

SPECIFICATION STANDARD OPTICAL FIBER BACKBONE CABLING 27 13 23

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of horizontal optical fiber infrastructure as described on the drawings and/or required by these specifications.
1. Installation, splicing, termination, testing, labeling and documentation of new inter building fiber optic communication cable between buildings as specified and on the drawings.
 2. The installation environment could include tie in and coordination with existing and new optical fiber and copper facilities, underground duct banks, direct-buried conduit, utility tunnel pathways.
 3. The Contractor shall be responsible for: placement of cable, installation and attachment of cable to support devices within the utility tunnel system, underground structures, and pole lines, the placement of conduit, the installation of pull-boxes, the furnishings of fiber optic splice closures, and installation of termination hardware, and other as specified by UNM IT.
 4. Contractor shall be responsible for providing and installing grounding and bonding materials, duct plugs, and fire stopping materials as required completing the installation.
 5. Other incidental hardware and appliances, necessary for the proper performance and operation of the communication cable system, which are consistent with the practices of cable installation, are to be provided by the Contractor as required to complete the installation.
 6. Contractor is responsible to ensure that utility locating has been performed as per the requirements of New Mexico One Call. The Contractor is responsible for any damages to any utility caused during construction. In any area where a utility has been located, work activity must be verified through pot holing.
- B. Coordinate the work in this section with section 27 15 23 OPTICAL FIBER HORIZONTAL CABLING

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- C. The Contractor shall complete all work and turn over a completed and standards compliant optical fiber cabling system to meet the UNM IT network installation system. The scheduled date for completion of optical fiber cabling and associated copper and wireless systems shall incorporate the activation dates for services need to activate all networked services including voice, data, special systems needed for a Certificate of Occupancy, the testing and operation of Building Monitoring Systems, and Electronic Safety and Security Systems.**

1.02 RELATED SECTIONS & REFERENCES

- A. The Contractor is held responsible to be knowledgeable with the provisions contained herein and with other Sections of this Specification as applicable to the completion of the installation. The Contractor is held responsible is assumed to possess the working knowledge, manpower, and materials applicable to the completion of the installation as specified in all specifications within the UNM IT Division 27 standards specifications and in particular the following Section:

1. Division 27, Section 27 00 00 Communications
2. Division 27, Section 271523 Communications Optical Fiber Horizontal
3. Division 27, Section 27 05 26 Grounding and Bonding for Communication Systems.
4. Division 27, Section 27 05 28 Pathways for Communication Systems.
5. Division 27, Section 27 05 53 Identification for Communication Systems.
6. Division 27, Section 27 11 16 Communications Cabinets, Racks, Frames, and Enclosures.
7. Division 27, Section 27 11 19 Communications Termination Blocks and Patch Panels.
8. Division 27, Section 27 11 23 Communications Cable Management and Ladder Rack.
9. Division 27, Section 27 13 13 Communications Copper Backbone Cabling.
10. Division 27, Section 27 13 23 Communications Optical Fiber Backbone Cabling
11. Division 27, Section 27 13 33 Communications Coaxial Backbone Cabling.
12. Division 27, Section 27 15 13 Communications Copper Horizontal Cabling.
13. Division 27, Section 27 08 00 Communications Commissioning, Testing and Acceptance.
14. Division 27, Section 27 05 43 Communications Underground Ducts, Raceways and Structures

- B. Design, install and test data distribution systems per manufacturer's requirements and in accordance with NFPA 70 (National Electric Code), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards and practices.

1. UNM IT Specifications and Standards
2. BICSI TDM, Current Edition

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3. ANSI/TIA-568-C.0, *Generic Telecommunications Cabling for Customer Premises*
4. ANSI/TIA/568-C.1, *Commercial Building Telecommunications Cabling Standard*
5. ANSI/TIA/568-C.2, *Copper Cabling Components Standard*
6. ANSI/TIA/568-C.3, *Optical Fiber Cabling Components Standard*
7. ANSI/TIA/EIA-569-B, *Commercial Building Standard for Telecommunications Pathways and Spaces*
8. ANSI/TIA/EIA-606-A, *Administration Standard for the Telecommunications Infrastructure of Commercial Buildings*
9. ANSI/J-STD-607-A, *Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications*
10. ANSI/TIA-942, *Telecommunications Infrastructure Standard for Data Centers*

The Contractor is responsible to determine and adhere to the most recent edition of these standards when developing their responses and completing the project installation.

1.03 QUALITY ASSURANCE

- A. UNM IT will inspect installation in progress. It is the responsibility of the Contractor to schedule regular and milestone inspection times with UNM IT. It is incumbent upon the Contractor to verify that the installation and material used has been inspected before it is enclosed within building features, buried, or otherwise hidden from view. The Contractor shall bear costs associated with uncovering or exposing installations or features that have not been inspected.
- B. The Contractor will provide electronic test results and a 20 year manufacturer's warranty with a copy of the warranty to be submitted to UNM IT at the completion of work.

1.04 OPTICAL FIBER BACKBONE SYSTEM DESCRIPTION

- A. The main Equipment Room (ER) and each Telecommunications Room (TR) shall house both voice and data backbone cabling and active equipment to support networking requirements. The ER in most cases shall be the main point of entry for outside services as well as main distribution point for all backbone cabling. Fiber optic backbone cable shall be employed between the ER and each TR for voice, data and special systems connectivity.
- B. Optical fiber inter building cabling systems vary depending upon system design, but a 48 fiber SMF cable for large buildings and a 24 fiber SMF cable for medium size building is typical. The size of intra building optical fiber cables is typically 24 SMF cable.
- C. Optical Fibers in the backbone shall be terminated using a pigtailed assembly that have incorporated into those assemblies a LC connector that is fusion spliced to the backbone

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optical fibers, unless otherwise specified and approved by UNM IT; housed in rack-mount fiber optic enclosures with cable supports.

- D. All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. All conductors and fibers of each installed cable shall be verified useable prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed-through couplers, patch panels, and connector blocks shall be repaired or replaced at the providers expense in order to ensure 100% useable conductors in all installed cables.

PART 2: PRODUCTS

2.01 GENERAL

- A. The materials and products specified herein reflect the minimum acceptable standards of fabrication and manufacture.
- B. All materials and products supplied by the Contractor and specified herein are to be new, unused, of first quality and in original packaging or shipping containers.
- C. Provide materials as specified or as approved equivalent by UNM IT.
- D. Match optical fiber glass for tie in to existing optical fibers.
- E. The following manufacturer's warranted systems are approved unless otherwise specified:
 - 1. AMP
 - 2. Belden
 - 3. Berk-Tek
 - 4. CommScope
 - 5. Corning
 - 6. Ortronics
 - 7. Siemons

2.02 SUBSTITUTIONS

- A. Product substitutions shall be managed according to the following guidelines:
 - 1. All substitutions shall be submitted to and approved by UNM IT.
 - 2. Acceptance of substitutions is at UNM IT discretion. UNM IT reserves the right to determine suitability of the substitute product and reject any and all materials submitted for substitution. Submit requests for substitutions in writing to

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UNM IT for approval within 10 days of contract award, or sooner if required to maintain the construction schedule.

1. Products rejected or otherwise judged unsatisfactory by the UNM IT will not be authorized for use in completing the work. Any unapproved products discovered as part of the installation will be removed and replaced with UNM IT specified and approved products at the Contractor's expense.
2. Project Drawings may be based on equipment configuration of a particular manufacturer. If a substitution is approved, the Contractor shall make changes needed to accommodate the substitution at no expense to the University of New Mexico, including work under other divisions.

2.03 OUTSIDE PLANT FIBER OPTIC CABLE

A. General:

1. Single mode fiber is the standard optical fiber media for backbone installations and optical fibers shall be low water-peak, laser optimized, suitable for CWDM use and complies with the ITU G.562.c/d. standard.
2. The cable types listed herein have been selected based on the typical environments and applications. It is the Contractor's responsibility to verify and submit an RFI on cables specified within that do not meet code or the environmental requirements of the project, environmental or code requirements of the installation before purchasing or providing.
3. When splicing into existing optical fibers the Contractor is to ensure the matching of optical fiber glass to the new and existing fibers and install the same glass type and manufacturer to prevent optical fiber mismatch.
4. Single Mode Optical Fiber Specification
 - a. Optical Characteristics – Single-mode fiber optic cable 8.3 μ m/125 μ m single-mode low water peak optical fibers.
 - b. Attenuation: 0.35dB/km @ 1310 nm; 0.25dB/km @ 1550 nm
5. Multi Mode Optical Fiber – When Specified by UNM IT only.
 - a. Install Multi Mode optical fiber when approved and specified by UNM IT.
 - a. Optical Characteristics – OM3 50 μ m/125 μ m laser optimized fibers, for new installations.

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- b. Optical Characteristics – OM1 62.5µm/125µm multimode optical fibers as specified for additions and modifications to existing of the same optical fiber.
- 6. Mechanical Construction – Armored fiber optic cable for direct-buried and conduit installation. Construction shall include: locatable central strength member or an IT approved equivalent, water swell-able yarn, buffer tubes/fibers, water swell-able tape, ripcord, polyethylene inner jacket, high tensile strength, corrugated steel tape armor (for direct buried applications), Polyethylene outer jacket, UV-stabilized jacket or equivalent. Install interlock optical fiber when specified by UNM IT.
- 7. Install orange interlock optical fiber for building backbone distribution.
- 8. Provide optical fiber color codes in compliance with Color TIA/EIA 527-7 and 14.
- 9. Cable shall be assembled to ensure that no more than 12 fiber strands occupy each buffer tube of like fiber strands.

2.04 FIBER OPTIC CONNECTORS

- A. Provide for all new fiber optic installations with fusion spliced LC pig tail connectors. The connectors shall be manufactured by the cabling system manufacturer and composed of the same optical fiber glass as used in the optical fiber cable specified by the project.
- B. When adding to or modifying existing work coordinate connector type with UNM IT.
- C. Multimode connectors, when specified shall be LC pigtailed connectors. They shall all be fusion spliced unless otherwise specified by UNM IT.
- D. Use UNM IT approved color code (no exceptions) for coupler panels as follows:
 - 1. 62.5um couplers - Beige
 - 2. 50um couplers - Aqua
 - 3. SM couplers - Blue

2.05 FIBER OPTIC ENCLOSURES

- A. Wall mounted enclosures shall be approved by UNM IT prior to system design and installation. RFI submittal is required. The enclosure shall be equipped for a fusion spliced pigtail connector installation.
- B. Provide wire management approved by UNM IT to equipment and interconnection enclosures.

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- C. Rack Mount enclosures shall be approved by UNM IT prior to system design and installation. RFI submittal is required. The enclosure shall be equipped for pigtail connector splicing and installation.
- D. Provide one 2RU wire manager, installed per rack at the top and one 2RU wire manager installed in the middle of the rack coordinated with the FDU installation to provide a crossover pathway for optical fiber jumpers.
- E. Provide blank 2RU panel install below the top wire manager.

2.06 OPTICAL FIBER SPLICE CLOSURES

- A. All splice closures shall be approved by UNM IT prior to installation. An RFI submittal to UNM IT is required for all optical fiber splice closures.
- B. Provide splice enclosures that are rated for the environment they are to be installed.
- C. All closures shall be pressure tested. No encapsulate shall be used on fiber enclosures.
- D. Provide Preformed Coyote Fiber Optic Splice Closures Kits or other approved by UNM IT that are sized as required for the maximum fiber count within the splice case including distribution fibers.
- E. Install only the splice enclosure manufacturer's specified splice trays. Splice only 12 fibers per splice tray (no exceptions, unless with written approval prior to installation from the UNM IT project manager).
- F. Splice trays shall be labeled with a permanent label on the front face of each splice tray indicating fiber count.
- G. Support all closures with manufacturers approved brackets.

2.07 INNER DUCT

- A. Aluminum threaded innerduct couplers shall be used to join two segments of corrugated innerduct together. Non-metallic couplers are not acceptable.
- B. All inner duct shall have a measured pull tape rated fro 400 lb pulling tensile.
- C. Each inner duct run shall be of the same manufacturer, model and size.
- D. All runs with cables leaving the building shall be water and gas proof sealed using a method approved by UNM IT.
- E. Innerduct sealing plugs shall be used to seal used and unused innerducts. Use in conjunction with triplex duct sealing plugs.

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2.08 LABELS

- A. Plastic cable labels shall be mechanically printed and shall be attached to all fiber optic cables using black UV rated cable ties or stainless steel cable ties within six inches of the splice closure and 6 " from all ducts and sleeves.
- B. Provide electronically printed, waterproof, self adhesive, laminated labels installable on the external surface of the outside panel of all FDU's and closures.

PART 3: EXECUTION

3.01 OPTICAL FIBER BACKBONE INSTALLATION

- A. General
 - 1. This Section describes the installation for the products and materials, as well as methods and UNM IT Standards associated with the optical fiber backbone installation. These Specifications, along with the Drawings and other UNM IT supplied specifications shall be provided during the course of the installation.
 - 2. The Contractor is instructed to coordinate his efforts with other trades who may be working within the same vicinity to avoid conflicts, lost time, cleaned environment for splicing and termination and potential injury. UNM IT will assist in contractor coordination as requested or as required.
 - 3. The Contractor shall install all materials plumb, square and in a workman-like manner.
 - 4. The Contractor shall supply all necessary tools, equipment, accessories, safety equipment, protective clothing, etc., as customary for the craft and necessary for the installation.
 - 5. The Contractor shall verify space requirements and locations with the project team and UNM IT before starting cable installations and terminations proceed.
 - 6. The Contractor shall verify the cable type and jacket rating required for use with UNM IT before starting the fiber installation.
 - 7. The Contractor shall verify existing cable fill in conduit, raceway or cable tray system prior to quote or bid and before installation of additional cables so as not to exceed 40% cable fill. Contractor will be responsible for installation of additional conduit, raceway or cable tray where additional cables to be added will exceed the 40% cable fill.

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8. The Contractor shall comply with all National, State of New Mexico and local codes and University of New Mexico Policies, Procedures, Standards AND Design Guidelines during the course of installation.
9. Should any portion of these Specifications conflict with applicable Codes, the Contractor shall cease work on that particular aspect of the Project and notify UNM IT immediately.
10. All equipment shall be installed in a neat and professional manner, arranged for convenient operation, testing and future maintenance.
11. All fiber cables shall be installed and terminated / fusion spliced by technicians trained and experienced in the installation and termination of fiber cables.
12. The Contractor shall employ certified system installation technicians and have at least 5 years experience in the installation of similar and equivalent systems.
13. The Contractor shall supply verification of experience, for this type of work, to UNM for approval before performing any work.

B. Field Conditions:

1. The Contractor shall verify fixed facility locations shown on the Drawings are based upon the latest design information available at the time this Specification was prepared.
2. The Contractor shall conduct field inspections to coordinate, verify and/or determine the actual as-built locations of conduits, manholes, handholes and all other special facilities that affect the installation, prior to commencing the installation in any area.
3. All ER/TR's and underground structures including utility tunnels, conduit and manhole systems, handholes and related fixtures shall be kept as clean as possible during installation. Labor required for any cleaning work shall be included in the quote or bid and provided by the Contractor.

C. Pre Cable Installation:

1. Ensure the correct product(s) for the project have been received by the Contractor are compliant to the project's product specification and have approved for installation by UNM IT. The Contractor should verify part numbers and footages on cable reel shipping labels, bills of lading, invoices, etc., shall be compared to the original order upon receipt and before installation.

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2. The Contractor shall inspect fiber optic cable reels for damage upon receipt from the shipper and verify the receipt of the specified product before installation.
3. The contractor should verify the length of the cable both visually and by the results of the OTDR test to verify the project requirements prior to installation.
4. The Contractor will retain the manufacturer's test data and provide it, along with all other specified test documentation to UNM IT at the completion of the Project.
5. All cable that does not meet the project or required UNM IT specification or approved by UNM IT shall be removed and replaced at the contractor's expense.

D. Optical Fiber Installation Within Ductbanks & Innerducts

1. UNM IT-designated conduits. If field conditions prohibit the use of the designated duct, inner duct or multi-cell/sub duct, the Contractor is to contact UNM IT for instructions prior to installation.
2. If existing multi-cell or innerduct duct specified is available, install one fiber cable in each sub-duct.
3. If cable is already installed within a duct without innerduct the Contractor is to contact UNM IT for direction.
4. Install cables in accordance to the manufacturer's approved installation methods, procedures and instructions to ensure warranty compliance.
5. Install measured pull tapes with a minimum of 400 lb pulling tensile in conduits when installing cables or innerduct into occupied conduits.

E. Installation of Optical Fiber within the ER/TR

1. Upon entering the ER/TR the backbone fiber optic cable shall be routed on cable tray to the designated rack location.
2. At least 25 feet of slack cable shall be included and stored as specified and approved by UNM IT. A minimum of 2 times the diameter of the cable minimum bend radius shall be maintained. Cable slack in the TRs shall be contained and routed in the cable tray. Do not coil the cable to achieve the service loop. Store slack as approved by UNM IT.

F. Splicing & Termination

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1. The contractor is responsible to ensure that all outages associated with active cable and equipment is coordinated and approved by UNM IT.
2. Fusion splice optical fibers in accordance to the approved fusion splicer, optical fiber and enclosure manufacturer's methods, procedures and instructions to ensure warranty compliance.
3. All optical fiber shall be neatly and efficiently dressed into splice tray management and the contractor is to ensure that splices are accessible without damage to the optical fibers or splices.
4. The contractor is to ensure that all splice trays are labeled and properly optical fibers, trays secured.
5. The contractor shall test and call for splice inspections of all optical fiber splices before closing cable splice enclosures.

3.02 FIBER OPTIC CABLE TESTING

A. Scope of Work

1. Work covered by this Paragraph shall consist of furnishing labor, equipment and supplies unless otherwise specified, and in performing the following operations recognized as necessary for the successful testing and verification of the installation of the Fiber Optic cable plant described on the Drawings and required by these specifications.
2. Notify the UNM IT 48 hours in advance when work, technicians and equipment are prepared for acceptance tests and inspections. Coordinate a meeting with UNM ITS personnel to discuss the required testing procedures, required performance, test equipment, documentation, etc. to verify to UNM IT a complete understanding of project requirements.
3. Provide technicians are trained and certified in the use of the test equipment used for the testing operations associated with the specified work.
4. Maintain test equipment to manufacturers' requirements, and ensure that all equipment is calibrated according to the manufacturer's requirements. Provide a copy of the current calibration certificate associated with all test equipment associated with the contracted work.

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B. Testing

1. Verify through visual inspection using an optical fiber test scope all fiber optic cable terminations, splices and connecting cables for defects and cleanliness.
2. The fiber optic cables shall be tested utilizing a power meter and stabilized light source capable of testing at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single-mode. Contractor shall complete a fiber optic post installation report at the time of testing containing meter readings at both 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single-mode in one direction (TR to outlet) on each fiber, actual loss and other pertinent data regarding the cables tested, including model and serial number of test equipment, cable part #, installed fiber length, building span loss at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for single-mode and date tested. Testing required is 100%.
 - a. Place a printed copy and provide and electronic copy on a CD of the test results from the tester in a 3-ring binder, proceeded by a tabbed divider and label as "Backbone Fiber": To_____ From_____.
 - b. Span loss calculations are required on the final test sheet for loss at 850 nm and 1300 nm for multimode and 1310nm and 1550nm for Single-mode.
 $(D = \text{Length} \times L = \text{Fiber Loss}) + (C \times \# \text{ connectors Loss}) + (\# \text{ Splices Loss})$

3. Maximum Acceptable Connector Loss Values

Fiber Type	Test Wavelength	Mated Pair Connector Loss (each including fusion splice)
50/125 Multimode	850nm	0.5 dB
50/125 Multimode	1300nm	0.5 dB
62.5/125Multimode	850nm	0.5 dB
62.5/125Multimode	1300nm	0.5 dB
Single-mode	1310nm	0.5 dB
Single-mode	1550nm	0.5 dB

4. Acceptable Fiber Type Test Wavelength Fusion Splice Loss (each)

Fiber Type	Test Wavelength	Splice Loss (each)
50/125 Multimode	850nm	0.25 dB
50/125 Multimode	1300nm	0.25 dB
62.5/125 Multimode	850nm	0.25 dB

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62.5/125 Multimode	1300nm	0.25 dB
Single-mode	1310nm	0.25 dB
Single-mode	1550nm	0.25 dB

5. Testing requirements for Attenuation and Reflection

- a. Acceptable attenuation shall be calculated based upon on connector, type, number of splices and optical fiber length and shall comply with TIA/EIA 526. Attenuation shall not exceed the specified perimeters established by the manufacturer and the requirements of this section
- b. Reflection test perimeter shall not exceed > - 40 db per connector or splice.

6. The total optical fiber segment performance shall not exceed the summation of all the manufacturers components specified performance parameters (Loss Budget) and/ or the combined loss values of components in Section 2.04 of this document.

7. Verify through bi-directional dual frequency power meter testing the attenuation and power loss of each point to point fiber optic strand and connectors. Test method (B) TIA/EIA 526 (7 and 14) is required.

8. Test all inter/intra building optical fiber segments using an OTDR with launch and receiving cables on each end during each test operation.

9. All optical fiber testing shall utilize the manufacturers specified and approved test jumpers and adapters.

10. Optical fiber cable that is left un-terminated at both ends shall be tested using a launch cable and bare fiber adapter.

11. Fiber optic cable that is left un-terminated at one end shall be tested at the connector end using an OTDR.

12. Submit all test results using LinkWare (or other wised approved software by UNM IT) electronic disk formatted test results including trace and length reports directly from the test equipment to UNM IT immediately upon completion of the testing.

13. The Contractor is responsible for ensuring that UNM IT has all necessary software and training required to view and interpret the submitted test results.

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3.03 LABELING

- A. Refer to Labeling Section 27 05 53 Identification for Communication Systems.
- B. Fiber Color Code approved for sequencing follows:

Number	Color
1	Blue
2	Orange
3	Green
4	Brown
5	Slate
6	White
7	Red
8	Black
9	Yellow
10	Violet
11	Rose
12	Aqua

3.04 AS-BUILT INFORMATION

- A. Contractor shall provide as-built information to UNM IT to accompany all test result information.
- B. As-built information shall be in electronic format in AutoCAD, the most current version... Indicate location of all outlets, distribution cable trays, junction boxes, FDU with configuration, optical fiber cable equipment rack layout with cable designators and counts and all additions and deletions pertaining to the backbone optical fiber cabling system.
- C. Contractor shall provide one set of preliminary as-built information, splice diagrams and test results including all test result information 30 days prior to occupancy to ensure the scheduled installation and activation of UNM IT equipment and services.
- D. Failure of the contractor to provide the required as-built information in a timely manner for UNM IT to prepare cutover information may cause an installation delay**

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for the project due to the contractors not meeting these requirements. The delivery of the as-built documentation needs to be coordinated with UNM IT as a project milestone.

- E. Partial as-builds shall be submitted as additional cabling is completed to meet installation schedules.
- F. The Contractor shall provide at substantial completion a list of all uncompleted work and a punch list of open items to the IT Facilities Manager at substantial completion and prior to UNM scheduled activations.
- G. If construction drawings are not utilized, contractor shall provide all telecommunications location information on an accurate and electronic formatted scaled floor plan preapproved by UNM IT.
- H. Partial as-builds shall be submitted as additional cabling is completed to meet installation schedules. The Contractor shall provide one set of preliminary as-build information, equipment layouts including elevations and test results to meet the schedule requirements of the UNM IT equipment installation and activation.
- I. As final submission, provide a CD with 2 copies of the IBNS in Excel format one copy shall be locked and the second shall be in an open, searchable format. Provide floor plans with outlet locations and ID's in Auto Cad and Complete Test results (not just summary sheet) in LinkWare.
- J. The final as-built shall be submitted with all corrections made no later than 30 days after cabling installation is completed.

3.05 SYSTEM WARRANTY

- A. Contractor shall provide a 20-year extended manufacturer's warranty in addition to the contractor's warranty provided to the project. The warranty shall be titled to the UNM IT Department. The warranty shall begin at the system acceptance date and remain in effect for a period of 20 years from that date.
- B. The umbrella warranty provided for the optical fiber backbone cabling system shall be issued by the manufacture of the cabling system. The contractor shall provide to UNM IT any additional warranties from partners in addition to the cabling system warranty, i.e. cable manufacturer, contractor warranties. Acceptable manufacturer warrantees include:
 - 1. AMP.
 - 2. Belden.
 - 3. CommScope/Systimax/Uniprise.
 - 4. Ortronics
 - 5. Siemons

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6. Corning

- C. All installed systems must conform to the manufacturer's official published specifications. Any exceptions agreed to by the contractor and the manufacturer shall be approved by UNM IT. The contractor shall submit in writing and obtain approval from UNM IT for all exceptions pertaining to the cabling system's warranty prior to the request being submitted to the manufacturer.
- D. The warranty shall include a warranty of the applications published by the manufacturer at the time of the warranty application. The contractor is to provide to UNM IT a list of these applications.
- E. The contractor will provide UNM IT with a copy of the warranty application at the time of submittal to the manufacturer.
- F. Contractor shall perform all labeling requirements and provide testing documentation for verification and submittal to the manufacturer and UNM IT. A copy of the warranty application and all documentation and test results shall be submitted simultaneously to UNM IT and the manufacturer.
- G. Contractor shall provide complete as-built copies intra and inter building cable and infrastructure plans sent to the manufacture showing final locations of all FDU's and splice enclosures prior to submission of the warranty application. The contractor is to ensure that the warranty submittals match the submitted as-built.
- H. Contractor shall submit for the warranty all cable records to reflect moves, adds, and changes as built.
- I. The contractor shall include and schedule UNM IT in all site surveys and inspections that relate to the warranty application or processes.

END OF SECTION