

SECTION 27 13 00 COMMUNICATIONS BACKBONE CABLING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes communications backbone cabling (fiber optic backbone and associated terminations), including intra-building and inter-building backbone cabling where indicated.

1.2 SUBMITTALS

A. Product data for backbone cables, termination hardware, enclosures/panels, and accessories.

B. Where OSP/backbone routing is included, submit pull plans and pathway coordination deliverables required by this Section.

C. Written manufacturer confirmation of warranty eligibility for the proposed backbone fiber and copper components, per Section 27 05 00 §1.3.F.

PART 2 – PRODUCTS

2.1 FIBER MEDIA AND CONNECTIVITY POLICY (CAMPUS STANDARD)

A. Outside the Data Center: Provide OS2 single-mode fiber terminated LC duplex for new backbone and inter-building trunks unless otherwise directed by Owner.

B. Data Center only (Stratton Administration Building): OM4 multimode fiber and MPO/MTP connectivity may be provided where specifically indicated on the drawings. OM4 and MPO/MTP are not permitted outside the Data Center for new work.

Note: Currently, OM4 is deployed for short runs within the Stratton Administration Building Data Center(s) only.

C. Fire Alarm System ONLY: legacy OM1 (62.5/125) is permitted only for fire alarm interface work coordinated under Division 28; OM1 is not permitted for new data network deployments.

2.2 FIBER OPTIC CABLES (PLENUM RATED)

A. Manufacturers: Provide products from manufacturers maintaining a documented quality management system (e.g., ISO 9001) for consistent manufacturing and traceability.

B. Data Center Only – OM4 Multimode (plenum): KU Campus Standard: Superior Essex TeraFlex® 10G-500 Multimode fiber, P/N 44012PG01 (OM4 OFNP plenum rated, 12 strand).

C. Intra-building / premises backbone (outside the Data Center) – OS2 Single-Mode (plenum): KU Campus Standard: Superior Essex TeraFlex® G.657.A1 Single-Mode fiber, P/N 44012K101

(OS2 OFNP plenum rated, 12 strand, indoor premises distribution / tight-buffered). This indoor premises cable applies to intra-building MDF-to-IDF or closet-to-closet backbone extensions only. Provide 12-strand OS2 as the basis of design for intra-building MDF-to-IDF or closet-to-closet extensions unless the Drawings or KU IT indicate a different strand count. For continuous outside-plant runs from the Data Center through the campus duct/manhole system, do not use this indoor premises cable; provide the Indoor/Outdoor water-blocked plenum cable specified in §2.3.

- D. Fire Alarm System ONLY (Division 28 scope) – OM1 Multimode (plenum): KU Campus Standard: Superior Essex TeraGain® 62.5 micron multimode fiber, P/N 440126G01 (OM1 OFNP plenum rated, 12 strand, indoor premises distribution / tight-buffered). and Division 28 coordination requirements. Provide 12-strand OM1 as the basis of design and minimum cable size for OM1 fire-alarm interface runs unless KU IT directs a larger strand count before bid after review of the Division 28 fire-alarm fiber-link requirements. Division 28 identifies the required active fiber pairs/strands, connector type, and fire-alarm equipment interface; KU IT confirms the final OM1 cable strand count for campus maintainability and spare capacity. Where more than 12 OM1 strands are required, size the cable per the strand-count rule of §2.2.G. The Contractor shall furnish and install this OM1 fiber only when required for fire alarm interface work. This indoor premises OM1 cable applies to intra-building runs only; where OM1 fire-alarm fiber is routed from the Data Center through the campus duct/manhole system, provide the Indoor/Outdoor water-blocked plenum OM1 cable specified in §2.3. Division 27 shall test the installed OM1 fiber as a Tier 1 optical loss (OLTS) measurement at 850 nm and 1300 nm in accordance with Section 27 08 00, with terminations and test results coordinated with Division 28 and the AHJ.
- E. Fire Alarm System ONLY (Division 28 scope) – OM1 termination method (field-terminated or pre-terminated, at the Contractor's option): OM1 fire-alarm fiber may be field-terminated from bulk cable (Paragraph D) by the manufacturer-certified Installer, or provided as pre-terminated factory assemblies, whichever is better suited to the run and as coordinated with Division 28 and KU IT. Where pre-terminated assemblies are used, KU Campus Standard: Legrand part numbers listed below.
1. P/N C010220207AFDY100F (OM1, LC-SC, A-B straight-through polarity, 12 strand, 100 ft).
 2. P/N C010300207AFDY100F (OM1, LC-ST, 12 strand, 100 ft).
 3. P/N C010120207AFDY100F (OM1, LC-LC, A-B straight-through polarity, 12 strand, 100 ft).
- F. Description (tight-buffered plenum): Single unit, single jacket, RoHS-compliant design; strand count as specified in Paragraphs B through D and on the Drawings; tight-buffered 900 µm fibers; dielectric aramid yarn strength members; OFNP flame-resistant outer jacket; suitable for LC connectors. Where a campus-standard part number is listed in a specific strand-count configuration, it establishes the required cable family, construction, listing, and

performance characteristics; provide the strand count shown on the Drawings for the specific run.

- G. Strand counts: OS2 single-mode fiber strand counts shall be as indicated on the Drawings and confirmed with KU IT. Unless otherwise indicated, OS2 OSP campus duct/manhole runs use a 24-strand basis of design, and intra-building MDF-to-IDF or closet-to-closet OS2 extensions use a 12-strand basis of design. OM1 fire-alarm strand counts are coordinated with Division 28 and KU IT under Paragraph D. Where OM1 is the fire-alarm medium, OM1 fire-alarm runs use a 12-strand basis of design and minimum cable size (from the MDF/IDF to the field housing serving the fire alarm control panel, per Paragraph H) unless KU IT directs a larger strand count before bid based on Division 28 requirements and campus spare-capacity considerations. Division 28 identifies the required active fire-alarm fiber pairs/strands and connector type; KU IT confirms the final installed cable strand count so that spare capacity remains available for field failure, restoration, and future maintainability. Where more than 12 OM1 strands are required, size the cable to the next available six-strand increment above the Division 28 requirement, or to the next standard cable size directed by KU IT. Where the fire alarm system supports single-mode optics, the medium and strand count are as directed by Division 28 and confirmed by KU IT before bid. Plenum-rated cable shall be used for all projects unless prior approval for non-plenum/riser is granted.
- H. OM1 fire-alarm termination topology and field housing (Division 28 coordination): Unless otherwise directed by Division 28 and KU IT, terminate OM1 fire-alarm fiber as follows:
1. MDF/IDF end: Terminate the OM1 fiber LC in the primary (MDF/IDF) fiber housing on an OM1 multimode LC adapter panel (KU Campus Standard: Ortronics OFP-LCD12MB — beige, phosphor-bronze sleeves) per Section 27 11 19 §2.2.
 2. Field housing: Route the OM1 fiber to a fiber housing located near the fire alarm control panel. KU Campus Standard: Ortronics Q-Series standard-density wall-mount fiber enclosure, P/N WQS-02P, fitted with OM1 multimode adapter/bulkhead panels matching the fire alarm system connector type — SC: Basis of Design OFP-SCD12MB; ST: Basis of Design OFP-STD12MB. The OM1 run between the MDF/IDF and the field housing is LC at the MDF/IDF end and SC or ST at the field-housing end, provided either as a field-terminated run (Paragraph D) or a pre-terminated assembly (Paragraph E).
 3. Patch cord: Provide a matching OM1 patch cord (SC-to-SC or ST-to-ST) from the field housing to the fire alarm panel as required by the fire alarm equipment.
 4. Adapter color and sleeve (deliberate OM1 requirement): OM1 adapter panels shall be the beige, phosphor-bronze-sleeve (legacy multimode) type; do not substitute aqua, ceramic-sleeve panels, which are intended for laser-optimized OM3/OM4 multimode. The LC duplex campus standard applies at the MDF/IDF; the SC/ST transition is specific to the fire alarm interface.

5. Confirmation (hold point): Confirm the fire alarm connector type (SC or ST), adapter-panel configuration, and patch-cord type with Division 28 and KU IT prior to ordering and installation.

2.3 OUTSIDE PLANT (OSP) / CAMPUS DUCT & MANHOLE FIBER (CONTINUOUS RUNS)

- A. Where new fiber optic cables are routed from the Data Center (Stratton Administration Building) to the project site through the campus duct bank / manhole system, provide water-blocked fiber optic cable suitable for underground conduit and wet vault environments, installed as a continuous cable run where feasible (no building-entry splice) as directed by KU IT.
- B. Manufacturer and KU Campus Standard: Superior Essex W-Series “Dry Block, Sunlight Resistant, Indoor/Outdoor” OFNP plenum cable — OS2 single-mode TeraFlex® G.657.A1, P/N W4024KK01 (24-strand basis of design), and OM1 (62.5/125) multimode TeraGain®, P/N W40126G01 (12-strand basis of design) — all-dielectric, dry-block (gel-free) water-blocked, sunlight/UV-resistant, OFNP plenum, black jacket. Contractor shall verify current part number, configuration, and availability with the manufacturer or authorized supplier prior to ordering. Listed OS2 and OM1 strand counts establish the campus-standard strand count for the cable family/construction; provide the strand count shown on the Drawings for each run, using the same cable family/construction or an approved equal meeting all requirements of this Section. Proposed project-specific deviation OSP fiber shall be submitted with a project submittal documentation and supporting documentation demonstrating equivalency and compatibility with campus standards. KU IT review/acceptance is limited to verifying documented equivalency, compatibility with existing campus infrastructure, and pathway risk/constructability. Acceptance shall not be unreasonably withheld where the project submittal documentation demonstrates compliance with the salient characteristics and all “shall” requirements of this Section. If KU IT does not accept a proposed “project-specific deviation,” KU IT shall provide the basis for non-acceptance in writing identifying the specific requirement(s) not met.
- C. Fiber types by use: (1) Data network (campus standard): OS2 single-mode fiber. (2) Fire Alarm system ONLY (Division 28 coordination): OM1 (62.5/125) multimode fiber permitted only where specifically required for fire alarm interface work and approved by KU IT and the AHJ. The Contractor shall furnish and install OM1 fiber when required for fire alarm interface work (Division 28 coordination).
- D. Listing / fire rating for continuous runs: Provide Indoor/Outdoor fiber optic cable that is plenum rated (OFNP). OFNP is required to support routing through plenum/environmental air spaces where present and to support continuous cable runs into building spaces without reliance on unlisted OSP allowances.

Note: This reflects KU campus practice to support continuous plenum routing without transitions.

- E. OSP suitability / wet environment: Provide tight-buffered, dry-block (gel-free) water-blocked construction with a sunlight/UV-resistant jacket suitable for campus duct and manhole environments, meeting the Indoor/Outdoor plenum (OFNP) performance requirements of ICEA S-104-696 so the cable is rated for both wet underground pathways and continuous plenum routing per Paragraph D. Loose-tube gel-filled outside-plant cable is not used for these runs, because such cable is not plenum-rated and would force a building-entrance transition contrary to Paragraph D. Provide construction and materials suitable for underground duct installations consistent with customer-owned campus OSP standards and OSP cable performance requirements (e.g., ANSI/TIA-758 and ANSI/ICEA S-87-640).
- F. All-dielectric basis and pathway review (hold point): The campus OSP is a duct-bank and manhole system with innerduct (Paragraph J), and there is no direct-buried cable; the conduit and innerduct provide the mechanical and rodent protection for the cable. Provide all-dielectric (non-armored) Indoor/Outdoor plenum construction as the basis of design for the continuous duct/manhole runs. All-dielectric construction also avoids armor bonding/grounding and supports the continuous, no-splice plenum routing required by Paragraph D. Prior to pulling, the Contractor shall review conduit/innerduct pathways, available free space, and pull-route conditions with KU IT (hold point). Armored cable is not required for in-duct runs. Armored construction applies only to a direct-burial segment installed without conduit (none currently anticipated on the campus duct/manhole system); where KU IT designates an armored cable for such a segment before bid and it is shown on the Drawings (Section 27 05 00 §1.11.B), the armored outside-plant cable is not plenum-rated, so provide a listed transition to plenum-rated cable at the building entrance for that segment, and identify any such directed armored segment and its added cost in the applicable bid breakout, unit price, or approved change documentation where the procurement format and the Contract Documents allow.
- G. Pre-pull pathway condition assessment (hold point): Prior to pulling new fiber through existing campus duct/manhole pathways, the Contractor shall coordinate with KU IT to verify the pull route, confirm available free space, identify existing cable congestion, and document obstructions or conditions that may damage existing plant. Provide a pull plan and mitigation approach (e.g., staged pulls, innerduct use, alternate route) for KU IT review before installation. The condition assessment shall be documented and provided to KU IT and the Project Manager, so that the pathway condition known before the pull is on record. Where, during the pull, a pathway is found blocked, crushed, water-filled, collapsed, or otherwise not usable as expected, the Contractor shall stop work in that pathway, protect existing plant, and promptly notify KU IT and the Project Manager rather than force the pull. Responsibility for corrective work on a pathway condition beyond what the documented pre-pull assessment disclosed is determined under the Division 01 change process in light of the documented conditions and the nature of the pathway; this Paragraph does not by itself assign that cost or time to either party.

H. Splices and mid-span enclosures (default: none): Provide continuous cable runs without mid-span splices wherever feasible. Do not install mid-span splices, splice cases, or building-entry splice points unless specifically directed in writing by KU IT. Where splicing is approved, provide a rated splice enclosure, slack storage, and labeling, and include the splice location(s) and enclosure details in the as-built documentation. I. Slack/storage (minimum): Provide service loops/slack sufficient for termination, future re-termination, and emergency restoration. Unless otherwise directed by KU IT, provide a minimum of 30 feet of slack at each building entrance/telecom room termination and provide slack storage at intermediate access points (e.g., manholes/handholes) where approved for restoration planning. J. Innerduct / cable protection (where applicable): Where routing through existing duct bank/manhole systems, provide innerduct or other cable protection/separation where space and pathway conditions allow. Coordinate innerduct sizing/quantity with KU IT during the pre-pull pathway review. K. Pull plan (deliverable): Prior to any pull through existing campus duct/manhole pathways, submit a pull plan to KU IT identifying route, pull direction, equipment (including tension monitoring where used), intermediate access points, protection measures for existing plant, restoration/contingency steps if a pull must be aborted, and the location of any manholes, handholes, or vaults in parking lots, drive lanes, or pedestrian ways together with the proposed work-area access and protection approach for each (see Paragraph L). L. Work-area access and traffic protection (coordination): Where OSP work requires opening or working in manholes, handholes, or vaults located in parking lots, drive lanes, roadways, or pedestrian ways, the Contractor shall identify each such location in the pull plan (Paragraph K) and shall coordinate work-area access and any parking-space, lane, or area closure through KU's project manager in advance of the work. KU's project manager coordinates the campus-side arrangements — including any required space or lane closure, coning, or barricading — with University Police / Public Safety and Parking Services. The Contractor remains responsible for furnishing and maintaining its own work-zone protection, barricades, signage, and pedestrian and vehicle safety measures in accordance with the General Requirements (Division 01) and applicable OSHA and traffic-control standards; this Paragraph establishes the coordination interface only and does not relieve the Contractor of those obligations. No parking-space, lane, or area closure shall be established, and no work in these locations shall begin, until coordination with KU's project manager is complete. Schedule work in these areas with KU to minimize disruption to campus operations, events, and peak-demand parking periods.

2.4 INTER-BUILDING BACKBONE CABLE – VOICE [DELETE IF NOT APPLICABLE]

PROJECT DECISION REQUIRED BEFORE BID. Conditional section (matched set) — retain or delete per the analog telephone serving option designated in Section 27 32 26 §2.1.F, and resolve together with building entrance protection (Section 27 11 19 §2.4) as a matched set per Issue Checklist C.5; otherwise delete this section in its entirety.

A. Verify with KU IT whether a dedicated copper voice backbone (e.g., 25-pair) is required for the project. Provide where indicated on the drawings or when approved in writing by KU IT,

including where required to serve analog telephone endpoints (e.g., emergency telephones, elevator telephone lines) per Section 27 32 26.

PART 3 – EXECUTION

3.1 INSTALLATION (GENERAL)

A. Install backbone cabling in accordance with ANSI/TIA-568 series, ANSI/TIA-569, ANSI/TIA-606, ANSI/TIA-607, and manufacturer instructions.

B. Maintain manufacturer minimum bend radius and maximum pulling tension at all times. Do not kink, crush, or deform cable; replace damaged cable.

C. Route cabling in designated pathways and provide support at intervals appropriate to the pathway system. Do not rest cabling on ceiling grid or other non-structural elements.

D. Provide service loops and slack storage in accordance with Section 27 13 00 requirements and KU IT direction; manage slack neatly and protect from damage.

E. Bond/ground metallic backbone pathways and hardware in accordance with Section 27 05 26, ANSI/TIA-607, and applicable codes.

3.2 TERMINATION AND IDENTIFICATION

A. Fiber Optic Backbone Termination.

1. Enclosure requirement: Terminate each backbone fiber optic cable in an approved fiber optic enclosure/housing at both ends of the run and maintain polarity per manufacturer requirements. Enclosures shall include adapter/bulkhead panels, strain relief, slack management, and labeling as required for a complete termination. Provide rack-mounted enclosures in telecommunications rooms and the Data Center; provide wall-mounted or rack-mounted enclosures as applicable at field/equipment locations. See the field-housing topology in Section 27 13 00 §2.2.H.

2. Prohibited termination methods and patch cord rule: Fiber shall not be left as a loose or bare connectorized cable extending from a conduit, pathway, ceiling, wall, or equipment location for direct connection to a device. Factory-terminated assemblies, pigtails, or connectorized cable ends shall not bypass the required enclosure/housing. Connection from the enclosure to active equipment, fire alarm interfaces, or other end devices shall be made with patch cords/jumpers from the enclosure adapter panel, unless specifically indicated otherwise in the Contract Documents and approved by KU IT.

B. Label backbone cabling per Section 27 05 53 and submit as-built records per Section 27 08 00.