

# **THE WILLIAM PATERSON UNIVERSITY OF NEW JERSEY**

**Main Campus – Carriage House  
Wayne, New Jersey**

**PROJECT MANUAL  
Project # WP-20-03-99**

**Architect**

Peter Johnston, Architect, PC  
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Hoboken, NJ

July 30, 2021  
**BID SET**

**THE WILLIAM PATERSON UNIVERSITY OF NEW JERSEY  
MAIN CAMPUS – CARRIAGE HOUSE**

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## SECTION 01100 - SUMMARY

## PART 1 - GENERAL

## 1.1 SUMMARY OF WORK

- A. Project: **The William Paterson University of New Jersey, Main Campus – Carriage House**
- B. Owner: **The William Paterson University of New Jersey, 300 Pompton Road, Wayne, NJ 07470**
- C. Architect: **Peter Johnston Architect, PC, 84 Washington Street, 2<sup>nd</sup> Floor, Hoboken, NJ 07030**
- D. Contractor:
- E. The Work consists of **but not limited to furnish and install all materials** for the renovation & alteration of the Carriage House (flooring, wall and ceiling finishes, doors, electrical, hardware and finishes). Contractor to verify all dimensions prior to construction of walls.
- F. Work Under Other Contracts: Contractor to coordinate work purchased by owner under separate contracts.

## 1.2 WORK RESTRICTIONS

- A. Contractor's Use of Premises: During construction, Contractor will have **full** use of **building** indicated.
- B. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 7 a.m. to 4 p.m., Monday through Friday, except otherwise indicated.
  - 1. Weekend Hours: Per Owner's approval.
  - 2. Early Morning Hours: Per Owner's prior approval.
  - 3. Hours of Utility Shutdowns: Scheduled with Owner with 72 hours in advance.
  - 4. Hours for Core Drilling and other noisy activities: Normal business hours with Owner's prior approval.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01100

## SECTION 01200 - PRICE AND PAYMENT PROCEDURES

## PART 1 - GENERAL

## 1.1 ALLOWANCES

- A. Allowances shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site. Include the following allowances in the Contract Sum:
  - 1. Allowances to be included in contract sum:
    - a.
- B. Obtain **two** proposals for each allowance and submit to Architect with recommendations. Purchase products **and systems** selected by Architect.
- C. Advise Architect of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- D. Submit invoices to show cost of products furnished under each allowance. Reconciliation of Allowance amounts with actual costs will be by Change Order.

## 1.2 ALTERNATES

- A. An alternate is an amount proposed by bidder for certain work that may be added to or deducted from the Base Bid amount if Owner accepts the Alternate. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.
- B. Indicate on the Bid Form amounts to be deducted from or added to the Contract Sum for the following alternates:

## 1.3 UNIT PRICES

- A. A unit price is an amount proposed by bidders and stated on the Bid Form as a price per unit of measurement for work added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased. Bidders shall indicate on the Bid Form unit prices for the following items of work:
  - 1. Acoustical ceiling tile – SQ/FT
  - 2. Painting – SQ/FT
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, **applicable taxes**, overhead, and profit.

## 1.4 CONTRACT MODIFICATION PROCEDURES

- A. On Owner's approval of a proposal from Contractor **on AIA Document G709**, Architect will issue a Change Order **on AIA Document G701**, for all changes to the Contract Sum or the Contract Time.

- B. When Owner and Contractor disagree on the terms of a proposal, Architect may issue a Construction Change Directive **on AIA Document G714**, instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order. Construction Change Directive will contain a description of the change and designate the method to be followed to determine changes to the Contract Sum or the Contract Time.

## 1.5 PAYMENT PROCEDURES

- A. Submit a Schedule of Values at least **10** days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the Schedule of Values with Contractor's Construction Schedule.
  - 1. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  - 2. Provide separate line items in the Schedule of Values for initial cost of materials and for total installed value of that part of the Work.
- B. Submit **1** original application for payment **on AIA Document G702/703**, according to the schedule established in Owner/Contractor Agreement.
  - 1. With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
  - 2. Submit final Application for Payment after completion of Project closeout procedures with release of liens and supporting documentation.
    - a. Include consent of surety to final payment **on AIA Document G707** and insurance certificates.
    - b. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.
- C. Submit monthly State of New Jersey Workforce Report Form AA-202 with each Application for Payment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01200

## SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

## PART 1 - GENERAL

## 1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Coordinate construction to ensure efficient and orderly installation of each part of the Work.
- B. Conduct progress meetings at Project site as required by director of facilities. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved with planning or coordination of future activities.
  - 1. **Architect will record** minutes and distribute to each party present and to parties who should have been present.

## 1.2 SUBMITTAL PROCEDURES

- A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 2. Architect will **return submittals, without review** received from sources other than Contractor.
  - 3. **Identify deviations from the Contract Documents on submittals.**
  - 4. Submit **three** copies of each submittal.
- B. Place a permanent label or title block on each submittal for identification. Provide a **6- by 8-inch** space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label:
  - 1. Project name.
  - 2. Date.
  - 3. Name and address of Contractor.
  - 4. Name and address of subcontractor or supplier.
  - 5. Number and title of appropriate Specification Section.
- C. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- D. Architect will review each action submittal, make marks to indicate corrections or modifications required, stamp and mark as appropriate to indicate action taken, and return copies less those retained.
- E. Contractor's Construction Schedule Submittal Procedure: Submit **two** copies of schedule within 7 days after date established for Commencement of the Work.

## PART 2 - PRODUCTS

## 2.1 ACTION SUBMITTALS

- A. **Product Data For All Materials:** Mark each copy to show applicable choices and options. Include the following for **all products**:
1. Data indicating compliance with specified standards and requirements.
  2. Notation of coordination requirements.
  3. For equipment, include rated capacities, dimensions, weights, required clearances, and furnished specialties and accessories.
- B. **Shop Drawings:** Submit Project-specific information drawn to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit **three** opaque copies on sheets at least **8-1/2 by 11 inches** but no larger than **30 by 42 inches**. Architect will return one copy. Include the following:
1. Dimensions, fabrication and installation drawings, roughing-in and setting diagrams, and relationship to adjoining construction.
  2. Identification of products and materials.
  3. Wiring diagrams showing field-installed wiring.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
  6. Shop drawings are required for:
    - a. HVAC
    - b. Wood Assembly at all three walls of office
    - c. Lighting
    - d. Custom Tac Wall with photograph
- C. **Samples:** Submit Samples finished as specified and physically identical with material or product proposed for use. Where variations are inherent in the material, submit **three** sets of paired units to show full range of variations. Include name of manufacturer and product name on label.
1. All materials and finishes

## 2.2 INFORMATION SUBMITTALS

- A. **Qualification Data:** Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. **Product Certificates:** Prepare written statements on manufacturer's letterhead, including signature of entity responsible for preparing certification, certifying that product complies with requirements.

## 2.3 DELEGATED DESIGN

- A. **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. **Delegated-Design Submittal:** In addition to Shop Drawings, Product Data, and other required submittals, submit **three** copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor, to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## 2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Time Frame: Extend schedule from date established for **commencement of the Work the Notice to Proceed** to date of **Final** Completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility.
- C. Updating: At **weekly** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **3 days** before each regularly scheduled progress meeting.
  1. As the Work progresses, indicate Actual Completion percentage for each activity.
- D. Revise the schedule after each meeting or activity where revisions have been made. As Work progresses, mark each bar to indicate actual completion. Distribute updated copies to same parties.

## PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01300



## SECTION 01400 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Testing and inspecting services are specified in other Sections of these Specifications or are required by authorities having jurisdiction and shall be performed by independent testing agencies.
  - 2. Where quality-control services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these services.
  - 3. Contractor is responsible for scheduling times for tests, inspections, and obtaining samples and notifying testing agency.
  - 4. Retesting and Reinspecting: Contractor shall pay for additional testing and inspecting required as a result of tests and inspections indicating noncompliance with requirements.
- B. Submittals: Testing agency shall submit a certified written report of each test and inspection to Contractor, **Owner**, Architect, and to authorities having jurisdiction when they so direct. Reports of each inspection, test, or similar service shall include the following:
  - 1. Name, address, and telephone number of testing agency.
  - 2. Project title and number.
  - 3. Date of issue.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 6. Names of individuals making tests and inspections.
  - 7. Description of the Work and test and inspection method.
  - 8. Complete test or inspection data, test and inspection results, an interpretation of test results, and comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 9. Recommendations on retesting and reinspecting.
  - 10. Name and signature of laboratory inspector.
- C. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.
- D. Testing Agency Responsibilities: Testing agency shall cooperate with Architect and Contractor in performing its duties and shall provide qualified personnel to perform inspections and tests.
  - 1. Agency shall promptly notify Architect and Contractor of irregularities or deficiencies in the Work observed during performance of its services.
  - 2. Agency shall not release, revoke, alter, or increase requirements of the Contract Documents nor approve or accept any portion of the Work.
  - 3. Agency shall not perform any duties of Contractor.
- E. Auxiliary Services: Cooperate with testing agencies and provide auxiliary services as requested, including the following:

1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of materials for testing, and assistance in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Security and protection for samples and for testing and inspecting equipment.
- F. Special Tests and Inspections: Owner will engage a qualified **[testing agency]** **[special inspector]** to conduct special tests and inspections required by authorities having jurisdiction.
- G. Special Tests and Inspections: Conducted by a qualified **[testing agency]** **[special inspector]** as required by authorities having jurisdiction, as indicated in individual Specification Sections.
- H. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01400

## SECTION 01420 - REFERENCES

## PART 1 - GENERAL

## 1.1 GENERAL REQUIREMENTS

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

PRIVATE tbl1@dom1

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
AFPA	American Forest & Paper Association (See AF&PA)	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHA	American Hardboard Association www.hardboard.org	(847) 934-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(202) 626-7300
AISC	American Institute of Steel Construction, Inc. www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100

AITC	American Institute of Timber Construction <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>	(303) 792-9559
ALSC	American Lumber Standard Committee <a href="http://www.alsc.org">www.alsc.org</a>	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. <a href="http://www.amca.org">www.amca.org</a>	(847) 394-0150
ANSI	American National Standards Institute <a href="http://www.ansi.org">www.ansi.org</a>	(202) 293-8020
APA	APA-The Engineered Wood Association <a href="http://www.apawood.org">www.apawood.org</a>	(253) 565-6600
APA	Architectural Precast Association <a href="http://www.archprecast.org">www.archprecast.org</a>	(239) 454-6989
ARI	Air-Conditioning & Refrigeration Institute <a href="http://www.ari.org">www.ari.org</a>	(703) 524-8800
ASCE	American Society of Civil Engineers <a href="http://www.asce.org">www.asce.org</a>	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers <a href="http://www.ashrae.org">www.ashrae.org</a>	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) <a href="http://www.asme.org">www.asme.org</a>	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering <a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a>	(440) 835-3040
ASTM	ASTM International <a href="http://www.astm.org">www.astm.org</a>	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) <a href="http://www.awci.org">www.awci.org</a>	(703) 534-8300
AWI	Architectural Woodwork Institute <a href="http://www.awinet.org">www.awinet.org</a>	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association <a href="http://www.awpa.com">www.awpa.com</a>	(817) 326-6300
AWS	American Welding Society <a href="http://www.aws.org">www.aws.org</a>	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association <a href="http://www.awwa.org">www.awwa.org</a>	(800) 926-7337 (303) 794-7711

BHMA	Builders Hardware Manufacturers Association <a href="http://www.buildershardware.com">www.buildershardware.com</a>	(212) 297-2122
BOCA	BOCA International, Inc. <a href="http://www.bocai.org">www.bocai.org</a>	(708) 799-2300
CABO	Council of American Building Officials (See ICC)	
CCC	Carpet Cushion Council <a href="http://www.carpetcushion.org">www.carpetcushion.org</a>	(203) 637-1312
CDA	Copper Development Association Inc. <a href="http://www.copper.org">www.copper.org</a>	(800) 232-3282 (212) 251-7200
CFFA	Chemical Fabrics & Film Association, Inc. <a href="http://www.chemicalfabricsandfilm.com">www.chemicalfabricsandfilm.com</a>	(216) 241-7333
CFR	Code of Federal Regulations <a href="http://www.access.gpo.gov/nara/cfr">www.access.gpo.gov/nara/cfr</a>	(888) 293-6498 (202) 512-1530
CISCA	Ceilings & Interior Systems Construction Association <a href="http://www.cisca.org">www.cisca.org</a>	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute <a href="http://www.cispi.org">www.cispi.org</a>	(423) 892-0137
CRD	Army Corps of Engineers Handbook for Concrete and Cement <a href="http://www.wes.army.mil">www.wes.army.mil</a>	(601) 634-2355
CRI	Carpet and Rug Institute (The) <a href="http://www.carpet-rug.com">www.carpet-rug.com</a>	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">www.crsi.org</a>	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) <a href="http://www.csa-international.org">www.csa-international.org</a>	(800) 463-6727 (416) 747-4000
CSSB	Cedar Shake & Shingle Bureau <a href="http://www.cedarbureau.org">www.cedarbureau.org</a>	(604) 820-7700
DHI	Door and Hardware Institute <a href="http://www.dhi.org">www.dhi.org</a>	(703) 222-2010
DOC	Department of Commerce <a href="http://www.doc.gov">www.doc.gov</a>	(202) 482-2000
DOD	Department of Defense Military Specifications and Standards <a href="http://www.dodssp.daps.mil">www.dodssp.daps.mil</a>	(215) 697-6257
EIMA	EIFS Industry Members Association	(800) 294-3462

	www.eima.com	(770) 968-7945
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FS	Federal Specification Available from Department of Defense Single Stock Point www.dodssp.daps.dla.mil	(215) 697-6257
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com	(785) 271-0208
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
IAS	International Approval Services (See CSA International)	
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.intlcode.org	(703) 931-4533
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America (The) www.iesna.org	(212) 248-5000

IGCC	Insulating Glass Certification Council <a href="http://www.igcc.org">www.igcc.org</a>	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance (The) (Formerly: SIGMA - Sealed Insulating Manufacturers Association) <a href="http://www.igmaonline.org">www.igmaonline.org</a>	(613) 233-1510
ITS	Intertek Testing Services <a href="http://www.itsglobal.com">www.itsglobal.com</a>	(800) 345-3851 (607) 753-6711
KCMA	Kitchen Cabinet Manufacturers Association <a href="http://www.kcma.org">www.kcma.org</a>	(703) 264-1690
LMA	Laminating Materials Association (Formerly: ALA - American Laminators Association) <a href="http://www.lma.org">www.lma.org</a>	(201) 664-2700
LPI	Lightning Protection Institute <a href="http://www.lightning.org">www.lightning.org</a>	(800) 488-6864 (847) 577-7200
MBMA	Metal Building Manufacturers Association <a href="http://www.mbma.com">www.mbma.com</a>	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association <a href="http://www.maplefloor.org">www.maplefloor.org</a>	(847) 480-9138
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry, Inc. <a href="http://www.mss-hq.com">www.mss-hq.com</a>	(703) 281-6613
NEBB	National Environmental Balancing Bureau <a href="http://www.nebb.org">www.nebb.org</a>	(301) 977-3698
NECA	National Electrical Contractors Association <a href="http://www.necanet.org">www.necanet.org</a>	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association <a href="http://www.nelma.org">www.nelma.org</a>	(207) 829-6901
NEMA	National Electrical Manufacturers Association <a href="http://www.nema.org">www.nema.org</a>	(703) 841-3200
NETA	InterNational Electrical Testing Association <a href="http://www.netaworld.org">www.netaworld.org</a>	(303) 697-8441
NFPA	NFPA International <a href="http://www.nfpa.org">www.nfpa.org</a>	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council <a href="http://www.nfrc.org">www.nfrc.org</a>	(301) 589-1776
NLGA	National Lumber Grades Authority <a href="http://www.nlga.org">www.nlga.org</a>	(604) 524-2393

NOFMA	National Oak Flooring Manufacturers Association <a href="http://www.nofma.org">www.nofma.org</a>	(901) 526-5016
NRCA	National Roofing Contractors Association <a href="http://www.nrca.net">www.nrca.net</a>	(800) 323-9545 (847) 299-9070
NSF	NSF International (National Sanitation Foundation International) <a href="http://www.nsf.org">www.nsf.org</a>	(800) 673-6275 (734) 769-8010
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute <a href="http://www.pci.org">www.pci.org</a>	(312) 786-0300
PDCA	Painting and Decorating Contractors of America <a href="http://www.pdca.com">www.pdca.com</a>	(800) 332-7322 (703) 383-0800
RCSC	Research Council on Structural Connections c/o AISC <a href="http://www.boltcouncil.org">www.boltcouncil.org</a>	
SDI	Steel Deck Institute <a href="http://www.sdi.org">www.sdi.org</a>	(847) 462-1930
SDI	Steel Door Institute <a href="http://www.steeldoor.org">www.steeldoor.org</a>	(440) 899-0010
SIGMA	Sealed Insulating Glass Manufacturers Association (See IGMA)	
SJI	Steel Joist Institute <a href="http://www.steeljoist.org">www.steeljoist.org</a>	(843) 626-1995
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association <a href="http://www.smacna.org">www.smacna.org</a>	(703) 803-2980
SPIB	Southern Pine Inspection Bureau (The) <a href="http://www.spib.org">www.spib.org</a>	(850) 434-2611
SPRI	SPRI (Single Ply Roofing Institute) <a href="http://www.spri.org">www.spri.org</a>	(781) 647-7026
SBCCI	Southern Building Code Congress International, Inc. <a href="http://www.sbcci.org">www.sbcci.org</a>	(205) 591-1853
SSPC	SSPC: The Society for Protective Coatings <a href="http://www.sspc.org">www.sspc.org</a>	(412) 281-2331 (877) 281-7772
STI	Steel Tank Institute <a href="http://www.steeltank.com">www.steeltank.com</a>	(847) 438-8265
TCA	Tile Council of America, Inc.	(864) 646-8453



	<a href="http://www.tileusa.com">www.tileusa.com</a>	
TFS	Texas Forest Service <a href="http://www.txforests-service.tamu.edu">www.txforests-service.tamu.edu</a>	(936) 639-8180
TIA/EIA	Telecommunications Industry Association/ Electronic Industries Alliance <a href="http://www.tiaonline.org">www.tiaonline.org</a>	(703) 907-7700
TPI	Truss Plate Institute, Inc. <a href="http://www.tpinst.org">www.tpinst.org</a>	(608) 833-5900
UL	Underwriters Laboratories Inc. <a href="http://www.ul.com">www.ul.com</a>	(800) 704-4050 (847) 272-8800
WCLIB	West Coast Lumber Inspection Bureau <a href="http://www.wclib.org">www.wclib.org</a>	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (See WCSC)	(212) 661-4261
WCSC	Window Covering Safety Council <a href="http://www.windowcoverings.org">www.windowcoverings.org</a>	(800) 506-4636 (212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) <a href="http://www.wdma.com">www.wdma.com</a>	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California <a href="http://www.wicnet.org">www.wicnet.org</a>	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association <a href="http://www.wmmpa.com">www.wmmpa.com</a>	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association <a href="http://www.wwpa.org">www.wwpa.org</a>	(503) 224-3930

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01420

## SECTION 01600 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- B. Product Substitutions: Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor after award of the Contract.
  - 1. Submit **three** copies of each request for product substitution.
  - 2. **Submit requests within 3 days after the Notice of Award.**
  - 3. Do not submit unapproved substitutions on Shop Drawings or other submittals.
  - 4. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
  - 5. Architect will review the proposed substitution and notify Contractor of its acceptance or rejection.
- C. Comparable Product Requests:
  - 1. Submit **three** copies of each request for comparable product. Do not submit unapproved products on Shop Drawings or other submittals.
  - 2. Identify product to be replaced and show compliance with requirements for comparable product requests. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified.
  - 3. Architect will review the proposed product and notify Contractor of its acceptance or rejection.
- D. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 4. Store materials in a manner that will not endanger Project structure.
  - 5. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
- E. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

## PART 2 - PRODUCTS

## 2.1 PRODUCT OPTIONS

- A. Provide products that comply with the Contract Documents, are undamaged, and are new at the time of installation.
  - 1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
  - 2. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
  - 1. Where Specifications name a single product or manufacturer, provide the item indicated that complies with requirements.
  - 2. Where Specifications include a list of names of products or manufacturers, provide one of the items indicated that complies with requirements.
  - 3. Where Specifications include a list of names of products or manufacturers, accompanied by the term "available products" or "available manufacturers," provide one of the named items that complies with requirements. Comply with provisions for "comparable product requests" for consideration of an unnamed product.
  - 4. Where Specifications name a product as the "basis-of-design" and include a list of manufacturers, provide the named product. Comply with provisions for "comparable product requests" for consideration of an unnamed product by the other named manufacturers.
  - 5. Where Specifications name a single product as the "basis-of-design" and no other manufacturers are named, provide the named product. Comply with provisions for "comparable product requests" for consideration of an unnamed product by another manufacturer.
- C. Unless otherwise indicated, Architect will select color, pattern, and texture of each product from manufacturer's full range of options that includes both standard and premium items.

## PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

## SECTION 01701 - EXECUTION AND CLOSEOUT REQUIREMENTS

## PART 1 - GENERAL

## 1.1 CLOSEOUT SUBMITTALS

- A. Record Drawings: Maintain a set of prints of the Contract Drawings as Record Drawings. Mark to show actual installation where installation varies from that shown originally.
  - 1. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- B. Operation and Maintenance Data: Submit three copies of manual. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
  - 1. Manufacturer's operation and maintenance documentation.
  - 2. Maintenance and service schedules.
  - 3. Maintenance service contracts.
  - 4. Emergency instructions.
  - 5. Spare parts list.
  - 6. Wiring diagrams.
  - 7. Copies of warranties.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

## 3.1 EXAMINATION AND PREPARATION

- A. Examine substrates and conditions for compliance with manufacturer's written requirements including, but not limited to, surfaces that are sound, level, plumb, smooth, clean, and free of deleterious substances; substrates within installation tolerances; and application conditions within environmental limits. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to property survey and existing benchmarks.
- C. Take field measurements as required to fit the Work properly. Where fabricated products are to be fitted to other construction, verify dimensions by field measurement before fabrication and, when possible, allow for fitting and trimming during installation.

## 3.2 CUTTING AND PATCHING

- A. Do not cut structural members **or operational elements** without prior written approval of Architect.
- B. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **prevent** interruption to occupied areas.

- C. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

### 3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for installation. Anchor each product securely in place, accurately located and aligned with other portions of the Work. Clean exposed surfaces and protect from damage.
- B. Clean Project site and work areas daily, including common areas.

### 3.4 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
  - 1. Remove labels that are not permanent.
  - 2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
  - 3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
  - 4. Vacuum carpeted surfaces and wax resilient flooring.
  - 5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
  - 6. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

### 3.5 CLOSEOUT PROCEDURES

- A. Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, maintenance service agreements, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Submit Record Drawings **and Specifications**, operation and maintenance manuals, **property surveys**, and similar final record information.
  - 6. Deliver tools, spare parts, extra materials, and similar items.
  - 7. Make final changeover of permanent locks and deliver keys to Owner.
  - 8. Complete startup testing of systems.
  - 9. Remove temporary facilities and controls.
  - 10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  - 11. Complete final cleaning requirements, including touchup painting.
  - 12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

- C. Request inspection for Final Completion, once the following are complete:
  - 1. Submit a copy of Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.
  - 2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- D. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- E. Submit a written request for final inspection for acceptance. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

### 3.6 DEMONSTRATION AND TRAINING

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
  - 1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 01701

## SECTION 01732 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 SECTION REQUIREMENTS

- A. Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and deliver to Owner's designated storage area.
- B. Comply with EPA regulations and hauling and disposal regulations of authorities having jurisdiction.
- C. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- D. It is not expected that hazardous materials will be encountered in the Work. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

### PART 2 - PRODUCTS (Not Applicable)

### PART 3 - EXECUTION

#### 3.1 DEMOLITION

- A. Maintain services/systems indicated to remain and protect them against damage during selective demolition operations. Before proceeding with demolition, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of the building.
- B. Locate, identify, shut off, disconnect, and cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
- C. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- D. Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain or construction being demolished.
- E. Provide temporary weather protection to prevent water leakage and damage to structure and interior areas.
- F. Protect walls, ceilings, floors, and other existing finish work that are to remain. Erect and maintain dustproof partitions. Cover and protect furniture, furnishings, and equipment that have not been removed.
- G. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

- H. Promptly remove demolished materials from Owner's property and legally dispose of them. Do not burn demolished materials.
- I. Remove, store, and reinstall all equipment and components

END OF SECTION 01732



## SECTION 09260 - GYPSUM BOARD ASSEMBLIES

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

## PART 2 - PRODUCTS

## 2.1 METAL FRAMING AND SUPPORTS

- A. Steel Framing Members, General: ASTM C 754.
  - 1. Steel Sheet Components: ASTM C 645, with manufacturer's standard corrosion-resistant zinc coating.
- B. Suspended Ceiling and Soffit Framing:
  - 1. Rod Hangers: 1/4" diameter A36 galvanized steel rod..
  - 2. Carrying Channels: Cold-rolled steel 1 1/2 inches deep, caddy cat channel clamp, model 4B1.5LS, caddy angle bracket 708AB.
  - 3. Furring Channels: **3/4-inch- (19.1-mm-) deep, cold-rolled channels, 0.0538 inch (1.37 mm) thick Steel studs, 0.0179 inch (0.45 mm) thick, in depth indicated Steel studs, 0.0312 inch (0.79 mm) thick, in depth indicated Steel, rigid hat-shaped channels; 7/8 inch (22.2 mm) deep, 0.0179 inch (0.45 mm) thick Steel, rigid hat-shaped channels; 7/8 inch (22.2 mm) deep, 0.0312 inch (0.79 mm) thick Resilient furring channels, 1/2 inch (12.7 mm) deep, with single- or double-leg configuration.**
  - 4. Grid Suspension System for Interior Ceilings: Interlocking, direct-hung system.
- C. Partition and Soffit Framing: Manufacturers, United States Gypsum Corp., Marino Industries Corp., Bostwick Steel Framing Co.
  - 1. Studs and Runners: 20 gauge partitions, unless otherwise indicated.
  - 2. Flat Strap and Backing: **0.0179 inch (0.45 mm) 0.027 inch (0.7 mm) thick.**
  - 3. Rigid Hat-Shaped Furring Channels: In depth indicated and **0.0179 inch (0.45 mm) 0.0312 inch (0.79 mm) thick.**
  - 4. Resilient Furring Channels: **1/2 inch (12.7 mm) deep, with single- or double-leg configuration.**

5. Cold-Rolled Furring Channels: 0.0538 inch (1.37 mm) thick, 3/4 inch (19.1 mm) deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch (31.8-mm) face flange, 7/8-inch (22.2-mm) wall-attachment flange, and 0.0179 inch (0.45 mm) thick.

## 2.2 PANEL PRODUCTS: Manufacturers: United States Gypsum Corp., Georgia Pacific Corp, Gold Bond Building Products.

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Gypsum Wallboard: ASTM C 36, in thickness indicated, with manufacturer's standard edges. **Regular type, unless otherwise indicated as required for specific fire-resistance-rated assemblies.**

## 2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, or plastic.
  1. Provide cornerbead at outside corners, unless otherwise indicated.
  2. Provide LC-bead (J-bead) at exposed panel edges.
  3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with **baked-enamel finish**.
- C. Joint-Treatment Materials: ASTM C 475.
  1. Joint Tape: Paper, unless otherwise recommended by panel manufacturer.
  2. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.
  3. Joint Compounds: By USG, National Gypsum.
- D. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
- E. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).
- F. Miscellaneous Materials: Auxiliary materials for gypsum board construction that comply with referenced standards.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation and with United States Gypsum's "Gypsum Construction Handbook."

- B. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.
  - 1. Where studs are installed directly against exterior walls, install **asphalt-felt or foam-gasket** isolation strip between studs and wall.
- C. Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
  - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
  - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
  - 3. Multilayer Fastening Methods: Fasten base layers **and face layer separately to supports with screws, with screws, and face layers to base layers with adhesive and supplementary fasteners.**
- D. STC-Rated Assemblies: Comply with ASTM C 919 for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies.
- E. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- F. Cementitious Backer Units: Comply with ANSI A108.11.
- G. Finishing Gypsum Board Assemblies:
  - 1. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
  - 2. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
  - 3. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.

END OF SECTION 09260

## SECTION 09310 - CERAMIC TILE

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples of all tile.
- B. Floor Tiles: Static coefficient of friction not less than 0.6 **for level surfaces and 0.8 for ramps**, per ASTM C 1028.

## PART 2 - PRODUCTS

## 2.1 CERAMIC TILE

- A. Ceramic tile that complies with standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."
- B. Ceramic Floor Tile: Unglazed, porcelain.
  - 1. Products:
    - a. Textures Quarry CC0T01 Tile By Dal Tile
  - 2. Surface: Slip resistant abrasive admixture.
  - 3. Module Size: 6" x 6"
  - 4. Color: As selected.
  - 5. Tiles mounted, by manufacturer's standard method (mudset).
  - 6. Provide self-leveling concrete.
  - b. Concrete Chic by American Olean CC67
  - 7. Surface: Nonresistant.
  - 8. Module Size: 12" x 12"
  - 9. Color: Elegant Gray.
- C. Glazed Wall Tile: Cushion-edged, flat tile.
  - 1. Products:
    - a. Wall tile by American Olean, 66SAM 0091 Biscuit.
  - 2. Module Size: 6" x 6" Semi-Gloss.
  - 3. Color: Biscuit
  - 4. Finish: glazed.

5. Tiles mounted, by manufacturer's standard method, into sheets and grouted with silicone rubber grout complying with ANSI A118.6.
- D. Tile trim units that match characteristics of adjoining flat tile. Bullnose. Provide cove base.
- E. Where indicated, protect exposed surfaces of tile against adherence of mortar and grout by factory precoating them with a hot-applied continuous film of petroleum paraffin wax. Do not coat unexposed tile surfaces.

## 2.2 INSTALLATION MATERIALS

- A. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.
  1. Thin-Set Mortar Type: **Latex-** portland cement.
    - a. Products:
      - 1) Laticrete #3701 mortar admix and Laticrete #272 Premium Floor N Wall Thin Set Mortar.
      - 2) Laticrete #86 Latilevel Thin Pour underlayment.
  2. Grout Type: Polymer modified, unless otherwise indicated.
    - a. Products:
      - 1) Laticrete tri-poly fortified sanded grout series 1500
      - 2) Laticrete tri-poly fortified undersanded grout series 1600.
  3. Grout Color: Any Laticrete color as selected by Architect.
- B. Setting-Bed Accessories: ANSI A108.1A.
- C. Cementitious Backer Units: Complying with ANSI A118.9, of thickness indicated.
- D. Waterproofing Membranes for Thin-Set Installations: ANSI A118.10, latex-portland cement product and as follows:
  1. Products:
    - a. Laticrete #9235 Waterproofing Membrane

## 2.3 STONE THRESHOLDS

- A. Granite thresholds complying with ASTM C 615 White, honed marble thresholds complying with the Marble Institute of America's Group A requirements for soundness, and with ASTM C 503 Nonfading slate thresholds with honed finish complying with ASTM C 629

fabricated to be not more than **1/2 inch (12.7 mm)** above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with tile installation standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.
- B. Comply with TCA's "Handbook for Ceramic Tile Installation."
- C. Floor Tile Installation Method[s]:
  - 1. Over Concrete Subfloors: TCA (**thin-set mortar bonded to concrete slab**)
- D. Wall Tile Installation Method[s]:
  - 1. Over Gypsum Board: (thin-set mortar bonded to gypsum board).
  - 2. Over concrete and masonry: Latex Portland Cement Mortar over concrete & masonry.

END OF SECTION 09310

## **SECTION 09 50 00**

### **Acoustical Ceilings**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

##### **1.2 SUMMARY**

###### **A. Section Includes**

1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

###### **B. Related Selections**

1. Section 09 51 00 - Acoustical Ceilings
2. Section 09 51 13 - Acoustical Fabric-Faced Panel Ceilings
3. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies
4. Section 09 20 00 - Plaster and Gypsum Board
5. Section 02 42 00 - Removal and Salvage of Construction Materials
6. Divisions 23 - HVAC Air Distribution
7. Division 26 - Electrical

###### **C. Alternates**

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition,

color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

### **1.3 REFERENCES**

#### **A. American Society for Testing and Materials (ASTM):**

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material
  - A. Armstrong Fire Guard Products
10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
11. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
12. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
13. ASTM E 1264 Classification for Acoustical Ceiling Products

#### **B. International Building Code**

#### **C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality**

#### **D. NFPA 70 National Electrical Code**

#### **E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures**

#### **F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components**

#### **G. International Code Council-Evaluation Services Report - Seismic Engineer Report**



1. ESR 1308 - Armstrong Suspension Systems

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System

I. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010

J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

#### **1.4 SYSTEM DESCRIPTION**

Continuous/Wall-to-Wall

#### **1.5 SUBMITTALS**

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

#### **1.6 QUALITY ASSURANCE**

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

A. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

B. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

C. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

## **1.7 DELIVERY, STORAGE AND HANDLING**

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

## **1.8 PROJECT CONDITIONS**

A. Space Enclosure:

Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

HumiGuard Max Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Ceilings with HumiGuard Max performance can be installed in conditions up to 120°F (49°C) and maximum humidity exposure including outdoor applications, and other standing water applications, so long as they are installed with either SS Prelude Plus, AL Prelude Plus, or Prelude Plus Fire Guard XL suspension systems. Products with HumiGuard Max performance can be installed in exterior applications, where standing water is present, or where moisture will come in direct contact with the ceiling. Only Ceramaguard with AL Prelude Plus suspension system can be installed over swimming pools.

## **1.9 ALTERNATE CONSTRUCTION WASTE DISPOSAL**

- A. Ceiling material being reclaimed must be kept dry and free from debris
- B. Contact the Armstrong Recycle Center a consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycling of the ceiling.
- C. Recycling may qualify for LEED Credits:
  - a. LEED 2009 - Category 4: Material and Resources (MR)
    - i. Credit MRc2: Construction Waste Management
    - b. LEEDv4 - MRp2 - Construction Waste Management Planning Qualifies as a material stream (non-structural) targeted for diversion. Ceilings will be source-separated and diverted through the Armstrong Ceiling Recycling Program.
  - c. LEEDv4-MRc5 -
    - i. Option 1: Divert ceilings to qualify for one of the 3 material streams (50%)
    - ii. Option 2: Divert ceilings to qualify for one of the 4 material streams (75%)

## **1.10 WARRANTY**

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
  - 1. Acoustical Panels: Sagging and warping
  - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
  - 1. Acoustical panels: One (1) year from date of substantial completion

2. Cirrus: Ten (10) years from date of substantial completion

3. Grid: Ten years from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

## **1.11 MAINTENANCE**

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

A. Ceiling Panels:

1. Armstrong World Industries, Inc. Calla Health Zone 2'-0" x 2'-0"

B. Suspension Systems:

1. Armstrong World Industries, Inc.

C: Perimeter Systems

1. Armstrong World Industries, Inc.

### **2.2 ACOUSTICAL CEILING UNITS**

A. Acoustical Panels -Calla Health Zone

1. Surface Texture: Smooth

2. Composition: Mineral Fiber

3. Color: White

4. Size: 24IN x 24IN

5. Edge Profile: Please Select a Molding for interface with Please Select a Suspension Line grid.

6. Noise Reduction Coefficient( NRC): ASTM C 423; Classified with UL label on product carton

0.50.

7. Ceiling Attenuation Class (CAC) : ASTM C 1414; Classified with UL label on product carton

33.

8. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton.

9. Flame Spread: ASTM E 1264; Class A (UL)

10. Light Reflectance White Panel: ASTM E 1477;

11. Dimensional Stability: undefined undefined

12. Recycle Content: None

13. Acceptable Product: Calla Health Zone as manufactured by Armstrong World Industries or equal.

## 2.3 METAL SUSPENSION SYSTEMS

Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

a. Structural Classification: ASTM C 635 normal duty

b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.

c. Acceptable Product: Prelude 15/16 square layin as manufactured by Armstrong World Industries or equal

Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim:

7875 - 10ft Shadow Molding

E. Accessories

ALBERC2 - aluminum systems - 2" Aluminum Beam End Retaining Clip

BERC2 - steel - 2" Beam End Retaining Clip

BERC - Beam End Retaining Clip

SJMR15 - Seismic Joint Clip - Main Beam - 15/16" Suspensions

SJMR09 - Seismic Joint Clip - Main Beam - 9/16" Suspensions

SJCG - PeakForm Suspension - Seismic Joint Clips CT

SJCSI - Square Bulb Suspension - Seismic Joint Clip CT

ES4 - for 15/16" Prelude Expansion Sleeves

ES49 - for 9/16" Suprafine

ES76004 for 1/4" Silhouette Suspension

ES76008 - for 1/8" Silhouette Suspension

STAC - Single Tee Adapter Clip

7445 - 48" Stabilizer bar - not required when using the BERC2  
7425 - 24" Stabilizer bar - not required when using the BERC2

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

### **3.2 PREPARATION**

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

### **3.3 INSTALLATION**

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

### **3.4 ADJUSTING AND CLEANING**

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish

damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycle of the ceiling.

# **Specification for Modular Resilient Flooring**

## *SECTION 096519 – RESILIENT TILE FLOORING*

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

##### **A. Section Includes:**

- 1. Luxury Vinyl Tile**
- 2. Description of Work:** Provide and install all modular resilient flooring as required by contract documents and their specifications.

#### **1.2 SUBMITTALS**

##### **A. Submit each of the following with your proposal (unless otherwise noted):**

- 1. Manufacturer's Data - Two (2) copies of resilient manufacturer's construction specifications, performance specifications, installation instructions, maintenance instructions, and warranty for resilient flooring and related items specified.**
- 2. LEED v4 applicable Data**
- 3. Samples: Customary (standard) size samples of each type of LVT, in each specified pattern, color, and construction.**

##### **B. Qualification Data for Installer:**

1. The installation provider shall be directly responsible for the quality of the completed floorcovering installation, including the quality of both the materials and labor used in the installation.
2. The installation provider shall directly warrant to the end use all products, materials and services related to the floorcovering installation (including any floorcovering(s), or other products or materials used in the installation) meeting specifications set forth herein.
3. Installation provider shall warrant all installation services will be free from defects in workmanship for a period of at least one (1) year following their completion, and that in the event of defective services, the installation provider will re-perform the effected services and, as necessary, supply new products of the same or similar grade sufficient to repair or replace products adversely affected.
4. The installation provider shall have successful resilient flooring installation experience on work similar to the work of this Section.



## Specification for Modular Resilient Flooring

5. The installation provider shall employ workers for this Project who are competent in techniques required by the manufacturer (trained or certified by the manufacturer) for resilient flooring installation.
6. Installation provider's proof of insurance, copy of contractor's license, and worker's compensation certificate.
7. Five (5) current project references for installation provider, with scope, date, and customer contact with phone number in compliance letter.

### C. Qualification Data for **Manufacturer:**

1. Commitment to sustainability – resilient provider shall demonstrate through programs of source reduction, recycling, reuse, water conservation and conservation of raw material usage its commitment to sustainability
2. Response to RFQ shall be accompanied by a letter confirming compliance with listed performance specifications signed off by an Officer of the Company.
3. Manufacturer shall make available a list of qualified minority, disabled, women and veteran owned LVT contractors capable of installation per manufacturer's installation instructions and provide contact information for each name supplied.
4. All products offered by the manufacturer shall be "standard running line" products and shall be available with no minimum order (single box availability).
5. Manufacturer shall guarantee availability of fully recyclable resilient flooring product.
6. The product warranty required herein shall be provided directly by the resilient flooring provider.

### D. All applicable product warranties provided by manufacturer.

1. Provide the following manufacturer's written warranty for a period of fifteen years from date of product invoice.
  - a. Resilient flooring products are warranted against excessive wear defined as complete removal of pattern and/or color due to normal traffic and assuming proper installation and maintenance according to manufacturer's guidelines.
  - b. Resilient flooring products are warranted against odor from plasticizer hydrolysis caused by moisture and alkalinity in concrete slabs up to manufacturer specified limits.

## Specification for Modular Resilient Flooring

- c. Resilient flooring products are warranted against manufacturing defects.
- E. Any alternatives to specified product(s) or approved manufacturers, to be considered, shall be submitted for approval at least ten (10) working days prior to bid or proposal to be considered. No custom alternatives will be accepted.
- F. Maintenance Instructions - Two (2) copies of the manufacturer's resilient flooring maintenance instructions.
- G. Submit manufacturer's National Voluntary Laboratory Accreditation Program (NVLAP) certified test results to show that resilient flooring product(s) meets or exceeds product performance specification criteria for resilient flooring testing requirements under Section 2.1 hereof.

### PART 2 PRODUCTS

**2.1 Luxury Vinyl Tile (LVT) Performance Standards.** Resilient flooring shall meet the following performance standards: acceptable product: interface flooring, studio set LVT Tile A007, size 9.8" x 39.3", color A00702 Pewter, Roppe 700 series wall base 4 ½" HT Standard Toe Base, Color Charcoal

0.1	Radiant Flux (ASTM E648)	≥ 0.45 watts/cm <sup>2</sup> , Class 1
0.2	Smoke Density (ASTM E662)	≤ 450
0.3	Size & Squareness (ASTM F2055)	Passes, +/- 0.016 inch per linear foot
0.4	Thickness (ASTM F386)	Passes
0.5	IIC Sound Rating (ASTM E492-09)	57 IIC
0.6	Slip Resistance (ASTM D2047)	>0.55 wet/dry, ADA compliant
0.7	Static Load Limit (ASTM F970)	1500 psi
0.8	Flexibility (ASTM F137)	Passes
0.9	Resistance to heat (ASTM F1514)	Passes
0.10	Resistance to light (ASTM F1515)	Passes
0.11	Dimensional Stability (ASTM F2199)	Passes
0.12	Residual Indentation (ASTM F1914)	Passes
0.13	Resistance to Chemicals (ASTM F925)	Passes
0.13	Carbon Footprint	3 <sup>rd</sup> party verified Carbon Neutral
0.14	Indoor Air Quality	FloorScore®/CDPH 01350 Certified for Low-VOC emissions
0.15	Material Composition	Free of Ortho Phthalates, Added Formaldehyde and Heavy Metal Stabilizers
0.16	Ingredients and Life Cycle Impacts	Environmental Product Declaration
0.17	Sustainability Assessment	NSF/ANSI 332 Silver
0.18	LEED v4	Contributes to IEQ: Low emitting materials; M&R: EPD and EPR
0.19	End of Life	Fully recyclable LVT to Carpet Tile Backing Recycling

## **Specification for Modular Resilient Flooring**

### **2.2 Product Construction Specification.** LVT shall meet the following construction specifications:

- .1 Construction: High performance luxury vinyl tile
- .2 Class / ASTM F1700: Class III Printed Vinyl Tile
- .3 Wear Layer Thickness: 22 mil
- .4 Total Thickness: 4.5 mm
- .5 Backing Class: Commercial Grade with sound absorption characteristics to meet IIC Sound Rating requirement.
- .6 Finish: Ceramor
- .7 Nominal Dimensions: Squares: 50 cm x 50 cm (19.69 in x 19.69 in); Planks: 25 cm x 1 (9.845 in x 39.38 in); when flooring design installation includes modular carpet, modular resilient dimensions must match modular carpet dimensions.
- .8 Installation Recommendation: Direct glue installation using manufacturer's recommended installation product and in compliance with manufacturer's installation guidelines.
- .9 Installation Method: All 50cm x 50cm square LVT products shall be designed for Ashlar, Brick, Monolithic, Non Directional and/or Quarter-Turn installation. All 25cm x 1m plank LVT products shall be designed for Ashlar and Herringbone installation.
- .10 When flooring design installation includes modular carpet, there shall be no carpet to resilient transition strips or layering added.

### **2.3 Related Materials**

- .1 Leveling compound – Use only Portland based leveling and patching compound as recommended by resilient flooring provider.
- .2 Glue – Use only the manufacturer's recommended installation products and install according to manufacturer's installation guidelines.

## **PART 3 EXECUTION**

### **3.1 Pre-Installation Requirements**

- .1 Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
  - .1 Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with the proper installation of the resilient flooring.

## **Specification for Modular Resilient Flooring**

- .2 Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 Installation**

#### **.1 General**

Comply with manufacturer's instructions and recommendations. All product shall be installed as per installation description – reference 2.2.9.

- .2 Comply with manufacturer's instructions for subfloor evaluation for moisture and alkalinity.
- .3 Install resilient under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.
  - .1 Run resilient under open bottom items such as heating convectors, and install tight against walls, columns and cabinets so the entire floor area is covered with resilient.
  - .2 Cutting shall be done in accordance with the manufacturer's recommendation, using the tools designed for the resilient being installed.
  - .3 Use leveling compound where necessary. Any floor filling or leveling shall have a minimum of 4'0" of feather.
  - .4 Expansion joints - Do not bridge building expansion joints with continuous resilient.

### **3.3 Cleaning and Protection**

- .1 Comply with manufacturer's written instructions for cleaning and protecting resilient.
- .2 On completion of the installation in each area, all dirt, resilient scraps, etc. shall be removed from the surface of the floor.
- .3 Remove debris, and sort pieces to be saved from scraps to be recycled.
- .4 Construction manager shall protect resilient flooring against damage during remainder of construction period.
- .5 At the completion of the work and when directed by the construction manager, clean resilient floor as per the maintenance recommendations of the resilient manufacturer.

### **3.4 Inspection**

- .1 Upon completion of the installation, manufacturer and installer shall verify and certify by means of an affidavit of compliance that work is complete, properly installed and meets all specifications herein.

## SECTION 09910

### COMMERCIAL PAINTING (United States)

Display hidden notes to specifier. (Don't know how? [Click Here](#))

William Paterson College 04/01/21

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Interior and exterior painting, including surface preparation for projects in the United States.

##### 1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications.
- B. Section 06200 - Finish Carpentry.
- C. Section 06400 - Architectural Woodwork.

##### 1.3 REFERENCES

- A. Green Seal Standard GS-11; May 20, 1993.
- B. US Green Building Council, (USGBC) - Green Seal standards for LEED paint credits.
- C. Occupational Safety and Health Act (OSHA) - Safety Standards.
- D. American National Standards Institute (ANSI) - Performance Standards.
- E. Paint Decorating Contractors of America (PDCA) - Application Standard.
- F. National Paint and Coatings Association (NPCA) - Gloss Standard.
- G. American Society for Testing Materials (ASTM) - Testing Methods.
- H. Master Paint Institute (MPI # ) - Established paint categories and standards.
- I. Ozone Transmission Commission (OTC) - Established levels of Volatile Organic Compounds.
- J. SCAQMD 1168 - South Coast Air Quality Management District Rule #1168; October 3, 2003.
- K. SSPC (PM1) - Steel Structures Painting Manual, Vol. 1, Good Painting Practice; Society for Protective Coatings; 1993, Third Edition.
- L. SSPC (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; Society for Protective Coatings; 1995, Seventh Edition.
- M. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

#### 1.4 DEFINITIONS

- A. Commercial as used in this Section refers to a product well suited for a commercial application.
- B. DFT as used in this Section refers to the Dry Film Thickness of the coating.
- C. Enamel refers to any acrylic or alkyd (oil) base paint which dries leaving an eggshell, pearl, satin, semi-gloss or high gloss enamel finish.
- D. DTM as used in this Section refers to paint that is applied Direct To Metal.
- E. LEED as used in this Section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers, paints and coatings.
- F. OTC as used in this Section refers to the Ozone Transmission Commission. OTC has established the following VOC levels for the Northeastern United States. Products shall meet the following OTC limits for VOC's.
  - 1. Interior flat paints: 100 grams per liter or less, per gallon.
  - 2. Interior enamels: 150 grams per liter or less, per gallon.
  - 3. Interior stains: 250 grams per liter or less, per gallon.
  - 4. Interior primers: 200 grams per liter or less, per gallon.
  - 5. Rust preventive coatings: 400 grams per liter or less, per gallon.
  - 6. Dry fog coatings: 400 grams per liter or less, per gallon.
  - 7. Floor coatings: 250 grams per liter or less, per gallon.
- G. Premium as used in this Section refers to the best quality product "top of the line".
- H. VOC as used in this Section refers to Volatile Organic Compounds found in primers, paints, sealers and stains. The level of VOCs appears after each product listed in the Schedule in grams per liter (g/L).
- I. Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 and/or 85 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of our products. The list below is provided for general guidance; refer to the technical data sheet for the actual gloss/sheen level for each product.
  - 1. Flat - Less than 5 Percent.
  - 2. Eggshell - 5 - 20 Percent.
  - 3. Satin - 20 - 35 Percent.
  - 4. Semi-Gloss - 30 - 65 Percent.
  - 5. Gloss - Over 65 Percent.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300 - Administrative Requirements.
- B. Coordinate with Section 01300 - Administrative Requirements.
- C. LEED Certification Product Data:
  - 1. See Section - Work Covered by Contract Documents.
  - 2. Submittals Required:
    - a. MRc3 Resource Reuse (LEED Form).
    - b. MRc4 Recycled Content (LEED Form).
    - c. MRc5 Local and Regional Materials (LEED Form).
    - d. EQc4.2 Low Emitting Materials - Paint (VOC Certification Letter).

- D. Product Data: Provide a complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category.
  - 2. Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.
- E. Samples: Submit three paper samples, 5 inches by 7 inches (127mm x 178mm) in size, illustrating selected colors for each color and system selected with specified coats cascaded.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
- B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Mock-up areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Approved mock-up areas will serve as the standard for remaining Work.
  - 4. Refinish mock-up area as required to produce acceptable Work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Disposal:
  - 1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
  - 2. Do not incinerate closed containers.
  - 3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

#### 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

#### 1.9 WARRANTY

- A. Inspection of all surfaces to be coated must be done by the manufacturer's representative to insure proper preparation prior to application. All thinners, fillers, primers and finish coatings shall be from the same manufacturer to support a product warranty. Products other than those submitted shall be accompanied by a letter stating its fitness for use and compatibility.

- B. At project closeout, provide to the Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect.

#### 1.10 EXTRA MATERIALS

- A. At project closeout, supply the Owner or owner's representative one gallon of each product for touch-up purposes. Cans shall be clearly marked with color name, number and type of paint.
- B. At project closeout, provide the color mixture name and code to the Owner or owner's representative for accurate future color matching.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Benjamin Moore and Co., which is located at: 101 Paragon Dr ; Montvale, NJ 07645; Contact: Diana Rattazzi (914) 261-8603 Email: [diana.rattazzi@benjaminmoore.com](mailto:diana.rattazzi@benjaminmoore.com); Web: [www.benjaminmoore.com](http://www.benjaminmoore.com)
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00

#### 2.2 MATERIALS - GENERAL

- A. Volatile Organic Compound (VOC) Content:
  - 1. Provide coatings that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D-National Volatile Organic Compound Emission Standards for Architectural Coatings.
    - b. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- B. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

#### 2.3 MIXING AND TINTING

- A. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

#### 2.4 INTERIOR PAINT SYSTEMS- UNITED STATES

- A. METAL: Aluminum, Galvanized.
  - 1. Latex Systems:
    - a. Semi-Gloss Finish High Performance:
      - 1) 1st Coat: Benjamin Moore Super Spec® HP Acrylic Metal Primer P04
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss N540
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss N540



- B. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
  - 1. Latex Systems:
    - a. **Low Sheen System: Office Walls/Common Areas**
      - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Low Sheen N537
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Low Sheen N537
    - b. **Flat System: Ceilings**
      - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534
      - 2) 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536
      - 3) 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat N536
  - 2. Epoxy System (Water Base):
    - a. **Gloss System: Kitchen Walls**
      - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534
      - 2) 2nd Coat: Corotech Acrylic Epoxy V450
      - 3) 3rd Coat: Corotech Acrylic Epoxy V450

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. The Contractor shall review the product manufacturer's special instructions for surface preparation, application, temperature, re-coat times, and product limitations.
- B. The Contractor shall review product health and safety precautions listed by the manufacturer.
- C. The Contractor shall be responsible for enforcing on site health and safety requirements associated with the Work.
- D. Do not begin installation until substrates have been properly prepared.
- E. Ensure that surfaces to receive paint are dry immediately prior to application.
- F. Ensure that moisture-retaining substrates to receive paint have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.
  - 1. Concrete and Masonry: 3-5 percent. Allow new concrete to cure a minimum of 28 days.
  - 2. Exterior Wood: 17 percent.
  - 3. Interior Wood: 15 percent.
  - 4. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
  - 5. Plaster and Gypsum: 15 percent.
  - 6. Concrete Slab-On-Grade: Perform calcium chloride test over 24 hour period or other acceptable test to manufacturer. Verify acceptable moisture transmission and pH levels.
- G. Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- H. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

### 3.2 PREPARATION - GENERAL

- A. Clean surfaces thoroughly prior to coating application.

- B. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- C. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- D. Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.
- E. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- F. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.
- G. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.
- H. Protect adjacent surfaces not indicated to receive coatings.
- I. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

### 3.3 SURFACE PREPARATION

- A. Concrete and Concrete Masonry: Clean surfaces free of loose particles, sand, efflorescence, laitance, form oil, curing compounds, and other substances which could impair coating performance or appearance.
- B. Concrete Floors: Remove contaminants which could impair coating performance or appearance. Verify moisture transmission and alkaline-acid balance recommended by coating manufacturer; mechanically abrade surface to achieve 80-100 grit medium-sandpaper texture.
- C. Existing Coatings:
  - 1. Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application; apply one coat primer of type recommended by coating manufacturer for maximum coating adhesion.
  - 2. If presence of lead in existing coatings is suspected, cease surface preparation and notify Architect immediately.
- D. Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.
- E. Masonry Surfaces - Restored: Remove loose particles, sand, efflorescence, laitance, cleaning compounds and other substances that could impair coating performance or appearance.
- F. Metals - Aluminum, Mill-Finish: Clean and etch surfaces with a phosphoric acid-water solution or water based industrial cleaner. Flush with clean water and allow to dry, before applying primer coat.
- G. Metals - Copper: Clean surfaces with pressurized steam, pressurized water, or solvent washing.

- H. Metals - Ferrous, Unprimed: Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.
- I. Metals - Ferrous, Shop-Primed: Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.
- J. Metals - Galvanized Steel (not passivated): Clean with a water-based industrial strength cleaner, apply an adhesion promoter followed by a clean water rinse. Alternately, wipe down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner; followed by wiping the surface dry using clean, lint-free cloths.
- K. Metals - Galvanized Steel, Passivated: Clean with water-based industrial strength cleaner. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion tape test" method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.
- L. Metals - Stainless Steel: Clean surfaces with pressurized steam, pressurized water, or water-based industrial cleaner.
- M. Plaster: Repair cracks, holes and other surface defects as required to maintain proper surface adhesion. Apply patching plaster or Joint compound and sand to produce surface flush with adjacent undamaged surface. Allow a full cure prior to coating application as recommended by the patching compound manufacturer's recommendations.
- N. Polyvinyl Chloride (PVC) Pipe: remove contaminants and markings with denatured alcohol scuff sand and wipe with solvent for maximum adhesion. Test adhesion before starting the job.
- O. Fiberglass Doors - remove contaminants with cleaning solvent (alcohol) scuff sand and wipe. Test adhesion of primer before starting job.
- P. Textiles - Insulated Coverings, Canvas or Cotton: Clean using high-pressure air and solvent of type recommended for material.
- Q. Wood:
  - 1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer; fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
  - 2. Remove mill marks and ink stamped grade marks.
  - 3. Apply primer coat to back of wood trim and paneling.
- R. Wood Doors: Seal door tops and bottoms prior to finishing.
- S. Wood Doors - Field-Glazed Frames and Sash: Prime or seal glazing channels prior to glazing.

### 3.4 APPLICATION - GENERAL

- A. Application of primers, paints, stains or coatings, by the Contractor, will serve as acceptance that surfaces were properly prepared in accordance with the manufacturer's recommendation.
- B. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions,

not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

- C. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
- D. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).
- E. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- F. Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- G. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- H. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

### 3.5 CLEANING

- A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
- B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
- D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- E. Remove protective materials.

### 3.6 PROTECTION AND REPAIR

- A. Protect completed coating applications from damage by subsequent construction activities until completion of painting project.
- B. Touch-up coatings damaged by subsequent construction activities.

END OF SECTION

**SECTION 271000 - STRUCTURED CABLING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Where Paragraphs of this Section conflict with similar paragraphs of the General and Supplementary Conditions and Division 1, requirements of this Section shall prevail.

**1.2 SUMMARY**

**A. General Requirements**

- 1. Only existing CommScope structured cabling equipment that is in production shall be bid. Equipment under development or in the planning stage will not be considered responsive. However, in order to indicate strategic direction, contractors may include future plans in a separate section with addendum material.
- 2. Upon WPUNJ's request, the successful contractor shall identify and present a local service facility of a duly authorized distributor of the equipment and material manufacturer that is a stocking distributor for the CommScope structured cabling system.
- 3. All equipment and material shall be new and of superior quality and reliability.
- 4. All installation shall be done in a neat, professional, and high quality manner, and in conformity with local and federal building codes and the CommScope structured cabling system configuration. All areas affected by installation, both inside and outside the buildings, will be restored to their former condition. The contractor is responsible for the cost of all repairs, painting and other restoration needed due to damage caused by the installation
- 5. The contractor shall provide all tools, equipment, test equipment, cleaning material, and miscellaneous hardware necessary for the cabling installation. Any equipment and material necessary for proper operation of the CommScope structured cabling system not specified or described herein shall be deemed as part of the specification.
- 6. An inspection of the entire installation shall be made prior to conducting performance and operational tests on the cable. The inspection of the cable shall be of the character and extent as to disclose an unsatisfactory condition, noncompliance in quality and/or code with installation specifications, or any other adverse conditions resulting from failure to meet standards or requirements as stated in this specification.
- 7. The contractor shall be responsible for the shipping, handling, and storage of all specified material and equipment.

**B. Contractor Requirements**

- 1. Furnish all labor, supervision, tooling, miscellaneous mounting hardware and consumables for each cabling system installed. Maintain current status with the warranting manufacturer, including all training requirements, for the duration of the cable infrastructure project. Staff each installation crew with the appropriate number of trained personnel, in accordance with the manufacturer/warranty contract agreement to support the 25-year system warranty requirements. After installation, submit all documentation to support the warranty in accordance with the manufacturer's warranty

requirements, including test results, and to apply for said warranty on behalf of the customer. The system warranty will cover the components and labor associated with the repair/replacement of any failed link as a result of a defective product when a valid warranty claim is submitted within the warranty period.

2. Establish a single point of contact (POC) with the customer who will be responsible for reporting progress and updating the customer's technical representative with issues that the owner must address to facilitate the cabling system installation. POC shall provide [weekly] written reports to the customer's technical representative detailing progress. Requests for access to limited access or restricted areas shall be made days prior to the required access. Information critical to the completion of the task or project shall be communicated to the customer's technical representative as the requirement becomes known. Casual information shall be passed during the scheduled progress report.
3. Maintain the customer's facility in a neat and orderly manner during the installation of the communications cabling system. The customer's facilities shall be maintained in broom clean condition at the completion of work each day. At the completion of work in each area, perform a final cleaning of debris prior to moving the installation crew to the next work area.
4. In an effort to meet LEED certification compliance, the selected contractor must provide all products specified as kitted single-packaged units under a single customized part number. Each complete packaged unit (i.e. per workstation or per rack assembly) will be priced per kit. This requirement helps maintain a "Waste-Free Construction" environment by transferring less packaging waste to the jobsite. After waste disposal, the selected contractor must provide a USGBC recycle certification document as evidence of their participation in LEED Waste Management practices. USGBC documentation will include the amount of construction waste diverted from landfill by volume and/or weight.
5. Contractors bidding and working on WPUNJ's infrastructure shall have a Registered Communication Distribution Designer (RCDD) on staff as accredited by the Building Industry Consulting Service International (BICSI).

C. Description: This section includes, but is not limited to, the following:

1. A complete and operational CommScope "SL" plenum rated structured cabling system consisting of Category 6A station cabling, fiber optic and copper backbone cabling, associated termination hardware, racks, and accessories. This structured cabling system is to support voice, data, wireless, security, AV, BMS, and other network connectivity requirements throughout the project. The cabling system shall be backed by a CommScope 25 year system and application assurance warranty. The warranty shall be facilitated by the contractor and be established between the WPUNJ and CommScope.
2. Backbone cabling system consisting of plenum rated, Category 6A cables, multi-mode OM-4 cable, single mode OS-2 cable, terminations, patch panels, enclosures, and accessories.

~~revised: 3. Outside plant cabling, consisting of 24 strands of single mode OS-2 indoor/outdoor rated cable and 24 strands of multi-mode OM-1 indoor/outdoor rated cable to be installed from the MPOE room in the new dormitory building through the mechanical room in High Mountain East and connecting to the campus network in the MPOE room in High Mountain West. The cables will be run in new conduits being installed from the new dormitory building to High Mountain East. From High Mountain East to High Mountain West the cables will be run in existing conduits which connect the two buildings.~~

4. Provide materials in quantities sufficient for complete installations as indicated in drawings and in this specification, whether or not all such components are contained in the drawings and specifications. D. Section Includes:

1. Pathways.
2. UTP cable
3. UTP cable hardware.
4. Optical fiber cable
5. Optical fiber cable hardware.
6. Coaxial cable
7. Coaxial cable hardware.
8. Equipment racks, cabinets and accessories.
9. Grounding.
10. Labeling.
11. Accessories.

### 1.3 STANDARDS

- A. ANSI/TIA-568-C.0: Generic Telecommunications Cabling for Customer Premises.
- B. ANSI/TIA-568-C.1: Commercial Building Telecommunications Cabling Standard.
- C. ANSI/TIA-568-C.2: Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
- D. ANSI/TIA-568-C.3: Optical Fiber Cabling Components Standard.
- E. ANSI/TIA-568-C.4: Broadband Coaxial Cabling and Components Standard, and addenda.
- F. ANSI/TIA/EIA-569-B: Commercial Building Standard for Telecommunications Pathways and Spaces.
- G. ANSI/TIA-569-D: Telecommunications Pathways and Spaces, and addenda
- H. ANSI/TIA/EIA-606-A: Labeling
- I. ANSI/TIA-606-B: Administration Standard for Telecommunications Infrastructure, and addenda
- J. ANSI/J-STD-607-A: Commercial Building Grounding and Bonding Requirements for Telecommunications.
- K. ANSI/TIA-607-B: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, and addenda.
- L. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balance Twisted-Pair Cabling.
- M. TIA-942-A: Telecommunications Infrastructure Standard for Data Centers, and addenda.
- N. TIA-492AAAC, Detail Specification for 850 nm Laser Optimized, 50-Micron Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers
- O. CommScope 409-5566 Rev J: Layout and Planning for Undercarpet Cabling System Customer Manual.
- P. American Society for Testing and Materials, (ASTM)
- Q. Building Industry Consulting Services International (BICSI)
- R. Federal Communications Commission (FCC)

- S. FCC Part 15 and Part 68
- T. Insulated Cable Engineers Association (ICEA)
- U. Institute of Electrical and Electronic Engineers, (IEEE)
- V. National Electrical Code (NEC)
- W. National Fire Protection Association (NFPA)
- X. Underwrites Lab (UL)
- Y. Governing Building Codes

#### **1.4 DEFINITIONS**

- A. As used in all Sections, "provide" means "furnish and install." "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project.
- B. Insofar as submittals, reviews, and approvals are concerned, the words "Architect" and "Engineer" may be used interchangeably in this division.
- C. Electronic Copy means copy in a searchable PDF format, and excludes scanned material and faxed material. Scanned material and faxed material shall not be submitted.

#### **1.5 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate, Pre-installation Meetings, Sequencing, Scheduling
  - 1. Coordinate statements with provisions of Division 01, Section 01 31 00 – Project Management and Coordination
  - 2. Coordinate with Division 01, Section 01 12 00 – Multiple Contract Summary (01 12 16 – Work Sequence)
  - 3. Coordinate with Division 01, Section 01 32 00 – Construction Progress Documentation (01 32 13 – Scheduling work)
  - 4. Additional requirements to be determined by WPUNJ

#### **1.6 SUBMITTALS**

- A. Product Data:
  - 1. Provide a summary spreadsheet showing each item and associated information identified below:
    - a. Date of submittal
    - b. Specification item paragraph number
    - c. Item name
    - d. Manufacturer description
    - e. Manufacturer part number
    - f. Acquisition lead time
    - g. Quantity required for the project



- h. Accessories and/or related items
  - i. "As specified" yes/no
  - j. If not as specified, provide "or equal" data to completely describe the proposed substitutes
  - k. Page number in submittal package where item product information starts (Provide spreadsheet entries and submittal product information in the same order as the items appear in the specification. For equipment and/or items not individually identified in the specification, include these items at the end.)
- 2. For each item, provide detailed manufacturer data sheets clearly marked, with colored arrows, to identify the manufacturer's name, the specific item and configuration being submitted, part number and acquisition lead time and date of submittal. Organize this information in the order identified in item "Product Data" above. Submittals that are not provided with the above information, and in the specified format, will be rejected.
- 3. Provide color selections for items that require color decisions. Provide physical material submissions of the items in the available colors, three copies or samples of each color selection set of options.
- 4. Submit documentation regarding the manufacturer's 25 year or greater extended warranty. The documentation is to include a sample of the warranty that will be provided to the customer when the installation is complete and documentation of the support procedure for warranty issues. Provide an application assurance manual documenting the vendor supported applications and application guidelines. In addition, furnish manufacturer's documentation stating the contractor is certified to perform warranty work.
- 5. After an item has been approved, changes in make, or part number shall not be permitted, unless:
  - a. Satisfactory written evidence is presented by the contractor, and approved by WPUNJ, that the manufacturer cannot make the scheduled delivery date of an approved item;
  - or
  - b. Other conditions become apparent indicating approval of the item to be substituted will be in the best interest of WPUNJ.
- 6. The contractor shall submit a cable and outlet identification plan to WPUNJ for approval before final cable and faceplate labels are installed.
- B. Shop Drawings:
  - 1. Provide one-line diagrams showing the devices, connections, cabling, routing, and related information. Identify each device, opening, pathway, conduit, tray, and/or system.
  - 2. Indicate typical layout including dimensions and other data necessary for satisfactory construction that are not shown in the contract documents.
  - 3. Submit detail drawings of changes made in the field due to issues that arose during install.
  - 4. Submit detail drawings of special accessory components not included in the CommScope product set.
  - 5. Provide the central drawing set to the owner at the conclusion of the project. File types for central inspection will be in PDF and CAD format. The marked up drawing set will accurately depict the as-built status of the system including termination locations, cable routing, and all administration labeling for the cabling system. In addition, a narrative will

be provided that describes any areas of difficulty encountered during the installation that could potentially cause problems to the telecommunications system.

**C. Manufacturer Instructions**

1. Customer's technical representative will make periodic inspection of the project in progress. One inspection will be performed at the conclusion of cable pulling, prior to closing the false ceiling to inspect the method of cable routing and support and the firestopping of penetrations. A second inspection will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with the TIS-568-C standards for jacket removal and pair untwist, compliance with manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly.

**D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified, provide two samples. Provide a complete color chart of available colors and finishes for each item. E. Contractor Qualifications:**

1. Provide reference information including, project name and description, contact name, email and telephone number, and project location for five projects of similar system, size and scope completed within the past two years.
2. Provide a technical resume for the Project Manager and on-site installation Supervisor assigned to this project. Include copies of certifications and evidence of training from manufacturers, industry organizations and field related training.
3. Identify subcontractors to be used on this project. The subcontractor(s) are required to possess the same credentials as documented above. The subcontractor's documentation must be included in the contractor documentation. The contractor will furnish the manufacturer's certification statement individually for both the contractor and subcontractor.
4. Provide evidence that the contractor is authorized by the manufacturer to furnish warranty services, components, and systems.
5. Installer
  - a. Maintain current status with the warranting manufacturer, including all training requirements, for the duration of the cable infrastructure project. Staff each installation crew with the appropriate number of trained personnel, in accordance with their manufacturer/warranty contract agreement, to support the 25 year warranty requirements. After installation, submit all documentation to support the warranty in accordance with the manufacturer's warranty requirements, including test results, and to apply for said warranty on behalf of the customer. The system warranty will cover the components and labor associated with the repair/replacement of any failed link as a result of a defective product when a valid warranty claim is submitted within the warranty period.

**F. Closeout Submittals, due upon substantial completion of the project:**

1. Operation and Maintenance Data: Provide operation, and maintenance manuals for each item/system.
2. As-built drawings, AutoCAD format, and PDF, which show the actual construction conditions and configurations. Make all modifications to these drawings by removing all superseded data and show the completed "As-Built" installation. The "As-Built" must be made available in the form of reproducible prints and an AutoCAD drawing file format for input to other systems. Maintain the as-built drawings throughout the project, and provide two hard copies, and electronic copies of the final conditions as-built drawings.

3. Deliver the completed Record Drawings, identified above, properly titled and dated to the Owner labeled "As-Built" drawings. These drawings are to be completed and delivered two (2) weeks prior to the cutover and become the property of the Owner.
4. Electronic copies of complete Owner and operating manuals and user guide for each system and record drawings. Instructions must include part numbers and names, addresses, and telephone numbers of parts source. After approval, provide electronic copies of the owner's and operating manuals and one hard copy of each, to the Owner.
5. Test and Evaluation Reports
  - a. Provide test documentation in a PDF format within three weeks after the completion of the project. The PDF(s) shall be clearly marked with the words "Test Results", the project name, and the date of completion (month and year). The file shall be organized by major heading tabs; Horizontal and Backbone. Each major heading shall be further sectioned by the test type. Within the horizontal and backbone sections, scanner test results (Category 6A), fiber optic attenuation test results, OTDR traces (if any), and green light test results shall be segregated by tab. Test data within each section shall be presented in the sequence listed in the administration records. The test equipment name, manufacturer, model number, and last calibration date will also be provided at the end of the document. The test document shall detail the test method used and the specific settings of the equipment during the test.
  - b. If the software used to document test results is proprietary, than the contractor will include the necessary software and licenses to read and store the test results.
  - c. When repairs and re-tests are performed, the problem and corrective action taken shall be noted, and both the failed and passed test data shall be collocated in the binder.
6. Provide the completed documentation for the warranty for all parts, components, labor, testing, and materials against defects, faulty workmanship, and/or failure for one full year following system(s) acceptance. Provide an additional Manufacturer's 25 year or longer extended warranty for materials, labor and application performance to the system industry specifications in place at the time of this award. The extended warranty is to be issued and backed by the Manufacturer of the structured cabling system. The warranty period is to be a minimum of 25 years from the date of Owner acceptance.

G. Submittals

The following is a summary table of the required submittals. It is provided as a reference, and is not a complete list of the required submittals, but provides guidance. Additional submittals may be required for the project. Refer to project documents for additional requirements. Submittals that require modification, replacement, additional information, and other changes are in addition to the submittals below, and are required as appropriate and/or required.

Submittal
Product Summary Spreadsheet
Product Data Sheets
Shop Drawings
Device Samples
Contractor Qualifications
O&M Manuals and Data, (electronic and hard copy)
As-built Drawings
Cable Test Results

Warranty Documentation
------------------------

H. AS-BUILT DOCUMENTATION

1. The contractor shall submit 3 copies of completed test results within 15 working days of test completion, in both electronic PDF and CAD and printed format. The submission shall include test print-outs of all new cables installed as a part of this project, using the methods specified in the Testing section of this specification.
2. The contractor shall submit 3 copies of a cable run summary in PDF format for the cabling installed as a part of this project. The cable run summary shall include the following information for each cable:
  - a. The outlet number
  - b. The cable number
  - c. The telecommunications room designation
  - d. The termination location, such as block, row, position, and/or port assignment
3. The contractor shall submit 3 copies of the marked-up "as-built" drawing(s) in PDF and CAD format to WPUNJ within 15 working days of completion of the Work (or each phase of the Work). As a minimum, the contractor shall annotate on a clean set of prints with the following information:
  - a. Any changes in the type or location of cable outlets, including all new outlet locations designated in "Red".
  - b. Outlet designations
  - c. The approximate routing of all cabling installed
  - d. All other pertinent information concerning the performance of the Work regarding "as-built" conditions that will provide a more accurate set of drawings.

I. Maintenance Contracts

1. Furnish an hourly rate with the proposal submittal which shall be valid for a period of one year from the date of acceptance. This rate will be used when cabling support is required to affect moves, adds, and changes (MACs) to the system. MACs performed by an authorized contractor shall not void the manufacturer's warranty.

J. Warranty Documentation

1. Facilitate a 25 year system performance warranty between the manufacturer and the owner.

1.7 WARRANTY

A. Manufacturer Warranty

1. Facilitate a 25 year system performance warranty and application assurance warranty between the manufacturer and the owner. An extended component warranty shall be provided which warrants functionality of all cabling and connectivity components used in the system for 25 years from the date of acceptance. The performance warranty shall warrant the installed copper and optical fiber portions of the cabling system. Copper and fiber optic drops shall be warranted to the link and channel performance as defined in the TIS-568-C standards.
2. Upon completion of the project, the customer's technical representative will perform a final inspection of the installed cabling system with the contractor's project foreman. The final

inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the aesthetic expectations of the customer.

3. Upon receipt of the test documentation, the customer reserves the right to perform spot testing of a representative sample of the cabling system to validate test results provided in the test document. Customer testing will use the same method employed by the contractor, and minor variations will be allowed to account for differences in test equipment and test variability. If significant discrepancies are found, the contractor will be notified for resolution.
4. During the three week period between final inspection and delivery of the test and as-built documentation, the customer will activate the cabling system. The customer will validate operation of the cabling system during this period.
5. Completion of the installation, in progress and final inspections, receipt of the test, receipt of the as-built documentation, and successful performance of the system for a two week period will constitute acceptance of the system.

**B. Contractor Warranty**

1. Provide all services, materials and equipment necessary for successful operation of entire telecommunications system and SCS system for a period of one year after system acceptance. Scope of warranty includes all equipment, devices, wiring, accessories, software, hardware, installation, programming, and configuration required to maintain a complete and operable system. Provide manufacturer's published recommended preventative maintenance procedures during warranty period. This shall apply to all items except those specifically excluded, or items wherein a longer period of service and warranty is specified or indicated. All warranties shall be effective for one year, minimum, from date Certificate of Final Acceptance is issued. Use of systems provided under this section for temporary services and facilities shall not constitute final acceptance of work nor beneficial use by Owner and shall not institute warranty period. The warranty shall cover repair or replacement of defective materials, equipment, workmanship, and installation that may be incurred during this period. Warranty work is to be done promptly and to Owner's satisfaction. In addition, warranty shall cover correction of damage caused in making necessary repairs and replacements under warranty. Additional warranty responsibilities are:
2. Obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in Owner's designated name. Replace material and equipment that require excessive service during guarantee period as determined by Owner.
3. Provide 2-business day service beginning on date of Substantial Completion and lasting until termination of warranty period. Service shall be at no cost to Owner. Service can be provided by installing contractor or by a separate service organization. Choice of service organization shall be subject to Owner's approval. Submit name and a phone number that will be answered on a 24-hour basis each day of week, for duration of service.
4. Submit copies of equipment and material warranties to Owner before final acceptance.
5. At end of warranty period, transfer manufacturers' equipment and material warranties still in force to Owner.
6. If warranty work problems cannot be corrected immediately to Owner's satisfaction, advise Owner in writing, describing efforts to correct situation, and provide analysis of cause for problem. If necessary to resolve problem, provide at no cost services of

manufacturer's engineering and technical staff at site in a timely manner to analyze warranty issues, and develop recommendations for correction, for review and approval by Owner.

7. Warrant the cabling system against defects in workmanship for a period of one year from the date of system acceptance. The warranty shall cover all labor and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. This warranty shall be provided at no additional cost to the owner.

#### 1.8 CERTIFICATIONS

- A. The contractor shall be manufacturer certified to install the specified CommScope structured cabling system that will provide a manufacturer's extended warranty of 25 years (minimum). The contractor shall submit proof of the manufacturer's certification as part of the bid response.
- B. The contractor shall have at least five (5) years of experience installing and servicing Telecommunication systems, and shall provide a list of completed projects equivalent in size and complexity to this project, with contact names and telephone numbers.
- C. The contractor shall have an RCDD on staff that will support the project in the capacity of Project Manager. The Project Manager shall have attended the CommScope structured cabling training class, and proof of attendance shall be submitted as part of the bid process. The project manager shall have demonstrated the ability to supervise a project of this magnitude and who shall attend project meetings while the work is in progress.
- D. The contractor shall submit in writing a list of qualified technicians assigned to this project, including relevant manufacturers training programs completed by each, and years of related experience of each.

#### 1.9 PERMITS

- A. The contractor shall be responsible for procuring all licenses and permits to perform the Work.

#### 1.10 GENERAL WORK STANDARDS

- A. All Work shall be performed in a professional manner, using practices of good craftsmanship.
- B. All cables shall have the specified connectors affixed using the tools specified by the manufacturer, using the tools specified by the manufacturer.
- C. All cables and outlets shall be labeled in accordance with the Cable Labeling and Identification section of this specification.
- D. The contractor shall be responsible for the daily removal of trash, debris, spent reels, and all other refuse related to this installation, as directed by the WPUNJ Facilities Manager.

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Schedule, arrange, and coordinate with involved parties/trades for shipments, arrivals, loading dock, elevators (as applicable), acceptance, storage, and security of equipment and materials. Assure that these activities do not interfere with other trades or the progress of the project.
- B. Deliver materials to site in manufacturer's original, unopened, protective containers and packaging, with labels clearly identifying product name and manufacturer.
- C. Store materials in secure, clean, and dry area indoors and protect materials according to manufacturer's specifications and recommended practices.

- D. Protect materials and finish from damage and moisture during handling and installation.

**1.12 BIDDERS INFORMATION**

**A. Working Hours**

1. All work shall be performed during normal business hours (a 7-hour day and 35-hour week, between the hours of 8:30 a.m. and 4:30 p.m.) or as determined by the project manager in agreement with WPUNJ. The work may be performed during off hours, with WPUNJ approval.
2. Specific portions of this project may be required to be performed during off hours. This work shall be coordinated and scheduled with WPUNJ Project Manager, and shall not affect the scheduled completion date. WPUNJ will NOT be responsible for any additional costs incurred for work being performed during off hours.

**B. Project Oversight**

1. The contractor's project manager shall be a Registered Communication Distribution Designer (RCDD). Proof of RCDD certification shall be provided with the bidder's proposal.
2. The contractor's RCDD project manager shall oversee the entire installation.
3. The contractor's project manager shall coordinate the scheduling of work with WPUNJ Project Manager and all other parties.

**C. Bidder Profiles**

1. The bidder shall furnish company related information, describing the structure of the organization, principals and related company personnel, and examples of reference projects relative to the scope of this specification. The bidder shall include names, addresses, and telephone numbers for reference projects listed.

**D. Bid Costs**

1. WPUNJ will not be responsible for any costs incurred in preparing responses to this document.

**E. Right of Rejection**

1. WPUNJ reserves the right to accept or reject any or all responses to this specification. Additionally, WPUNJ reserves the right to enter into discussions and/or negotiations with more than 1 qualified bidder at the same time, should this action be in WPUNJ's best interest.
2. WPUNJ reserves the right to terminate this contract, if in the opinion of WPUNJ, the performance of the contractor does not meet the standards set forth by WPUNJ in general, and in this specification in particular.

**F. Pricing Information**

1. The bidder shall submit pricing for furnishing and installing the complete cabling system, as described in this specification package. Pricing shall be broken down into "labor" and "materials".
2. The bidder shall provide a complete bill of materials for this project as a part of their submission.
3. The bidder shall submit pricing for furnishing and installing additional "Data" and "Voice" outlets and deleting "Voice" and "Data" outlets.

4. The bidder shall provide an hourly rate sheet for all personnel and labor categories, for the following:
  - a. Straight time work (during normal business hours).
  - b. Evening work (Monday through Friday, outside normal business hours).
  - c. Weekend time.
5. The bidder shall furnish a list of company holidays as a part of their response.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. General Requirements: Comply with ANSI/TIA/EIA-569-B.
- B. Cable Support: Cable supports shall be sized to allow a fill ratio that meets the standards specified herein and identified to support the Category of cabling being installed, designed to prevent degradation of cable performance and pinch points that could damage cable. Where not in conduit, EMT, or tray, provide J-hooks at a maximum of four foot intervals to support the cables.
- C. Cable Trays:
  1. Manufacturers: **Basor or equal**. Meet with the designated representative of the Owner prior to ordering cable tray. Confirm the actual required manufacturer, size and type. Do not order cable tray without designated representative of the Owner approval.
  2. Cable Tray Material: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing.
    - a. Basket Cable Tray Dimensions: Confirm all tray manufacturer, size and type with owner.
    - b. Provide mounts, supports, brackets, anchors, suspension materials, and accessories to ensure a complete and operational system.
- D. Conduit and boxes: comply with the requirements of other sections, relating to "raceway and boxes for electrical systems." Comply with these sections. Flexible metal conduit is not acceptable and shall not be used.

### 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated 3/4" by 48" by 96". Comply with requirements for plywood backing panels specified in "Rough Carpentry"

### 2.3 COMMUNICATIONS COPPER BACKBONE CABLING

- A. Manufacturers of station, patch, and copper backbone cable: CommScope
- B. Backbone voice cabling shall be 24 AWG, 25-pair U/UTP, white, UL/NEC CMR rated and be independently verified for compliance. Cable jacketing shall be lead-free. Cable shall be independently verified by ETL and shall meet the Category 5e performance requirements of TIA-568-C.2 and ISO Class D.
- C. Cable performance shall be independently verified and characterized to 100MHz. Cable shall be supplied on wooden reels. Cable shall be independently verified for flammability by ETL testing services and shall comply with NEC article 800, NFPA 70, and CMR (ANSI/UL 1666, IEC 3321).



D. Backbone cable shall be CommScope product part number 884021305/10.

1. INSTALLATION

- a. Install all systems in accordance with manufacturer's printed instructions.
- b. All backbone cables shall be installed in the following manner.
  - 1) Backbone cables shall be installed separately from horizontal distribution cables
  - 2) Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits or in separate innerduct(s) within conduits
  - 3) Where cables are installed in an air return plenum, the cable shall be installed in conduit, or plenum cable shall be installed in a plenum innerduct to provide protection to the cable
  - 4) Where backbone cables and distribution cables are installed in a cable tray or wire-way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables

E. Communications Patch Cords, Station Cords, and Cross-Connect Wire

1. Manufacturers: CommScope
2. Data and voice cable assemblies for the horizontal cross-connect and the workstation shall be Category 6A assemblies. Cable assemblies shall be factory-assembled by the manufacturer of the cabling system.
  - a. Voice and data cable assemblies used in each TR for horizontal cross-connect shall be standard category 6A RJ45 cable assemblies for panel to panel crossconnect or panel to switch interconnect. Voice and data cable assemblies at each workstation shall be category 6A RJ45 assemblies. Each workstation shall require one 10-foot cable assembly for each voice port and each data port.
3. Voice and data cross-connect and workstation cable assemblies shall be constructed with RJ45 modular plugs. The cable assemblies shall utilize colored cable and "snagless" cable boots. Cable assemblies shall meet the Category 6A performance requirements of TIA-568-C.2 and be factory-assembled.
4. Voice assemblies shall be Blue in color. Data workstation cable assemblies shall be Ivory in color and various colors for other applications to match Jack color and quantity. The color of each "Data" jack shall be determined and approved by WPUNJ before installation and determined by application. Patch cable assemblies shall be CommScope category 6A, UNC10G series cords. Part number per jacket color listed in Table 1 below, yyy=length in feet). Example: a Blue, UNC10G-BL10 foot, Blue cord is part number UC1AAA2-0ZF010.
5. Meet with the designated representative of the Owner prior to ordering patch and work area cords. Confirm the actual required cord lengths and colors. Do not order cords without designated representative of the Owner approval. Provide the patch cords to the designated representative of the Owner. Provide the labor for patching and labeling the cords in the closet for switch and equipment connections and cord connection and the work area between the outlets and Owner provided devices, or other devices. **Please see addendum for specific project requirements.**

Jacket Color	Product Name	Part Number
Gray	UNC10G-GY	UC1AAA2-0CFyyy
Blue	UNC10G -BL	UC1AAA2-0ZFyyy
Green	UNC10G -GR	UC1AAA2-0MFyyy
Red	UNC10G -RD	UC1AAA2-07Fyyy
White	UNC10G -WT	UC1AAA2-08Fyyy
Yellow	UNC10G -YL	UC1AAA2-09Fyyy
Black	UNC10G -BK	UC1AAA2-01Fyyy
Orange	UNC10G -OR	UC1AAA2-06Fyyy
Violet	UNC10G -VL	UC1AAA2-0LFyyy

**TABLE 1**  
**PATCH CORD JACKET COLOR CODES**

## 2.4 COMMUNICATIONS COPPER HORIZONTAL CABLING

- A. Manufacturers: CommScope
- B. Horizontal cabling for voice and data circuits shall be Category 6A 4-pair U/UTP, UL/NEC plenum rated, and be independently verified for compliance.
- C. Cable performance shall be independently verified and characterized to 600 MHz
- D. Category 6A U/UTP Series 640P Horizontal Cabling
  1. Horizontal cabling for voice and/or data circuits shall be 4-pair U/UTP, NEC/NFPA plenum rated and be independently verified for compliance. Cable performance shall be independently verified by ETL and Exceed the TIA-568-C.2 Category 6A requirements as shown in Cable chart 2a.
  2. Cable jacketing shall be lead-free. ~~Conductor insulation will utilize AirES technology.~~ Cable spline will be unique oblique elliptical offset filler for improved alien crosstalk. Cable shall be packaged on a 1000 ft. reels. Cable shall be independently verified for flammability by UL and shall comply with NEC article 800 and NFPA 70; [CMP (NFPA 262).
  3. Cable colors will be blue for voice, Gray for Data, and selected colors per special applications. **Please see addendum for specific project requirements.**
  4. Horizontal cable shall be CommScope products listed in Table 2 below.

Category 6A U/UTP	Packaging Reel, 1000 ft.	Part Numbers: CommScope <b>CS44P</b> Series			
		BL=Blue	WT=White	GY=Gray	YL=Yellow
		<b>CS44P BLU</b> <a href="#">UN874035114/10</a>	<b>CS44P WHT</b> <a href="#">UN874026814/10</a>	<b>CS44P GRY</b> <a href="#">UN874044414/10</a>	<b>CS44P YEL</b> <a href="#">UN874050014/10</a>
		GN=Green	OR=Orange	VT=Violet	BK= Black
		<b>CS44P GRN</b> <a href="#">UN874035914/10</a>	<b>CS44P ORG</b> <a href="#">UN874015814/10</a>	<b>CS44P VLT</b> <a href="#">UN874041614/10</a>	<b>CS44P BLK</b> <a href="#">UN874021414/10</a>

**TABLE 2**  
**HORIZONTAL CABLE PART NUMBERS**

5. Cable shall exceed all TIA and ISO Category 6A /Class E<sub>A</sub> requirements as well as meet the performance requirements listed in the Tables 3 and 4 shown below.

Frequency	IL, STD	IL, TYP	NEXT, STD	NEXT, TYP	ACR, STD	ACR, TYP	PSNEXT, STD	PSNEXT, TYP
1.00 MHz	2.1	1.8	74.3	90.6	72.2	88.8	72.3	88.3
4.00 MHz	3.8	3.6	65.3	82.4	61.5	78.8	63.3	80.2
8.00 MHz	5.3	5.1	60.8	77.6	55.4	72.5	58.8	75.8
10.00 MHz	5.9	5.7	59.3	76.4	53.4	70.7	57.3	74.4
16.00 MHz	7.5	7.3	56.2	73.1	48.8	65.9	54.2	71.3
20.00 MHz	8.4	8.1	54.8	71.5	46.4	63.4	52.8	69.7
25.00 MHz	9.4	9.1	53.3	70.2	44	61.1	51.3	68.3
31.25 MHz	10.5	10.2	51.9	68.6	41.4	58.4	49.9	66.7
62.50 MHz	15	14.6	47.4	64.2	32.4	49.6	45.4	62.3
100.00 MHz	19.1	18.6	44.3	60.8	25.2	42.1	42.3	59
155.00 MHz	24.1	23.4	41.4	58.4	17.4	35	39.4	56.4
200.00 MHz	27.6	26.8	39.8	56	12.2	29.2	37.8	54.2
250.00 MHz	31.1	30.1	38.3	54.3	7.3	24.2	36.3	52.5
300.00 MHz	34.3	33.1	37.1	53.1	2.9	19.9	35.1	51.2
350.00 MHz	37.2	36	36.1	51.8	-1.1	15.8	34.1	49.9
400.00 MHz	40.1	38.8	35.3	50.8	-4.8	12	33.3	48.8
500.00 MHz	45.3	43.6	33.8	47.9	-11.4	4.3	31.8	45.8
550.00 MHz		43.8		48		4.1		45.9
650.00 MHz		50.2		43.5		-6.7		41.5

**TABLE 3**  
**HORIZONTAL CABLE PERFORMANCE REQUIREMENTS**

Frequency	PSACR, STD	PSACR, TYP	ACRF, STD	ACRF, TYP	PSACRF, STD	ACRF, TYP	RL, STD	RL, TYP
1.00 MHz	70.2	86.5	67.8	82.1	64.8	80.3	20	32.2
4.00 MHz	59.5	76.6	55.8	70.1	52.8	68.4	23	33.9
8.00 MHz	53.4	70.7	49.7	64.1	46.7	62.3	24.5	36.7
10.00 MHz	51.4	68.7	47.8	62.2	44.8	60.4	25	37.7
16.00 MHz	46.8	64	43.7	58.2	40.7	56.4	25	38.7
20.00 MHz	44.4	61.6	41.8	56.4	38.8	54.5	25	38.7
25.00 MHz	42	59.2	39.8	54.5	36.8	52.6	24.3	35.5
31.25 MHz	39.4	56.5	37.9	52.7	34.9	50.7	23.6	37.2
62.50 MHz	30.4	47.7	31.9	46.6	28.9	44.7	21.5	34.6
100.00 MHz	23.2	40.3	27.8	42.5	24.8	40.5	20.1	30.3
155.00 MHz	15.4	33	24	38.9	21	37	18.8	30.8
200.00 MHz	10.2	27.4	21.8	36.6	18.8	34.6	18	30
250.00 MHz	5.3	22.3	19.8	34.6	16.8	32.6	17.3	30.5
300.00 MHz	0.9	18.1	18.3	33.1	15.3	31.2	16.8	31.1
350.00 MHz	-3.1	13.9	16.9	31.9	13.9	29.9	16.3	31.7
400.00 MHz	-6.8	10	15.8	30.6	12.8	28.6	15.9	31.5
500.00 MHz	-13.4	2.2	13.8	28.7	10.8	26.7	15.2	32
550.00 MHz	2		28.6		26.7		31.9	
650.00 MHz	-8.8		25.7		23.5		25.3	

**TABLE 4**  
**HORIZONTAL CABLE PERFORMANCE REQUIREMENTS**

6. Additional electrical and mechanical specifications are as follows:
- Mutual Capacitance: 5.6 nF/100 m @ 1khz
  - Conductor DC Resistance: 7.61 ohms/100 m | 2.32 ohms/100 ft

- c. Voltage: 300 VDC
- d. Delay Skew: 45 ns
- e. Propagation Delay: 536 ns/100 m @ 500 MHz
- f. Nominal Velocity of Propagation: 66%
- g. Operating Temperature: -20° C – 75° C (-4° F – 167° F)
- h. Storage Temperature: -20° C – 80° C (-4° F – 176° F)
- i. Installation Temperature: 5° C - 50° C (41° F - 122° F)
- j. Bend Radius: 4 × cable diameter
- k. Packaging:
  - 1000' Reel: 42 lbs./kft
  - 1000' Pull-box: 42 lbs./kft
- a. Materials: Conductors: 23 AWG, Solid Copper (0.0224" nominal)
  - Diameter Over Conductor: 0.889 mm | 0.035 in
  - Diameter Over Jacket, nominal: 7.239 mm | 0.285 in
- b. Compliances: UL Subject 444  
(UL)-C(UL) Type CMP  
ICEA S-90-661  
ETL Verified TIA-568-C.2 Category 6A Horizontal Cable Requirements  
ISO/IEC 11801 Category 6A Horizontal Cable Requirements

2002/95/EC RoHS IEEE 802.3at PoE+

E. Installation

1. Install all systems in accordance with manufacturer's printed instructions, as well as all WPUNJ's codes and standards.
2. All copper horizontal cables shall be installed in the following manner:
  - a. Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type
  - b. Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in this document
  - c. The cable's minimum bend radius of 4 times the cable diameter and maximum pulling tension of 25 lbs. shall not be exceeded
  - d. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals – at no point shall cable(s) rest on acoustic ceiling grids or panels
  - e. Horizontal distribution cables shall be bundled in groups of not greater than 40 cables (cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle)
  - f. Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware
  - g. The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices

- h. Cables shall not be attached to ceiling grid or lighting support wires
- i. Where light support for drop cable legs is required, install clips to support the cabling
- j. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced prior to final acceptance at no cost to the Owner
- k. Cables shall be identified by a self-adhesive label
- l. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate
- m. Cables shall be dressed and terminated in accordance with the recommendations in TIA-568-C standards, manufacturer's recommendations, and/or best industry practices.
- n. Pair untwist at the termination shall not exceed 0.25 inch for connecting hardware
- o. Cables shall be neatly bundled and dressed to their respective panels or blocks
- p. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame
- q. The cable jacket shall be maintained as close as possible to the termination point
- r. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties
- s. Cable labels shall not be obscured from view

## 2.5 UTP CABLE HARDWARE

- A. Manufacturers: CommScope
- B. Connecting Blocks: 110-style IDC. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- C. Termination block fields shall be mounted as noted in drawings, and shall be on the opposite side of the room from the room entrance. Backbone termination fields shall be mounted to the left of the horizontal voice fields. Conduits with 4" minimum diameter shall be used in all closets. Conduits for data backbone shall be located adjacent to the racks and conduits for voice shall be located adjacent to the voice termination fields. The Contractor shall provide innerduct for all backbone fiber runs. Contractor shall provide required ladder and wall-mount management rings to properly support and dress cables from conduits to racks and frames.
- D. Patch panels and fiber enclosures shall be contained in 19" x 7" rack(s) or cabinets. All equipment racks shall be augmented with horizontal and vertical cable management hardware, both front and rear, to properly dress horizontal cables and patch cords.
- E. Cable support management bars shall be installed onto racks at rear of patch panels.
- F. Product Options
  - 1. Category 6A Patch Panels
    - a. Horizontal termination for voice and data circuits shall consist of unloaded flat modular patch panel frames, with front loading 6 ports modular SL sized jack port bezels. Patch panels shall be configured with individually replaceable category 6A jacks wired to T568B. Modular jacks shall be compatible with CommScope SL series modular jack termination tool part number 1725150-6. 48 port panel is standard and is CommScope PN 760237041 | CPP-UDDM-SL-2U-48

- b. Each modular 6A jack shall be SL size, provided with an integral conductor lacing cap, integrated strain relief, integrated cutting blades to allow all four pairs of a four pair cable to be terminated at one time and removable replaceable color caps. Each modular 6A jack, CommScope part number **USL10G-xx (xx=color)**, shall be provided separately.
- c. The front of each 6-port module shall include and be capable of accepting 9mm to 12mm labels with clear plastic covers and black plastic covers for adhesive labels; ports shall be capable of accepting an icon to indicate its function.
- d. **Please see addendum for specific project requirements.** Patch panels shall be CommScope products listed in Table 5 below:

<u>Description</u>	<u>Port Count</u>	<u>Rack Mount</u>		<u>Part Numbers</u>
		<u>Units</u>		
SL Series Patch Panels (Modular)	24	1U	Flat	CPP-UDDM-SL-1U-24
			Angled	CPPA-UDDM-SL-1U-24
SL Series Patch Panels (Modular)	48	2U	Flat	CPP-UDDM-SL-2U-48
			Angled	CPPA-UDDM-SL-2U-48

**TABLE 5**  
**PATCH PANEL PART NUMBERS**

- G. Horizontal cable management: provide horizontal cable management as indicated.
- H. Communications Faceplates and Connectors
  1. Wall and modular furniture faceplates shall contain "SL" sized Category 6A jacks and inserts for voice and data communications. Faceplate jacks shall be terminated with Category 6A cables and inserted into the communications faceplate. Faceplates shall be 2 and 4 port with angled port openings to secure jacks to be flush to plate surface and not protruding past plate surface. Standard configuration will be one Blue jack for voice and one data jack colored per application. Special 6 and 8 port configurations will be flush non-angled and noted on drawing. Label and or Icons requirements and scheme will be discussed with WPUNJ and contractor and inclusive in termination estimate.
  2. Manufacturers: CommScope or approved equal
  3. Product Options
    - a. Category 6A Jacks
      - 1) Communications faceplate ports shall contain Category 6A jacks. Jacks shall be terminated to the horizontal cabling and inserted into the communications faceplate. Two port faceplate shall contain a minimum of one data port and one voice port.
      - 2) Modular jacks shall be un-keyed, 4-pair, RJ-45, and shall fit in a .790" x .582" opening (SL).
        - a) Termination of RJ45 modular jacks shall be completed using a hand tool which employs a fully repeatable, self-centering, non-impact mechanical termination process. This process shall simultaneously cut and terminate all 8 conductors. CommScope SL Tool **1725150-6**
      - 3) ~~Modular jacks shall terminate using the SL Series modular jack termination tool part number 1725150.~~

- 4) ~~Jacks shall employ an integral lacing fixture for easy wire lacing, integrated strain relief with cable jacket stop features. Jacks shall include integrated cutting blades for automatically trimming conductors consistently, and have removable replaceable color caps. Each modular jack shall be wired to T568B and shall accommodate cable with a maximum O.D. of 9.00 mm.~~
- 5) The insulation displacement contacts shall be capable of terminating 24-22 AWG solid or 24 AWG stranded conductors with a maximum insulation diameter of 1.60 mm.
- 6) The insulation displacement contacts shall be paired with additional space between pairs to improve crosstalk performance.
- 7) Each modular jack shall meet the ANSI/TIA-568-C.2 and ISO 11801, Category 6A performance standards and the requirements listed in the following table:
- 8) **Please see addendum for specific project requirements.** Voice and data jacks shall be CommScope products listed in Table 6 below:

Description	Part Number
CommScope Category 6A U/UTP SL Modular Jack; Almond/Ivory – Data	USL10G-ALD
CommScope Category 6A U/UTP SL Modular Jack; Black – Not Used	USL10G-BLK
CommScope Category 6A U/UTP SL Modular Jack; Gray – Not Used	USL10G-GRY
CommScope® Category 6A U/UTP Cord, Plenum, RJ45 to Ceiling connector, 18in, white (Other lengths available)	CCA-CAT6A- PLENUM-WH- N018 760235592
CommScope Category 6A U/UTP SL Modular Jack; Blue – Voice	USL10G-BLU
CommScope Category 6A U/UTP SL Modular Jack; Red – Not Used	USL10G-RED
CommScope Category 6A U/UTP SL Modular Jack; Yellow – A/V	USL10G-YEL
CommScope Category 6A U/UTP SL Modular Jack; Green - Security	USL10G-GRN
CommScope Category 6A U/UTP SL Modular Jack; <b>Violet</b> - IEL	USL10G-VIO
CommScope Category 6A U/UTP SL Modular Jack; White – Not Used	USL10G-A.WHT
<del>X=color: 2-Black; 5-Orange; 8-Yellow; 9-Green; 1-1 Ivory; 1-3 White; 4-Gray; 7-Red; 6-Blue; 1-0-Violet; 1-Almond</del>	

**Table 6**  
**Cat 6A Jack Part Numbers**

- 9) Electrical performance shall be guaranteed to meet or exceed the channel specifications of ISO/IEC 11801 Class EA and ANSI/TIA-568-C Category 6A as well as to meet the specifications listed below:

PART 3 - REQ MHZ	INSERTION LOSS dB/100 m	RETURN LOSS dB/100 m	NEXT dB/100 m	PSNEXT dB/100 m
<b>0.772</b>	2.1	19.0	65.0	62.0
<b>1</b>	2.3	19.0	65.0	62.0
<b>4</b>	4.2	19.0	63.0	60.5
<b>8</b>	5.8	19.0	58.2	55.6



<b>10</b>	6.5	19.0	56.6	54.0
<b>16</b>	8.2	18.0	53.2	50.6
<b>20</b>	9.2	17.5	51.6	49.0
<b>25</b>	10.2	17.0	50.0	47.3
<b>31.25</b>	11.5	16.5	48.4	45.7
<b>62.5</b>	16.4	14.0	43.4	40.6
<b>100</b>	20.9	12.0	39.9	37.1
<b>200</b>	30.1	9.0	34.8	31.9
<b>250</b>	33.9	8.0	33.1	30.2
<b>300</b>	37.4	7.2	31.7	28.8
<b>400</b>	43.6	6.0	28.7	25.8
<b>500</b>	49.3	6.0	26.1	23.2

#### Materials

Material Jack Housing:	Polycarbonate, stainless steel fiber filled
Lacing Fixture:	Polycarbonate
Interface Contacts:	Beryllium copper, plated with 1.27 µm [50 µin] minimum thick gold in localized area and 3.81 µm [150 µin] minimum thick matte tin in solder area over 1.27 µm minimum thick nickel underplate
Insulation Displacement Contacts:	Phosphorous bronze, plated with 3.81 µm [150 µin] minimum thick matte tin over 1.27 µm [50 µin] minimum thick nickel underplate
Cutting Blades:	Stainless steel
Integral Dust Cover:	Polycarbonate

#### Electrical

Voltage:	150 VAC Max
Operating Temperature:	-40° to 70° C (-40° to 158° F)

#### Mechanical

Modular Jack:	750 mating cycles
Insulation Displacement Contacts:	Accept solid, 24-22 AWG conductors or stranded 24 AWG conductors with a maximum insulation diameter of 1.60 mm
Cable Outside Diameter:	Accepts cables with a maximum O.D. of 9.00 mm

#### UL Listed to U.S. and Canadian safety standards

UL File Number:	E81956
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#### b. Wall Faceplates

- 1) Standard work area wall configuration shall be single gang 2 or 4 port Angled faceplate. Special applications will require 6 or 8 port faceplates per drawing.
- 2) Standard Faceplate color is Almond (Ivory); Data/voice jacks shall be loaded with SL modular jacks. Faceplates shall contain labeling requirements to be discussed at meeting with contractor.
- 3) **Please see addendum for specific project requirements.** Faceplates shall be CommScope products listed in Table 7 below (x=color)



Description	Box Size	Part Number
Angled 2-Port Faceplate	Single Gang	1375155-1
Angled 4-Port Faceplate	Single Gang	406185-1
SL Blank Insert	Single Gang	1116412-2
1-Port Wall Phone Faceplate Stainless	Single Gang	Semtron 1FM-0E- AMP-Phone
6-Port Faceplate	Single Gang	2111012-1
<del>6-Port Faceplate</del>	<del>Double Gang</del>	<del>2111013-1</del>
<del>8-Port Faceplate</del>	<del>Double Gang</del>	<del>2111014-1</del>
Surface Mount Module, 2 port, alpine white (security)	2 Port SMB	1-1933668-3

**Table 7**  
**Faceplate Part Numbers**

### 3.2 OPTICAL FIBER BACKBONE CABLING

- A. Manufacturers: CommScope or approved equal
- B. All new Intra-building premises distribution backbone data cable shall consist of 900µm tight-buffered, 850nm laser-optimized OM4 50/125 multimode & Singlemode OS2 in plenum type surrounded with dielectric central strength member.
- C. Backbone OSP data cable shall be ~~OM1-62.5 multimode and~~ Singlemode OS2 and armored or all-dielectric outside plant cable (OSP). The OSP cable shall consist of strain-free 250µm TIA color-coated fibers encased in a colored buffer tube filled with a water-barrier filling compound.
- D. Cable shall be tested to comply with the most recent revision of TIA-568-C.3 and ISO/IEC 11801 standards, and their published addenda.
- E. Distribution backbone fiber cabling shall be CommScope products listed in Tables 8 and 9 below.

Premises Distribution							
Fiber Count	UL/NEC Rating	OM4 Armored	<del>OM3 Armored</del>	OM4 Non-armored	<del>OM3 Non-armored</del>	Singlemode Non-armored	Singlemode Armored
6	Riser	N/A	N/A	N/A	N/A	N/A	N/A
	Plenum	N/A	N/A	N/A	700009772	760004333	N/A
12	Riser	760127514	N/A	760012112	N/A	760004440	N/A
	Plenum	760128017	760127647	760006411	700009734	760004358	760127803
24	Riser	760127407	N/A	760018564	N/A	N/A	N/A
	Plenum	760127910	N/A	760018697	N/A	760018630	N/A

**TABLE 8**

#### F. Inter-building Outside Plant (OSP) Backbone Cabling for Data Circuits

1. Backbone OSP data cable shall be ~~OM1-62.5 multimode or~~ Singlemode OS2 and [armored or all-dielectric] outside plant cable (OSP). The OSP cable shall consist of strain-free 250µm TIA color-coated fibers encased in a colored buffer tube filled with a water-barrier

filling compound. All-dielectric cable constructions shall have water-blocking outer strength members and a medium-density polyethylene (MDPE) black outer jacket.

2. Cable shall be tested to comply with the most recent revision of TIA-568-C.3, ISO/IEC 11801, ICEA-640, Telcordia, and GR-20-CORE standards, and their published addenda.
3. Inter-building backbone outside plant fiber cabling shall be CommScope products listed in Table 10 below.

Loose-tube Non-Armored OSP Fiber Cable		
Fiber Count	Fiber Type	All-Dielectric Part Number
12	OM1	760053959
	Singlemode	760053843
24	OM1	760053967
	Singlemode	760053850
48	OM1	760053983
	Singlemode	760053876
72	OM1	760054007
	Singlemode	760053892
144	OM1	<del>760054023</del>
	Singlemode	760053918

**TABLE 10**  
**INTER-BUILDING OSP FIBER BACKBONE CABLE PART NUMBERS**

- G. Provide in strand counts indicated.
- H. Installation
  1. Install all systems in accordance with manufacturer's printed instructions, as well as all WPUNJ's codes and standards.
  2. All backbone cables shall be installed in the following manner.
    - a. Backbone cables shall be installed separately from horizontal distribution cables
    - b. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits or in separate innerduct(s) within conduits
    - c. Where cables are installed in an air return plenum, the cable shall be installed in conduit, or plenum cable shall be installed in a plenum innerduct to provide protection to the cable
    - d. Where backbone cables and distribution cables are installed in a cable tray or wire-way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables

1. Manufacturers: CommScope
2. Backbone data cable assemblies shall be optical fiber assemblies factory-terminated using duplex connectors and match feed cabling, OS2 singlemode, OM4 Multimode as per design.
3. Optical fiber cable assemblies shall be duplex LC or SC (depending upon the electronic interface).
4. Optical fiber cable assemblies shall be OFNR rated.
5. Optical fiber cable assemblies shall be CommScope product part number ~~FEXLCLC42-MXMxxx~~ or ~~FEXLCSC42-MXMxxx~~ (xxx=length in meters).
6. Meet with the designated representative of the Owner prior to ordering patch cords. Confirm the actual required cord quantities, lengths and colors. Do not order cords without designated representative of the Owner approval. Provide the patch cords to the designated representative of the Owner. Provide the labor for patching and labeling the cords in the closet.

### 3.3 OPTICAL FIBER HORIZONTAL CABLING

#### A. Manufacturers; CommScope

1. Horizontal optical fiber cabling shall be 6 strand 50/125µm OM4 optical fiber cable terminated with LC duplex connectors.
2. Horizontal optical fiber shall meet the performance requirements of TIA-568-C.3 standard.
3. 50/125µm OM4 Horizontal Indoor Fiber Optic Cabling
  - a. Horizontal data cable shall be all-dielectric and shall consist of four 900µm tight-buffered 50/125um fibers surrounded by aramid strength members and a PVC outer jacket.
  - b. The cable shall have a UL Plenum rated.
  - c. Cable shall meet the performance requirements of TIA-568-C.3 and ISO/IEC 11801 standards.
  - d. The cable jacket shall be Aqua.
  - e. The cable shall be OM4 CommScope product part numbers:

Fiber Count	Armored Plenum	Part Number		Non-armored Plenum	Part Number
4	<del>P-004-DZ-5L-FSUAQ</del>	<del>760128140</del>		<del>P-004-DS-5G-FSULM</del>	<del>760229369</del>
6	P-006-DZ-5K-FSUAQ	760128181		P-006-DS-5K-FSUAQ	760012138
12	P-012-DZ-5K-FSUAQ	760128017		P-012-DS-5K-FSUAQ	760006411
24	P-024-DZ-5K-FSUAQ	760127910		P-024-DS-5K-FSUAQ	760018697

4. Installation
  - a. Install all systems in accordance with manufacturer's printed instructions, as well as WPUNJ's codes and standards.
  - b. All Optical Fiber horizontal cables shall be installed in the following manner:
    - 1) Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type

- 2) Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in this document
- 3) Where cable splices are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose
- 4) ~~Two and four fiber horizontal cables shall support a bend radius of 25 mm (1 in) under no load conditions. Two and four fiber cables intended to be pulled through horizontal pathways during installation shall support a bend radius of 50 mm (2 in) under a pull load of 222 N (50 lbf).~~
- 5) If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals – at no point shall cable(s) rest on acoustic ceiling grids or panels
- 6) Horizontal distribution cables shall be bundled in groups of not greater than 40 cables (cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle)
- 7) Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware
- 8) The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices
- 9) Cables shall not be attached to ceiling grid or lighting support wires
- 10) Where light support for drop cable legs is required, the Contractor shall install clips to support the cabling
- 11) Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner
- 12) Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification
- 13) The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate
- 14) Cables shall be dressed and terminated in accordance with the recommendations made in the TIA-568-C standards and published addenda, manufacturer's recommendations, and/or best industry practices.
- 15) Cables shall be neatly bundled and dressed to their respective panels
- 16) Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties
- 17) Cable labels shall not be obscured from view
- 18) Fiber slack shall be neatly coiled within the fiber termination enclosures or in rack-mount fiber management enclosures
- 19) No slack loops shall be allowed external to the fiber enclosure(s)
- 20) Each cable shall be individually attached to the respective termination panel by mechanical means
- 21) The cable strength member(s) shall be securely attached the cable strain relief bracket in the panel

- 22) Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the termination panel
- 23) Each cable shall be clearly labeled at the entrance to the termination panel
- 24) Dust caps shall be installed on the connectors and couplings at all times unless physically connected

### 3.4 OPTICAL FIBER CABLE HARDWARE

#### A. Manufacturers: CommScope

##### 1. 1U, 2U and 4U Rack Mount Fiber Patch Enclosures

- a. Fiber optic enclosures shall be capable of containing up to 72 (1RU), 144 (2RU) or 288 (4RU) fibers in LC form factor.
- b. Enclosures shall be designed to protect against bend radius violations.
- c. Enclosures shall ensure that cable routing paths for all fibers are clear and cable congestion is minimized,
- d. Enclosures shall include a hinged front door for protection. The door shall be easily removable for safe, easy access to installed connectors.
- e. **Please see addendum for specific project requirements.** Fiber Optic Rack & Wall Mount Panels shall be CommScope, product part numbers:

Product Code	Part Number	Description
SD-1u	760231449	sliding fiber rack panel, accepts (3) LGX Plates
SD-2u	760231456	sliding fiber rack panel, accepts (6) LGX Plates
SD-4u	760231464	sliding fiber rack panel, accepts (12) LGX Plates
WBE-EMT-BK/2P-PNL	760147496	Wall Mount (Accepts 2 PNL-type adapter panels)
WBE-EMT-BK/4P-PNL	760147504	Wall Mount (Accepts 4 PNL-type adapter panels)
WBE-EMT-BK/8P-PNL	760147512	Wall Mount (Accepts 8 PNL-type adapter panels)

- f. Adapter plates shall be installed into rack-mount or wall mount fiber optic enclosure. Adapter plates shall be COMMScope product part number listed in Table 11 below:

Fiber Strands	Adapter plates		Part Number
12	LC adapter single-mode, 12-fiber, blue	PNL-BK-012-SFA-LC12-BL	760148254
24	LC adapter single-mode, 24-fiber, blue	PNL-BK-024-SFA-LC02-BL-NS	760148361
6	SC adapter single-mode, 6-fiber, blue	PNL-BK-006-SFA-SC06-BL	760148213
12	SC adapter single-mode, 12-fiber, blue	PNL-BK-012-SFA-SC02-BL	760027714
12	LC adapter OM1, 12-fiber, Beige	PNL-BK-012-MFA-LC12-BG	760148064
24	LC adapter OM1, 24-fiber, Beige	PNL-BK-024-MFA-LC02-BG-NS	760148189
6	SC adapter OM1, 6-fiber, Beige	PNL-BK-006-MFA-SC06-BG	760147983
12	SC adapter OM1, 12-fiber, Beige	PNL-BK-012-MFA-SC02-BG	760021790
12	LC adapter OM 3&4, 12-fiber, Aqua	PNL-BK-012-MFA-LC12-AQ	760148056
24	LC adapter OM 3&4, 24-fiber, Aqua	PNL-BK-024-MFA-LC02-AQ-NS	760148171

6	SC adapter OM 3&4, 6-fiber, Aqua	PNL-BK-006-MFA-SC06-AQ	760147975
12	SC adapter OM 3&4, 12-fiber, Aqua	PNL-BK-012-MFA-SC02-AQ	760066076
0	Blank Plate	PNL-BK-BLANK	760147751

**TABLE 11**  
**FIBER PANEL ADAPTER PACKS PART NUMBERS**

- g. Cross-connect patch cords are also required for security.
- h. All punch down blocks must be cross-connected.

### 3.5 EQUIPMENT RACKS, CABINETS, FRAMES AND ENCLOSURES

- A. Manufacturers: open racks in MDF or IDFs, by the following, CommScope
- B. The telecommunication rooms shall house racks, voice termination fields, and required cable routing hardware. Racks shall be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side. If one mounting rail of the rack is placed against a wall, the mounting rail shall be no closer than 6" to the wall to allow room for vertical management. Where there is more than one rack, the racks shall be ganged with vertical management hardware to provide interbay management. Ganged rack frames will be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side of the ganged assembly. In all closets the racks shall be on the opposite side of the room from the voice termination fields.
- C. All equipment racks shall be augmented with horizontal and vertical cable management hardware, both front and rear, to properly dress horizontal cables and patch cords.
- D. Product Options
  - 1. Horizontal Cable Management Panels
    - a. Horizontal cable management fingers shall be black UL 94V-0 polycarbonate.
    - b. Shall be 2U, single sided, 5.5" deep; CommScope part number 1933532-1
    - c. Management front and rear covers shall be 5052-H32 2.29 mm [0.09 in] aluminum with a flat black polyester powder coating finish (1F59126).
    - d. Management spacers and uprights shall be 6063-T6 Aluminum with a flat black polyester powder coating finish (1F59126)
    - e. **Please see addendum for specific project requirements.** Optional Management Panel sizes listed for convenience in Table 12 below:

Description	Part Number
Horizontal 1U management panel, single sided, 5.5" deep	1933530-1
Horizontal 1U management panel, double sided, 5.5" deep front and rear	1933531-1
<i>Horizontal 2U management panel, single sided, 5.5" deep; WPUNJ Spec.</i>	1933532-1
Horizontal 2U management panel, double sided, 5.5" deep front and rear	1933533-1
Horizontal 3U management panel, single sided, 5.5" deep	1933561-1

Horizontal 3U management panel, double sided, 5.5" deep front and rear	1933562-1
<del>Horizontal 1U management panel, single sided, 8" deep</del>	<del>1933564-1</del>
<del>Horizontal 1U management panel, double sided, 8" deep front and rear</del>	<del>1933565-1</del>
Horizontal 2U management panel, single sided, 8" deep	1933566-1
Horizontal 2U management panel, double sided, 8" deep front and rear	1933567-1
<del>Horizontal 3U management panel, single sided, 8" deep</del>	<del>1933568-1</del>
<del>Horizontal 3U management panel, double sided, 8" deep front and rear</del>	<del>1933569-1</del>

**TABLE 12**  
**Horizontal Cable Management Part Numbers**

2. Vertical Cable Management

- a. Vertical cable managers shall be 84" high, double sided with 8.5" deep standard fingers front side fingers and rear side fingers or gates.
- b. Management fingers shall be black UL 94V-0 polycarbonate.
- c. Management front and rear covers shall be 5052-H32 2.29 mm 0.09 in aluminum with a flat black polyester powder coating finish (1F59126).
- d. Management spacers and uprights shall be 6063-T6 Aluminum with a flat black polyester powder coating finish (1F59126)
- e. **Please see addendum for specific project requirements.** Vertical cable managers shall be COMMSCOPE products listed in Table 13 below:

Description	Part Number
Vertical cable managers, 84", double sided, 6" W, 8.5" deep front and rear, Standard fingers front and rear	1933534-1
Vertical cable managers, 84", double sided, 10" W, 8.5" deep front and rear, Standard fingers front and rear	1933535-1
Vertical cable managers, 84", double sided, 12" W, 8.5" deep front and rear, Standard fingers front and rear	1933536-1
<del>Vertical cable managers, 84", double sided, 12" W, 11" deep front and rear, Extended fingers front and rear</del>	<del>1933539-1</del>
Vertical cable managers, 84", double sided, 6" W, 8.5" deep front and rear, Standard fingers front, Open fingers rear	1933540-1
Vertical cable managers, 84", double sided, 10" W, 8.5" deep front and rear, Standard fingers front, Open fingers rear	1933541-1
Vertical cable managers, 84", double sided, 12" W, 8.5" deep front and rear, Standard fingers front, Open fingers rear	1933542-1

**TABLE 13**  
**VERTICAL CABLE MANAGEMENT PART NUMBERS**

3. Equipment Racks

- a. Equipment racks shall be 19" 2-post or 4-post style. Racks shall be 84" high with 3" deep channels.
  - b. Two post racks shall have double sided EIA universal 3" channel depth rails with 0.625 in, 0.625 in, 0.5 inch mounting spaces, #12-24 pre-tapped mounting holes, and stamped RMU (rack mount unit) markings. Two post racks shall be 6061-T6 aluminum alloy, have a load rating of 1200 lbs. (544 kg) (when evenly distributed across rack height), and conform to EIA-310-D.
  - c. Four-post rack shall have double sided EIA universal 3" channel depth rails with nearly 360° of access and be completely open to allow excess heat from equipment to quickly dissipate. Four post rack rails shall have 0.625, 0.625, 0.5 inch mounting spaces, #12-24 pre-tapped mounting holes, and RMU (rack mount unit) markings. Rack depth shall be adjustable in 1 inch increments from 30 to 36 inches (overall depth). Four post racks shall be made from 6061-T6 aluminum alloy, have a flat black powder coating, and have a load rating of 2000 lbs. (907 kg) (evenly distributed across rack height). Four post racks shall conform to EIA310-E.
  - d. Equipment racks shall be CommScope product part number 1933559-1 and/or 1933570-1
4. Finishes
- a. Cable management and equipment racks shall be black in color.
- E. Power Distribution Units
- 1. Meet with the designated representative of the Owner prior to ordering power distribution units. Confirm the actual required manufacturer, size and type/product number. Do not order power distribution units without designated representative of the Owner approval.

### 3.6 GROUNDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI/J-STD-607-A.

### 3.7 IDENTIFICATION PRODUCTS

- A. Manufacturers: CommScope
- B. Develop and submit for approval a labeling system for the cable installation based on TIA-606-A standards. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cable origin and destination and a unique identifier for each cable within the system. Racks and patch panels shall be labeled to identify the location within the cabling system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- C. Labeling software shall be compliant with TIA-606-A and shall be able to produce complex unique identifiers of up to 12 independent segments. Labeling software shall be capable of inserting symbols as well as use any standard true type font as well as capable of saving individual build information and of fine tuning print adjustments. Labeling software shall be compatible with CommScope products.
- D. Cable Labels
  - 1. Cable labels shall be self-adhesive, self-laminating, pre-cut, and laser-printer compatible. Labels shall be used with [4-pair horizontal copper cable], be [0.984" x 1.496" (4-Pair)] in



size and be divided [48 (4-Pair)] labels per sheet with each sheet being 8.5" x 11". Cable labels shall be CommScope product part number [1479002-X and/or 1479003-X (X denotes packaging, see Table below:

Description	Labels per Sheet	Sheets per Pack	Labels per Pack	Part Number
4-Pair Label	48	5	240	1479002-1
		100	4800	5-1479002-1
<del>25-Pair Label</del>	<del>24</del>	5	<del>120</del>	<del>1479003-1</del>
		100	<del>2400</del>	<del>5-1479003-1</del>

**TABLE 14 CABLE LABEL PART  
NUMBERS**

2. Color as selected by Architect.
3. The labeling shall be machine-generated and affixed to the cable, faceplate, patch panel, rack or other hardware.
4. Labels shall be affixed in a level and square position.

#### PART 4 - EXECUTION

##### 4.1 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used unless otherwise noted. Conceal pathways and cables unless otherwise noted.
- B. Coordinate telecommunications outlet/connector locations with Architectural drawings and associated electrical outlets. Provide the necessary hardware, accessories, and miscellaneous parts for a complete installation.

##### 4.2 DAMAGE

- A. Any cuts, abrasions, burns, stretched segments, and/or other damage that will be detrimental to the performance of that cable shall be cause for replacement of that entire segment of cable.
- B. Incidental damage to cables and connectors shall be corrected at the contractor's expense before testing and final acceptance of cables.

##### 4.3 INSTALLATION OF CABLES

- A. Install all systems in accordance with manufacturer's printed instructions, as well as WPUNJ's codes and standards.
- B. Four pair UTP cabling wiring scheme, 568B.
- C. General Requirements for Cabling:
  1. Comply with ANSI/TIA-568-C.1.
  2. Comply with NECA 1.
  3. Comply with BICSI ITSIM, Cable Termination Practices.

4. Install 110-style IDC termination hardware unless otherwise indicated.
5. Terminate conductors; no cable shall contain un-terminated elements unless otherwise noted. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 4 feet. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, install lacing bars and distribution spools.
8. Install conductors parallel with or at right angles to sides and back of enclosure.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to manufacturer recommended temperature before installing. Heat lamps shall not be used for heating.
11. Route cables, in bundles of no more than fifty. Bundle cables using Hook and Loop wire management straps, tie wraps are not acceptable.
12. In the communications equipment room, install a 10 foot long cable service loop.
13. In the ceiling above the work area outlet, install a 5 foot long cable service loop, secured on a J-hook that is suspended from the building structure, or mounted to sheet rock or a stud above the entry to the raceway to the outlet box.
14. Comply with manufacturer and industry pulling tension limits.
15. The contractor shall install, dress, and terminate all station cabling in a professional manner, using practices of good craftsmanship. Where communications cabling must cross power cables/conduits, they shall cross at right angles (90-degrees) to the power runs. A minimum of 12 inches of separation from power cables/conduits shall be maintained where communications and power cabling follow the same route.
16. The following minimum separation distances between power cables/conduits of 480 volts or less and voice backbone cable(s) shall be maintained where communications and power cabling follow the same route.

Condition	< 2kVa	2 to 5 kVa	> 5kVa
Unshielded power lines or electrical equipment in proximity to open or non-metal pathways	5-inches	12-inches	24-inches
Unshielded power lines or electrical equipment in proximity to grounded metal conduit pathways	2.5-inches	6-inches	12-inches
Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway		3-inches	6-inches

In addition, all cabling shall be a minimum of 12-inches from fluorescent light fixtures and 72 inches from electrical transformers and motors.

D. All Optical Fiber horizontal cables shall be installed in the following manner:

1. Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type

2. Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in this document
3. Where cable splices are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose
4. Two and four fiber horizontal cables shall support a bend radius of 25 mm (1 in) under no-load conditions. Two and four fiber cables intended to be pulled through horizontal pathways during installation shall support a bend radius of 50 mm (2 in) under a pull load of 222 N (50 lbf).
5. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals – at no point shall cable(s) rest on acoustic ceiling grids or panels
6. Horizontal distribution cables shall be bundled in groups of not greater than 40 cables (cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle)
7. Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware
8. The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices
9. Cables shall not be attached to ceiling grid or lighting support wires
10. Where light support for drop cable legs is required, the Contractor shall install clips to support the cabling
11. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner
12. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification
13. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate
14. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA-568-C standards and published addenda, manufacturer's recommendations, and/or best industry practices.
15. Cables shall be neatly bundled and dressed to their respective panels
16. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties
17. Cable labels shall not be obscured from view
18. Fiber slack shall be neatly coiled within the fiber termination enclosures or in rack-mount fiber management enclosures
19. No slack loops shall be allowed external to the fiber enclosure(s)
20. Each cable shall be individually attached to the respective termination panel by mechanical means
21. The cable strength member(s) shall be securely attached the cable strain relief bracket in the panel
22. Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the termination panel
23. Each cable shall be clearly labeled at the entrance to the termination panel
24. Dust caps shall be installed on the connectors and couplings at all times unless physically connected

- E. Group connecting hardware for cables into separate logical fields.

#### **4.4 FLOOR AND WALL PENETRATIONS**

- A. The contractor shall be responsible for installing all required floor, wall, and building penetrations.

- B. WPUNJ shall approve the location of all required floor, wall, and building penetrations.

#### **4.5 FIRESTOPPING**

- A. Comply with requirements in Division 076.
- B. Comply with ANSI/TIA-569-B, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.
- D. Provide firestopping as indicated, and ensure compliance with codes, regulations, and requirements of other sections, and the AHJ;
- E. The contractor shall furnish and install fire-stop material in all floor, wall, and building penetrations after all cabling has been installed, in accordance all applicable codes and manufacturer's instructions.
- F. The contractor shall save all fire stopping containers, tubes, jars, boxes, etc., all vendor/distributor packing slips, and all MSDS sheets as a part of the end of project submittals. These shall be available for inspection by WPUNJ as part of the system acceptance for this installation.

#### **4.6 GROUNDING**

- A. Install grounding according to BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. Comply with ANSI/J-STD-607-A.

#### **4.7 IDENTIFICATION**

- A. Label system components, wiring, cabling termination hardware, jacks, faceplates, complying with ANSI/TIA/EIA-606-A.
  - 1. Administration Class: 2.
  - 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Comply with requirements in Section 099123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- C. Cable Schedule: Post in prominent location in communications each equipment room. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, hardware, horizontal cables, work areas, grounding buses and pathways, and equipment grounding conductors. Follow convention of ANSI/TIA/EIA-606-A or as indicated or directed in writing by the designated representative of the Owner. Furnish electronic record of all drawings, in software and format selected by Owner. E. Cable Identification:
  - 1. Label each horizontal and backbone cable within 4 inches of each termination, where it is accessible in a rack, cabinet, junction box or outlet box.
  - 2. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Prior to labeling, coordinate with owner for labeling scheme. Label each connector, faceplate, 110-block or other connecting hardware.

- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in ANSI/TIA/EIA-606-A.

1. For cables use flexible vinyl or polyester labels that flex as cables are bent.

#### **4.8 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:

1. Visually inspect cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with standards.
2. Visually confirm correct marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment, patch cords and work area cords, and labeling of all components.
4. Test instruments shall meet or exceed applicable requirements in standards specified herein.
5. Horizontal UTP Performance Tests: Test for Category 6A compliance, according to ANSI/TIA-568-C-2.
6. Backbone UTP Performance Tests: Test each pair for continuity, length and pair polarity.
7. Optical Fiber Cable Performance Tests: Test at both wavelengths from each end.
8. Coaxial Cable Tests: Test coaxial cables using a TDR for any faults.

- B. End-to-end cabling will be considered defective if it does not pass tests and inspections.

- C. Prepare test and inspection reports.

#### **4.9 CLEANING**

- A. Clean equipment any work areas prior to presentation for acceptance by client. This work will include wiping of work areas, removal of streaks, dust, stains, etc., and assurances that systems and components as represented are new and undamaged.

#### **4.10 TRAINING AND DEMONSTRATION**

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.
- B. Provide twelve hours of training and familiarization with the system. Schedule the training at the convenience of the Owner, in sessions of not more than four hours, unless previously agreed to with the designated representative of the Owner.

#### **4.11 CABLE TESTING AND CERTIFICATION**

- A. The contractor shall procure and provide all necessary test equipment, test cables, adapters, load boxes, and any other hardware required to perform cable testing.
- B. The contractor shall schedule all testing with WPUNJ in advance of testing. Additionally, WPUNJ reserves the right to witness testing of all installed cabling.

- C. The contractor shall submit each test report to WPUNJ for approval. Approval is based upon the expected results for the cable being tested, and upon the corrective actions taken by the contractor when specific tests fail.
- D. D.All Category 6A station cables shall be tested and certified for compliance with the standards for TIA Category 6A cabling using an approved Category 6A tester with Level III accuracy. As a minimum, the following tests shall be performed on each horizontal voice and data cable:

Wire Map	Insertion Loss
Length	Return Loss
Propagation Delay	Pair-to-Pair Equal Level Far End Crosstalk.
Delay Skew	Power Sum Equal Level Far End Crosstalk.
Impedance	Pair-to-Pair Near End Crosstalk.
Resistance	Power-Sum Near End Crosstalk.

Print outs of the test results for each station cable shall be furnished as part of the as built package.

#### 4.12 SYSTEM ACCEPTANCE

- A. Obtain written acceptance from the Owner or the Owner's representative at the completion of system installation, testing, documentation and training. Failure of the contractor to obtain sign off will result in the contractor remaining responsible for extending, at no charge to the owner, conditions of the warranty and guarantees until such time that sign off had occurred. Time included in the above condition will be presented to the owner in addition to the standard warranties.

END OF SECTION

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