction. Equipment not protected shall be replaced at the Contractor's expense.