

PREFACE - UT DATA/TELECOMMUNICATION SPECIFICATION DIRECTORY

GENERAL

A. INTRODUCTION

The “Directory”, contained here-in, is not provided as, nor intended as complete “Table of Contents” or as a “Index’ of the various University of Toledo Data/Telecommunications Specifications, Appendices and Annexes.

Provision of this “Directory” shall in no-way limit, diminish, or relieve the Associate, Consultant, Architect, Associate or Contractor of responsibility for a full and complete knowledge, understanding and compliance to all information contained in the Specifications, Appendices and Annexes applicable and/or provided.

B. PURPOSE

The “Directory” contained here-in, is provided as a “Rough Outline” of the various University of Toledo Data/Telecommunication Specifications, Appendices and Annexes, to aid the Consultant, Architect, Associate and Contractor in location of information with-in the specific documents.

DIRECTORY

SECTION 16453 – DATA/TELECOMMUNICATION GROUNDING

PART 1 – GENERAL

PAGE #

| | | |
|----|--|---|
| A. | Related Documents | 1 |
| B. | Description of Work | 1 |
| C. | <u>Quality Assurance:</u> | |
| | Item 1: Manufacturers..... | 1 |
| | Items 2 thru 5: Standard Compliance..... | 1 |
| | Item 6: Contractor Qualifications..... | 1 |

PART 2 – PRODUCTS

| | | |
|----|------------------------------|---|
| A. | Material and Components..... | 2 |
|----|------------------------------|---|

PART 3 – EXECUTION

| | | |
|----|-----------------------|-----|
| A. | Items A thru AU | 2-8 |
|----|-----------------------|-----|

PART 4 – SYSTEM TESTING

| | | |
|----|------------------------------------|------|
| A. | Items A thru I | 8-10 |
| B. | Grounding Test Report Form 1 | 11 |

SECTION 16731 – INTERBUILDING DATA/TELECOMMUNICATION CABLE SYSTEM

| <u>PART 1 – GENERAL</u> | <u>PAGE #</u> |
|---|---------------|
| A. Related Documents | 1 |
| B. <u>Scope of Work:</u> | |
| Items 1 thru 10 | 1-2 |
| C. <u>Quality Assurance:</u> | |
| Item 1: Manufacturers | 2 |
| Item 2: Telecommunications Contractor..... | 2 |
| Items 3 thru 9 | 3-5 |
| D. Standards Compliance | 5 |
| E. Inspection of Work/Construction Area..... | 6 |
| F. On Site Project Manager (Project Foreman) | 6-7 |
| G. Equipment Warranty | 7 |
| H. Special Conditions | 7 |
| <u>PART 2 – PRODUCTS</u> | |
| A. General..... | 8 |
| B. <u>Cables:</u> | |
| Item 1: 100 OHM Multi-Twisted Pair Telephone Exchange Cable... .. | 8-9 |
| Item 2: 100 OHM Multi-Pair CAT 50 SP Broadband Cable | 10 |
| Item 3: 75 OHM Broadband Coaxial Feeder Cable | 10-12 |
| Item 4: Fiber Optic Cable – Outdoor Interbuilding (Tight Buffered) Backbone..... | 12-15 |
| Item 5: Fiber Optic Cable – Outdoor Interbuilding (Loose Tube) Backbone..... | 15-17 |
| C. <u>Hardware:</u> | |
| Item 1: 100 OHM Multi-Pair U.T.P. Cable System Hardware | 17-18 |
| Item 2: Cross-Connect Blocks..... | 18-19 |
| Item 3: Optical Fiber Cable System Hardware | |
| Spliced Enclosures | 19-20 |
| Interconnect Centers..... | 20 |
| Modular Fiber Optic Couplers | 20 |
| Item 4: Modular Fiber Optic Connections..... | 21-23 |
| D. <u>Distribution Hardware:</u> | |
| Item 1: General | 23 |
| Item 2: Distribution Rack Frames..... | 23-24 |
| Item 3: Equipment Cabinets and Enclosures | 24 |
| Item 4: Backboards..... | 25 |
| Item 5: Cable Trays | 25 |
| Item 6: Cable Ladder | 25 |
| Item 7: Conduits | 26 |
| Item 8: Grounding and Bonding | 26-27 |

SECTION 16731 – INTERBUILDING DATA/TELECOMMUNICATION CABLE SYSTEM
 (continued)

| <u>PART 3 – EXECUTION</u> | <u>PAGE #</u> |
|---|---------------|
| A. <u>Raceways:</u> | |
| Item 1: Cable Trays | 27-29 |
| Item 2: Conduit | 29-30 |
| Item 3: Miscellaneous | 30-31 |
| B. <u>Interior Cable - Installation:</u> | |
| Items 1 thru 40..... | 31-38 |
| C. <u>Outdoor/Aerial Cable Installation:</u> | |
| Items 1 thru 8 | 38-39 |
| D. <u>Underground Cable Installation:</u> | |
| Items 1 thru 13..... | 39-41 |
| E. <u>Tunnel System Cable Installation:</u> | |
| Items 1 thru 6 | 41 |
| F. <u>Miscellaneous:</u> | |
| Item 1: Cable Marking and Labeling | 42 |
| Item 2: Flooded Cables..... | 42 |
| Item 3: Exterior/Emergency Telephone Enclosure Installation | 42 |
| G. <u>System Testing and Verification:</u> | |
| Item 1: General..... | 43-44 |
| Item 2: 100 OHM Multi-Twisted Pair Telephone Exchange Cable Systems..... | 44 |
| Item 3: 100 OHM Multi-Pair Category-5.5c O.S.P. Broadband Cable Systems..... | 44-46 |
| Item 4: 75 OHM Broadband Coaxial Cable Systems..... | 46-47 |
| Item 5: 62.5/125/50 um Multimode and 8.3/125 um Single-Mode Fiber Optic Cable Systems | 47-50 |
| Item 6: Intrabuilding Data/Telecommunications Grounding Systems..... | 50 |
| Item 7: Interbuilding data/Telecommunications Grounding Systems..... | 50-51 |
| Item 8: Independent System Verification..... | 51 |
| Item 9: Cabling Test Reporting Forms | 51 |
| H. <u>Submittals:</u> | |
| Item 1: Record Drawings | 51-52 |
| Item 2: Cabling System Instruction Manuals | 52-53 |
| Table-1: Data/Communications Conduit/Raceway Fill Schedule | 54 |
| Form 2: 100 OHM Multi-Twisted Pair Test Report..... | 55 |
| Form 3: Coaxial Cable Test Report..... | 56 |
| Form 4: Fiber Optic Test Report | 57 |
| Figure 5a: Ground Potential Difference and Ground Path Resistance Measurement Procedure..... | 58 |
| Figure 5b: Ground Potential Difference and Ground Path Resistance Measurement Diagram..... | 59 |

SECTION 16731 – INTERBUILDING DATA/TELECOMMUNICATION CABLE SYSTEM
(continued)

| <u>PART 3 – EXECUTION</u> (continued) | <u>PAGE #</u> |
|---|---------------|
| Figure 5c: Ground Potential Difference and Ground Path Resistance Measurement Report | 60 |
| Figure 6: Typical Interbuilding Aerial Installation | 61 |
| Figure 7a: Typical Interbuilding Underground Installation..... | 62 |
| Figure 7b: Typical Interbuilding Underground Installation..... | 63 |
| Appendix “A” Owner/Associate Approved Material List | 68 |

SECTION 16741 – TELEPHONE/DATA RACEWAY SYSTEMS

PART 1 – GENERAL

| | |
|---|---|
| A. Related Documents | 1 |
| B. Description of Work | 1 |
| C. <u>Quality Assurance:</u> | |
| Items 1 thru 3: Standards Compliance | 1 |
| Items 4 & 5: Contractor Qualifications..... | 1 |

PART 2 – PRODUCTS AND EQUIPMENT

| | |
|---------------------------------|-----|
| A. Backboards | 1-2 |
| B. Outlets and Boxes | 2-3 |
| C. Cable Trays | 3 |
| D. Cable Ladder | 3 |
| E. Conduits | 4 |
| F. Surface Mounted Raceway..... | 4-5 |

PART 3 – EXECUTION

| | |
|---|-----|
| A. <u>Cable Trays:</u> | |
| Items 1 thru 16..... | 5-6 |
| B. <u>Conduit:</u> | |
| Items 1 thru 5 | 7-8 |
| C. <u>Miscellaneous:</u> | |
| Items 1 thru 6 | 8 |
| Table-1: Data/Communications Conduit/Raceway Fill Schedule..... | 9 |

SECTION 16751 – INTRABUILDING DATA/COMMUNICATION CABLE SYSTEM

PART 1 – GENERAL

| | |
|----------------------------|-----|
| A. Related Documents | 1 |
| B. <u>Scope of Work:</u> | |
| Items 1 thru 12..... | 1-3 |

SECTION 16751 – INTRABUILDING DATA/COMMUNICATION CABLE SYSTEM
(continued)

| <u>PART 1 – GENERAL</u> (continued) | <u>PAGE #</u> |
|---|---------------|
| C. <u>Quality Assurance:</u> | |
| Item 1: Manufacturers..... | 3 |
| Items 2 thru 5: Contractors Qualifications | 3-4 |
| D. Standards Compliance | 4-5 |
| E. Inspection of Work/Construction Area..... | 5 |
| F. <u>On-Site Project Team:</u> | |
| Items 1 thru 9 | 5-7 |
| G. Equipment Warranties | 7 |
| H. Special Conditions..... | 7 |
| <u>PART 2 – PRODUCTS</u> | |
| A. General | 8 |
| Wireless..... | 39 |
| Cameras..... | 39 |
| B. <u>Cables:</u> | |
| Item 1: Horizontal Voice Cables..... | 8-9 |
| Item 2: Voice Riser/Tie Cables..... | 9 |
| Item 3: Horizontal User Data Cables..... | 10 |
| Item 4: Fiber Optic Cable – Indoor Backbone and Horizontal Station..... | 10-13 |
| Item 5: 75 OHM Impedance Coaxial Cable..... | 13-15 |
| C. <u>Connectivity Hardware:</u> | |
| Item 1: Telecommunication Faceplate..... | 15 |
| Surface Mounted Enclosures | 16 |
| Standard Wall Phone Faceplate..... | 16 |
| 2-Port Duplex Receptacle Mounting..... | 16 |
| Item 2: Voice/Data/CATV/Fiber Optic Communication Jacks | 17 |
| Modular 8P8C Jacks, Voice & Data..... | 17 |
| Modular “SC” Coupler Fittings | 18 |
| Modular “SC/PC” Coupler Fittings | 19 |
| Multi-Mode “SC” Connectors | 19 |
| Single-Mode “SC/PC” Connectors..... | 20 |
| 75 OHM Impedance Universal “F” Connectors..... | 21 |
| D. <u>Cross-Connect Hardware:</u> | |
| Item 1: General | 21-22 |
| Item 2: Distribution Rack Frames..... | 22 |
| Item 3: Equipment Cabinets and Enclosures | 22-23 |
| Item 4: Patch Cord and Cable Organizers | 23-24 |
| Item 5: Patch Panels..... | 24 |
| Item 6: Cross-Connect Blocks..... | 25 |
| Item 7: Fiber Optic Interconnect Centers | 25-26 |

SECTION 16751 – INTRABUILDING DATA/COMMUNICATION CABLE SYSTEM
(continued)

| <u>PART 2 - GENERAL</u> (continued) | <u>PAGE #</u> |
|---|---------------|
| E. <u>“Rocket Card” Wiring:</u> | |
| Item 1: General | 26 |
| Item 2: Components | 26 |
| Item 3: Installation..... | 27 |
| Item 4: Testing | 28 |
| F. <u>Miscellaneous:</u> | |
| Item 1: Backboards..... | 28 |
| Item 2: Non-Metallic Surface Mounted Raceway | 28-29 |
| Item 3: Conduit and Metallic Raceways | 29 |
| Item 4: Furniture Partition Raceways | 29 |
| Item 5: Metallic Surface Mounted Raceway | 29-30 |
| Item 6: Patch Cords | 30 |
| <u>PART 3 – GROUNDING AND BONDING</u> | |
| A thru D | 30-31 |
| <u>PART 4 – EXECUTION</u> | |
| A thru BS | 31-43 |
| <u>PART 5 – SYSTEM TESTING AND VERIFICATION</u> | |
| A. General | 43-47 |
| B. Horizontal Unshielded Twisted Pair Cables | 47-50 |
| C. Multi-Twisted Pair Trunk, Riser and Tie Cables (Shielded and Unshielded)..... | 50 |
| D. Coaxial Cable | 50-51 |
| E. 62.5/125 AND 50 Um Multimode and 8.3/125 UM Single-Mode Fiber Optic Cable..... | 51-53 |
| F. Independent System Verification | 53-54 |
| G. Cabling Test Reporting Forms Included..... | 54 |
| <u>PART 6 – SUBMITTALS</u> | |
| A. Record Drawings | 54 |
| B. <u>Cabling System Instruction Manuals:</u> | |
| Form 1: 100 OHM U.T.P. Test Report..... | 56 |
| Form 1A: 100 OHM U.T.P. Cover Sheet..... | 57-58 |
| Form 2: 100 OHM Multi-Twisted Pair Test Report..... | 59 |
| Form 3: Cable Verification Test Report | 60 |
| Form 4: Fiber Optic Test Report | 61 |
| Appendix “A”: Owner/Associate Approved Material List | 68 |

ANNEX “A” – UT STANDARD CABLE IDENTIFICATION AND NUMBER PROCEDURE

| | <u>PAGE #</u> |
|--|---------------|
| <u>PART 1 – INTRODUCTION AND PURPOSE</u> | 1 |
| <u>PART 2 – EXPLANATION AND IMPLEMENTATION</u> | 1-3 |
| <u>PART 3 – DESIRED WIRING SEQUENCES AND COLOR CODINGS FOR TELECOMMUNICATION JACKS</u> | 3-4 |
| <u>PART 4 – CABLE IDENTIFICATION, NUMBERING SUBMITTAL AND APPROVAL</u> | 4 |
| Figure 2a UT Horizontal Cable Identification and Labeling Procedure..... | 5 |
| Figure 2b UT Horizontal Cable Identification and Labeling Procedure..... | 6 |
| Figure 2c Typical Sample Faceplates..... | 7 |
| University of Toledo Communications Closets Listing Annex A | A-12 |

ANNEX “B” – FURNITURE PARTITION – DATA/COMMUNICATION CABLING COMPLIANCE

| | |
|--|-----|
| <u>PART 1 – INTRODUCTION AND PURPOSE</u> | 1 |
| <u>PART 2 – CORRECTIVE IMPLEMENTATION</u> | 1-2 |
| <u>PART 3 – ADDITIONAL CABLE MANAGEMENT REQUIREMENTS</u> | 2-3 |

ANNEX “C” – ROCKET CARD WIRING STANDARD

PART 1 – GENERAL

| | |
|----------------------------|---|
| A. Related Documents | 1 |
| B. Scope of Work | 1 |
| C. Compliance | 1 |

PART 2 – PRODUCTS

| | |
|---------------------|---|
| A. General | 2 |
| B. Components | 2 |

PART 3 – EXECUTION

| | |
|----------------------|-----|
| A Installation | 2-3 |
|----------------------|-----|

| | |
|-------------------------------|---|
| <u>PART 4 – TESTING</u> | 3 |
|-------------------------------|---|

ANNEX “D” – WIRELESS NETWORK WIRING STANDARD

| <u>PART 1 – GENERAL</u> | <u>PAGE #</u> |
|--|---------------|
| A. Related Documents | 1 |
| B. Scope of Work | 1 |
| C. Compliance | 1 |
| <u>PART 2 – DESCRIPTION</u> | |
| A. General | 1 |
| B. Access Point (AP)..... | 2 |
| <u>PART 3 – PRODUCTS</u> | |
| A. General | 2 |
| B. Components | 2 |
| <u>PART 4 – EXECUTION</u> | |
| A. Installation | 2-4 |
| <u>PART 5 – TESTING</u> | |
| Figure 4a: Typical “Wireless” Access Pont Layout Grid | 5 |
| Figure 4b: Typical “Wireless” Access Point Layout Grid | 6 |

ANNEX “E” – DATA/TELECOMMUNICATIONS SPACES AND SERVICES – DESIGN CRITERIA FOR ASSOCIATES

| | |
|--|-----|
| <u>PART 1 – QUALIFICATIONS OF THE ASSOCIATE</u> | |
| A. Architect/Associate/Designer Qualifications | 1-2 |
| <u>PART 2 – GENERAL</u> | |
| A thru D | 2-3 |
| <u>PART 3 – DEFINITIONS AND SCOPE OF SPACES</u> | |
| A. Data/Telecommunication Spaces Shall Generally be Defined as follows:..... | 3 |
| B thru F | 4 |
| <u>PART 4 – SPECIAL CONDITIONS</u> | |
| A thru D | 4 |

ANNEX “E” – DATA/TELECOMMUNICATIONS SPACES AND SERVICES – DESIGN
CRITERIA FOR ASSOCIATES

(continued)

| <u>PART 5 –DESIGN CONSIDERATIONS - GENERAL</u> | <u>PAGE #</u> |
|---|---------------|
| A thru AN | 4-9 |
| <u>PART 6 – DESIGN RESPONSIBILITIES</u> | |
| A thru C | 9 |
| <u>PART 7 – DESIGN SPECIFICS</u> | |
| A. Typical Outlet Connectivity | 9-10 |
| B. Pay Phones and Emergency Phones..... | 10-11 |
| C. Voice/Data/CATV/Fiber Optic Flush Mounted Faceplates..... | 11 |
| D. Voice/Data/CATV/Fiber Optic Surface Mounted Modular Furniture..... | 12 |
| E. Non-Metallic Surface Mounted Raceway for Non-Fishable Walls..... | 12-13 |
| F. <u>Cross-Connect Design:</u> | |
| Item 1: Voice Cables..... | 13-14 |
| Item 2: User Data Cables..... | 14 |
| Item 3: Fiber Optic Cables | 14-15 |
| G. <u>Equipment, Material, Installation:</u> | |
| Item 1: Distribution Rack Frames..... | 15 |
| Item 2: Wall Mounted Data Cabinets..... | 15-16 |
| Item 3: Patch Cord Organizers..... | 16 |
| H. <u>Raceways and Conduits:</u> | |
| Items 1 thru 14..... | 16-17 |
| I. Grounding | 17-19 |
| <u>PART 8 – EXECUTION</u> | |
| A thru B; Items 1 thru 71 | 19-24 |
| <u>PART 9 – TESTING</u> | |
| A; Items 1 thru 18 | 24-25 |
| <u>UT COMMUNICATIONS CLOSETS LISTING</u> | |
| Figure 1a: Interbuilding Entrance Facility Room Layout..... | 30 |
| Figure 1b: Interbuilding Entrance Facility..... | 31 |
| Figure 3a: Intrabuilding Data/Telecommunication Room | 32 |
| Figure 3b: Interbuilding Entrance Facility Room Figure | 33 |
| UT Rack Prototype Layout: Section: 16751..... | 77 |
| UT IT Closet Characteristics: Section: 16751..... | 79 |

ANNEX “F” CONTRACTORS QUALIFICATIONS & RESPONSIBILITIES

| <u>PART 1 – GENERAL</u> | <u>PAGE #</u> |
|---|---------------|
| A. Description of Work | 1 |
| <u>PART 2 – QUALIFICATIONS</u> | |
| A. Contractor Requirements..... | 1-4 |
| B. Required Contractor Submittals | 4 |
| C. On-Site Project Construction Team | 4-6 |
| D. Special Conditions | 6 |
| UT “Rocket” Telecom Department – Contractor Reference Questionnaire Form .. | 7-12 |

ANNEX “G” – SUBMITTALS

| <u>PART 1 – GENERAL</u> | |
|---|---|
| A. Description of Work | 1 |
| <u>PART 2 – POST-BID/PRE-CONTRACT SUBMITTALS</u> | |
| A. <u>Contractor Qualifications:</u> | |
| 1. Subcontractor Identification | 1 |
| 2. Contractor RCDD | 1 |
| a. Certificate and Resume | 1 |
| 3. Contractor Resume | 1 |
| 4. Contractor Project Foreman | 2 |
| a. Certification and Resume | 2 |
| 5. Proposed Manufacturers Warranty Documentation | 2 |
| a. Contractor’s Manufacturer Certified Installer Documentation | 2 |
| B. <u>Contractor References:</u> | |
| 1. Contractor Reference Questionnaires | 2 |
| <u>PART 3 – POST-CONTRACT/PRE-CONSTRUCTION SUBMITTALS</u> | |
| A.1. Shop Drawing Submittals..... | 3 |
| A.2. Proposed Testing Equipment..... | 3 |
| <u>PART 4 – UNDER CONSTRUCTION SUBMITTALS</u> | |
| A. Tradesmen Registrations and Certificates | 3 |
| B.1. Cable Factory Master Reel Test Reports | 3 |
| B.2. Cable Tray and Raceway Routing Drawings..... | 4 |
| B.3. Cross-Connect Field Layout Plans..... | 4 |
| B.4. Firestopping Submittals | 4 |

ANNEX “G” – SUBMITTALS
(continued)

PART 4 – UNDER CONSTRUCTION SUBMITTALS (continued)

| | |
|--|-----|
| B.5. Cable Testing Team Submittals | 4-5 |
| B.6. Progress Testing Reports | 5 |

PART 5 – CLOSEOUT SUBMITTALS

| | |
|-----------------------|---|
| A. Shop Manuals | 5 |
|-----------------------|---|

| | |
|---------------------------------|---|
| <u>PART 6 – EXECUTION</u> | 6 |
|---------------------------------|---|
