1 General

1.1 Scope of work

1.1.1 The extent of the Interbuilding CATV Cabling Installation (The Project) will include the following as shown on the Drawings or as Specified herein.

1.1.2 Installation, testing, labeling and documentation of new interbuilding CATV cable between buildings as specified herein and on the Drawings.

1.1.3 The installation environment will include existing BDFs, existing underground concrete encased duct, existing direct-buried conduit, existing utility tunnel pathways, as well as areas of Purdue University property which will require directional boring, and/or trenching to facilitate direct burial of cable and conduit to be completed by the Contractor. The Contractor shall not be responsible for the installation of concrete-encased ducts, or utility tunnels.

1.1.4 The Contractor shall be responsible for placement of cable, attachment of cable to support devices within the utility tunnel system and underground structures, placement of conduit, metallic pull boxes (NEMA Type 3R), furnishing CATV splice closures and performance of splices, installation of termination hardware and enclosures, termination of CATV cable, labeling, testing and documentation of the work.

1.1.5 The Contractor shall be responsible for the provision of grounding and bonding materials, duct plugs, and fire-stopping materials as appropriate. Other incidental hardware and appliances necessary for the proper performance and operation of the communication cable system, which are consistent with the practices of underground cable installation, are to be provided by the Contractor at no additional charge to the Owner.

1.2 Quality Assurance

1.2.1 Verification: The Purdue IT Infrastructure Services Department will maintain inspection personnel to visit the job site. 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.

1.3 Substitutions

1.3.1 Submit requests for substitutions within 10 days of contract award, or sooner if required to maintain the construction schedule.

1.3.2 The Contractor must submit sufficient information to show that a proposed substitute is equivalent to the item specified. Acceptance of substitutions is at the discretion of the Purdue IT Infrastructure Services Representative; this Representative reserves the right to determine suitability of the substitute product and reject any and all materials submitted for substitution. All substitute products and materials must be approved for substitution by the Purdue IT Infrastructure Services Representative in writing prior to installation. Products rejected or otherwise judged unsatisfactory by the Purdue IT Infrastructure Services Representative 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 Purdue IT Infrastructure Services Department-specified and approved products at the Contractor’s expense.

1.3.3 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 Purdue University, including work under other divisions.

1.4 Intent of the drawings and specifications

1.4.1 Where specified only by reference standards, select any product meeting standards by any manufacturer.

1.4.2 Where specified by naming several products or manufacturers, select any product and manufacturer named that meets the specified requirements. Other products and manufacturers will not be considered.

1.4.3 Where specified by naming one or more products or manufacturers, select any product and manufacturer named in the preferred quality standard. The Contractor may submit a request for another product for acceptance.

1.4.4 Where specified by naming only one product and manufacturer: “There is no option and no substitution” will be allowed.

1.5 Communication

1.5.1 It is Purdue’s expectation that the A/E of Record will work jointly with Purdue’s Telecommunication representatives to address specific technical issues and Owner requirements.

1.5.2 All questions, deviations, comments concerning guideline(s) interpretation, content,
PHYSICAL FACILITIES
2020 Consultant’s Handbook Specifications
Division 27 Communication
1333 Coaxial Backbone Cabling

2 Products

2.1 General

2.1.1 The materials and products specified herein reflect the minimum acceptable standards of fabrication and manufacture. 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.

2.2 Outside Plant CATV Cable

2.2.1 The Project will require the installation of outside plant CATV cable in various outside plant environments. The cable types listed herein have been selected based on these environments and applications.

2.2.1.1 Mechanical Construction – OSP CATV Cable

- Polyethylene Jacket where jacketed cable required
- Aluminum Outer Jacket
- Dielectric Adhesive
- Dielectric
- Copper Center Conductor
- Migra-Heal Flooding Compound where required

2.2.2 Manufacturer shall be:

2.2.2.1 CommScope #P3500JCASS for underground/direct buried installations

2.2.2.2 CommScope #P3500JCAM109 for self-supporting aerial installations

2.2.2.3 CommScope #P3500CA for aerial installations utilizing lashing techniques

2.3 CATV Termination Connectors

2.3.1 For OSP CATV terminations within the BDF, use LRC #SI500K3, “K” series, two piece splice connectors.

2.3.2 For OSP CATV terminations within an amplifier, use LRC #EI500K3 “K” series, two piece PIN type connector. Coordinate with Physical Facilities Electronics Shop before disturbing existing amplifiers.

2.4 CATV Splice Connectors

2.4.1 For OSP CATV splices, use LRC #SI500FFK3, “K” series, two piece splice connectors.

2.5 Termination within the Telecommunication Room (BDF)

2.5.1 All OSP CATV cables shall be terminated in the BDF as described in Item 2.01, C.1.

2.5.2 Install (1) Belden #GBSNS1P6K, 5-1500MHz, grounding block in the BDF. Coordinate termination location of the OSP CATV cable within the BDF with an ITIS Representative.

2.5.3 Install RG-6 type cable, terminated on both ends with Thomas Betts Part #SNS6 snap-n-seal connector as described in Sections 271533 and 271543, between the OSP CATV cable and the lightning arrester.

2.5.4 Install Green #6 AWG insulated copper grounding conductor from the grounding block to the BDF ground bus bar.

2.6 HDPE

2.6.1 HDPE will be installed in specified ducts as indicated herein. HDPE shall be either:

2.6.1.1 Molded 1-1/4 inch orange HDPE and be of smooth walled configuration. Each HDPE placed by the Contractor shall have 1250lb pull tape placed within the HDPE secured at each end. Locatable 1250lb pull tape shall be installed in at least one HDPE of an empty HDPE group.

2.7 HDPE Couplers

2.7.1 HDPE push-on, locking, and airtight couplers shall be used to join two segments of smooth walled HDPE together.

2.8 Duct Plugs

2.8.1 Split Triplex Duct Sealing Plugs to be installed in 4-inch ducts containing Contractor-installed 1-1/4 inch HDPEs.

2.8.2 HDPE Sealing Plugs to be used to seal unused ducts. These are to be used in conjunction with triplex duct sealing plugs.

2.9 CATV Cable Labels

2.9.1 Brady #PTL-8-439WH, 1/2” White Labels

2.10 Cable Support – J-Type Pipe Hangers

2.10.1 B-Line #BCH32 or Owner approved equal, 2” J-Hook, sized appropriately.
Execution

Telecommunications Installation

General

3.1.1.1 This Section describes the installation locations for the products and materials, as well as methods and Owner's Standards associated with the Telecommunications Installation portions of the Project. These Specifications, along with the Drawings and other Owner-supplied specifications shall be followed during the course of the installation.

3.1.1.2 The Contractor is instructed to coordinate his efforts with other tradesmen who may be working within the same vicinity to avoid conflict, lost time and potential injury. The Owner will assist in coordination as requested or as required.

3.1.1.3 The Contractor is to install all materials plumb, square and in a workman-like manner.

3.1.1.4 The Contractor is required to supply all necessary tools, equipment, accessories safety equipment, protective clothing, etc., as customary for the craft and necessary for the installation.

3.1.1.5 The Contractor shall comply with all National, Indiana State, Local and Purdue University Codes and Standards during the course of installation. Should any portion of these Specifications conflict with said Codes, the Contractor is to cease work on that particular aspect of the Project and notify the Owner immediately.

Field Conditions

3.1.2.1 Fixed facility locations shown on the Drawings are based upon the latest design information available at the time this Specification was prepared. The Contractor shall conduct field inspections to 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.

Cleanliness

3.1.3.1 All BDFs, Underground structures to include utility tunnels, conduit and manhole systems, handholes and related fixtures shall be kept as clean as possible during installation.

3.1.3.2 Labor required for any cleaning work shall be provided by the Contractor.

Completion

3.1.4.1 BDFs and Underground structures which include utility tunnels, conduit and manhole systems, handholes and related fixtures, shall be thoroughly cleaned, flushed out, or blown out before the installation is offered to the Owner for acceptance.

Temporary Work

3.1.5.1 Temporary labels, temporary protection and related items shall be removed and the entire installation left in a clean, usable condition.

CATV HDPE Installation

3.2.1 Refer to the Project Drawings as applicable for routing

Duct/Conduit Preparation

3.2.2 All ducts and conduits intended for use as a pathway will be blown out with compressed air or brushed out to remove dirt, water, and other residue prior to cable and HDPE installation.

HDPE Installation

3.2.3 HDPEs are to be contiguous sections end to end. If it is absolutely necessary to splice HDPE together, use HDPE couplers as specified herein.

3.2.4 Secure HDPE pull ropes by cutting a slit into the excess duct and wedging the pull rope in the slit. Tie off excess slack around the duct.

3.2.5 Install a triplex duct plug into each end of the duct used according to the manufacturer's instructions.
3.2.3.6 Install a simplex duct plug over the cable and secure the plug as instructed by the manufacturer.

3.2.3.7 Install a blank plug in unused HDPEs.

3.3 CATV Installation

3.3.1 General for cable installation within ductbanks:

3.3.1.1 Cable is to be installed in Owner-designated ducts.

3.3.1.2 If field conditions prohibit the use of the Owner-designated duct, the Contractor is to select a duct for use and coordinate his selection prior to cable installation with the Purdue IT Infrastructure Services Department.

3.3.1.3 If multi-cell duct is available, install one cable in each sub-duct.

3.3.1.4 If no multi-cell duct is available, the Contractor is to install 3 HDPEs into a single duct. One cable is to be installed within each HDPE. If cable is already installed within a duct without HDPE, new cable is to be pulled into the duct (also without HDPE) along with existing cables, provided that the new cable can be pulled without damage to itself or to other cables already in place.

3.3.2 Description – Primary CATV Cable Backbone Route

3.3.2.1 As described herein and/or as shown on the Drawings.

3.3.3 Splicing of CATV Cable

3.3.3.1 Where required as part of the installation, the Contractor shall perform splices of CATV cable.

3.3.3.2 Where direct buried underground splices are required, install Canusa #CFTV-1300 selective adhesive filled heat shrink around the splice, extending 6 inches beyond the connectors on each end.

3.3.3.3 Prior to sealing the splice(s) with the heat shrink, a Representative from the Purdue IT Infrastructure Services Department shall inspect the splice.

3.3.4 The CATV splice shall be sealed to be air and water tight as specified by the manufacturer.

3.3.4 Installation of CATV Cable within the BDF

3.3.4.1 Routing of cable and cable slack

3.3.4.1.1 Upon entering the BDF, the CATV cable shall be routed to the termination location as shown on the drawings or as directed by a Purdue ITIS Representative.

3.3.4.1.2 The cable is to be secured to the BDF wall or other specified location using cable ties or brackets.

3.3.4.1.3 If cable ties are used, they shall be pulled snug, without deforming the jacket of the cable.

3.3.4 Installation of CATV Cable within the BDF

3.4 CATV Cable Installation

3.4.1 Scope of Work

3.4.1.1 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 CATV cable plant described on the Drawings and required by these specifications.

3.4.1.2 In addition, the Contractor shall:

3.4.1.2.1 Verify through continuity testing as well as visual inspection of the quality of the CATV cable being installed.

3.4.1.2.2 Verify acceptable installed cable attenuation utilizing a spectrum analyzer and existing CATV signal. Coordinate with Physical Facilities before connecting to the existing system.

3.4.1.2.3 Verify through visual inspection of all CATV termination locations on drawings, the integrity of the workmanship and the operability of the CATV media.
3.4.2 Contractor Responsibility:

3.4.2.1 The Contractor shall:

3.4.2.1.1 Complete quality control inspection and testing per this Specification.

3.4.2.1.2 Notify the Purdue IT Infrastructure Services Department when work, technicians and equipment are prepared for acceptance tests and inspections.

3.4.2.1.3 Coordinate testing with the Purdue IT Infrastructure Services Department beforehand to avoid delays in the Project schedule.

3.4.2.1.4 Maintain written record of tests pertinent for each CATV run and upon completion of testing, assemble and certify a final test report. Report to include attenuation values at specific frequencies as well as length measurements.

3.4.2.1.5 Maintain safety procedures and discipline when testing equipment and cabling that contains voltage.

3.4.3 Test Equipment

3.4.3.1 Contractor shall test the installed CATV cable utilizing a contractor furnished spectrum analyzer.

3.4.3.2 Contractor shall submit hand written documentation of the attenuation values at the following center frequencies:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>83</td>
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<td>30</td>
<td>259</td>
</tr>
<tr>
<td>39</td>
<td>313</td>
</tr>
</tbody>
</table>

3.4.4 Acceptance Procedures:

3.4.4.1 The following acceptance practices will be followed to ensure that should the incorrect products be received, should damage to the cable have occurred during shipping and handling; the Contractor can reorder replacement materials as soon after determination of the product’s unsuitability as possible to minimize the impact to the installation schedule.

3.4.4.2 The Contractor shall visually inspect CATV cable reels for damage upon receipt from the shipper.

3.4.4.3 Part numbers on cable reel shipping labels, bills of lading, invoices, etc., shall be compared to the original order.

3.4.4.4 Cable lengths should be verified.

3.4.5 Field Testing Procedures

3.4.5.1 The Purdue IT Infrastructure Services Department is to be notified at least 24 hours prior to testing to allow observation at the Owner's discretion. If the Purdue IT Infrastructure Services Representative confirms their intention to observe, a reasonable starting time will be agreed upon. Should the Representative not be present at the scheduled commencement time, the Contractor may begin testing as scheduled.

3.4.6 Maximum Acceptable Attenuation Values

3.4.6.1 Refer to section 2.2.1.3 for maximum acceptable attenuation values.

3.4.6.2 Each connector used will add .2dB insertion loss typical.

3.5 Labeling

3.5.1 Each CATV Cable installed by the Contractor shall be labeled per Purdue ITIS