1.1.0 GENERAL

The purpose of this specification is to establish a requirement for the installation of a voice, video and data cable network. The cable (copper & fiber), wire, hardware, equipment racks, jumpers, wall plates, connectors and all other such required appurtenances shall be in accordance with this document.

The vendor shall provide a complete cable network for each work station and such that any jack can be directly connected to any other jack by means of the proper jumper cables, patch cords and electronics. All jacks, connectors and interface devices shall be industry standard types--no proprietary connecting devices shall be acceptable.

The vendor shall insure that the cable network will support all current systems, 1000Base-T, 100Base-TX, 100Base-T4, 100Base-T2, HDMIBase-T and 10Base-T communications protocols including but not limited to 1000 BASE-T links. The installation shall be complete and fully operational. The contractor shall not exceed standard lengths or other requirements of Ethernet, 10 BASE-T, 100 BASE-T and 1000 BASE-T.

The vendor shall utilize cable, hardware and connecting devices manufactured in compliance with IEEE, EIA/TIA, UL and NEC standards and codes. Manufacturer of acceptable products is Belden, or equivalent as determined by the College. Vendor must abide by cable, hardware and connecting devices manufacturer's installation recommendations.

The vendor shall remove and replace ceiling tiles as required. All removed tiles must be put back in place at the conclusion of each workday. Vendor shall work in conjunction with other contractors or College facilities personnel who happen to be in the same building. The vendor will be responsible for, at their own expense, replacing any ceiling grid and/or tile that become damaged during the cable installation.

It is the vendor's responsibility to inspect the facility and become familiar with the site and any encumbrances to complying with these specifications for both preparation of response and after award of contract.

1.2.0 CABLING OVERVIEW

1.2.1 All Data cables from each station location will come back to the designated MDF location on enhanced Category 6 twisted pair cable. The enhanced Category 6 cable will terminate on a multi-port patch panel so that any station or computer can be patched anywhere in the network.

All cable shall be plenum rated.

1.3.0 CABLE

All cables utilized on this project shall comply with NEC article 800 for use on voice/data systems. These cables shall be UL listed for these applications. All cable runs shall comply with the layouts indicated in the building and site drawings unless otherwise agreed upon by the College Project Manager. The cable shall be equal to Belden Media Twist.

- Solid, annealed bare 23 AWG copper conductors.
- Pairs shall be bonded together in data communications cable.
- Conductor insulation color-coded to telephone industry standards.
- Insulated conductors shall be bonded into pairs and pairs shall be twisted with varying lay lengths to minimize crosstalk.
- Cable shall support digital and analog, voice, data, and video.
- Cable shall also support 10, 100, 1000 Mbps Ethernet and HDMI Video.

1.4.0 DATA AND VIDEO CABLE

The vendor shall provide, install, and test, at each workstation designated in the drawings, cables complying with the following specifications for the worst pair.

- Plenum Rated
  - ☐ Category: 6
  - ☐ Pairs: 4, each pair individually bonded together as a whole
  - ☐ Type: 23 AWG Twisted
  - ☐ Imped: 100 ± 12 ohms from 1 to 20 MHz,
    100 ± 15 ohms from 25 to 200 MHz,
    100 ± 20 ohms from 250 to 310 MHz,
    100 ± 22 ohms from 310 to 500 MHz
  - ☐ Attenuation: 39.8 max @ 100 meters @ 350 MHz
  - ☐ Capacitance: Mutual Capacitance @ 1 KHz, nominal: 15.0 pF/ft
    Capacitance Unbalance Pair to Ground, max.: 49.2 pF/100 m
  - ☐ DC Resistance: DC Resistance @ 20°C, max.: 9 ohms/100 m
    DC Resistance Unbalance @ 20°C, maximum: 3%
  - ☐ PS-NEXT: 34.2 dB@350MHz
  - ☐ SRL: 17.0dB@350MHz
    21.0dB@100MHz
  - ☐ ACR, NEXT Attenuation, SRL have to be specified and tested to 350MHz.
  - ☐ Must be 25 dB ACR@100MHz (8 dB improvement over TIA/EIA 568-B Standard)
  - ☐ Must be 19 dB SRL@100MHz (3 dB improvement over TIA/EIA 568-B Standard)
  - ☐ Must be PS-NEXT performance ETL verified to TIA/EIA 568-B and ISO/IEC 11801
  - ☐ ACR: 25dB@100MHz
    14dB@155MHz
  - ☐ NEXT: 59.9dB@10MHz
    44.3dB@100MHz
    36.2dB@350MHz
  - ☐ ANSI/TIA/EIA-568-B.2-1 draft 10 for cat 6

1.5.0 CROSS CONNECT PANELS (DATA AND VIDEO)

The vendor shall provide, wire, install, test and verify all cable terminations on eight (8) wire RJ-45 type patch panels. These panels shall be rack mounted in standard EIA nineteen (19) inch racks. There will be separate cross connect panels for video and data jacks.

These patch panels shall be provided with permanently attached and uniquely identifying labeling and coding per EIA /TIA 606 to designate the station location and jack. Each of the VIDEO and DATA jacks on a wall plate, as well as the cable itself, will be coded (mechanically, not by hand) at both ends. If the termination is located above a dropped ceiling, the ceiling grid should be discreetly labeled below the termination.

These patch panels shall be manufactured by Belden or other approved source. All connectors shall be of a standard RJ-45 type. The vendor shall provide RJ-45 patch cords equal to twice the number of utilized patch panel ports. All patch panels and patch cords shall comply with EIA/TIA TSB-40. Half the quantity of patch cords shall be 5 feet in length and half shall be 15 feet in length.
Racks are located in designated MDF location. The vendor shall include the vertical wire management to dress the patch cords in a neat and uniform manner, the horizontal wire management for the patch panels, and a 6 foot surge protected power strip within each rack.
The data cabling will be wired back to a rack (described below) located in room:

West Hall room# 114

1.5.1 Refer to Attachment "A" for typical patch panel layout.

1.6.0 WALL JACKS AND PLATES

Due to a desire on the part of Middlesex County College to install a cable system that will support them well into the future, the following requirements have been specified.

Jacks shall attain the following electrical specifications.

☐ Applicable Standards & Environmental Programs
Other Standards: FCC Part 68, Subpart F, IEC 60603-7
EU Directive 2002/95/EC (RoHS): Yes
EU RoHS Compliance Date 07/01/2006
MII Order #39 (China RoHS): EUP 50
Telecommunications Standards: Category 6 - TIA 568.B.2-1, ISO/IEC 11801:2002 Ed.2
Third Party Performance Verification: ETL - Verified Category 6
Safety Listing: ACA, Bi-national Standard Listed

All hardware must meet the minimum Enhanced Category 6 specifications and support 10, 100, 1000, Mbps Ethernet and HDMI Video.

☐ Jack must come color coded for both 568A and 568B pinning.
☐ Identical jacks must be used at both the station and closet panel locations.
☐ Front Connection Lead Frame Copper Allow with 50u inch Gold over Nickel
Rear Connection IDC Copper Allow with Nickel Plating
Connector Body Plastic - UL940V-0

☐ Footprint/Type: KeyConnect
Plug / Jack Compatibility: RJ45, RJ11

Termination Interface:
Termination Connection Durabilities
Front Mated Connection 1,000 cycles
Rear Gas Tight IDC Connection 20 terminations

Connector/Hardware Retention: 20 lbs.
Plug/Connector Retention: 11.250 lbs.
Storage Temperature Range: -40°C To +70°C
Installation Temperature Range: -10°C To +60°C
Operating Temperature Range: -10°C To +60°C

☐ System must be certified for a minimum of twenty (20) years.
☐ Certification must be application independent and based only on the electrical performance of the installed system.

Face plates and surface mount boxes must conform to the following requirements.
Plates: Belden KeyConnect
☐ Face plates must accept the jacks outlined above.
☐ Face plates must be available in 2, 4, and 6 port versions for single gang arrangements. They should also be available in a 12 port version for use in double gang applications.
☐ Construction must be with high impact, flame retardant, UV inhibiting, UL rated 94V-0 thermoplastic.
☐ Angled face plates should also be available in 4 port single gang, and 8 port double gang configurations.
☐ Surface mount boxes must accept the jacks outlined above.
☐ The same box must mount on a standard NEMA wall box, on modular furniture knockouts or on any flat sturdy surface.

1.8.0 DATA JACKS

The vendor shall provide a wall plate with sufficient jack positions for all video and data. The Video jack will be as previously described. The data jacks will terminate in RJ-45 type devices.
Jacks: Belden # AX101325

These jacks shall be located as indicated in the drawings and shall fit the single or double gang electrical box.

1.9.0 CONNECTORS

All connectors for use with RJ-45 terminations shall utilize gold plated contacts with a platening thickness of no less than thirty (30) micro-inches. Use of an RJ-11 jack in an RJ-45 receptacle shall not damage either connector.

All terminating connectors shall accept 20, 22, 23, and 24 AWG twisted pair cable, either solid or stranded.

All terminating connectors for Data lines shall be Green in color.

1.10.0 STANDARDS

1.10.1 All wire, cable, connectors, blocks, patch panels and wall plates used for data shall comply with Category 6 - TIA 568.B.2-1, ISO/IEC 11801:2002 Ed.2

1.10.2 In order to insure compliance with accepted industry standards and the interconnectivity of devices; the vendors shall submit a sample of each connecting device proposed and a length of cable with properly stamped jacket of the type to be used on this project within 10 days of award.

1.10.3 Fire-resistance assemblies constructed of gypsum panel assemblies used for wall, shaft, or ceiling repairs shall restore the original fire-resistive structural integrity of the assembly. Repairs shall be approved assemblies and shall meet all code requirements.

1.11.0 GROUNDING AND SURGE PROTECTION

1.11.1 The vendor shall provide, as required, as an integral part of this installation, grounding and surge protection on all voice and data circuits out of the patch panels and connecting blocks leaving the building.

All cross-connect racks will be grounded in accordance with local codes.

1.12.0 CABLE SUPPORT

1.12.1 The vendor shall install, J hooks for cable support. These will be installed above the drop ceiling, and supported by the hooks so as not to rest on any portion of the ceiling. J hooks shall be no greater than **four (4) feet apart** and will be large enough so as to allow the cables to easily pull through during installation. The "J" hooks shall be self-supporting.

1.13.0 SCHEDULING

1.13.1 All work will be completed within 15 days of Notice to Proceed.

1.14.0 DRAWINGS

1.14.1 Contractor shall provide completed 'as built' drawings of all cable and wire on reproducible Mylar sheets with two (2) blue line copies for sign off and an Autocad version 14 disk shall also be provided. These drawings shall include vendors statement of full compliance with specifications and shall identify each wire pull with a number in a cable record document to correspond to the final drawings. The contractor shall provide three (3) copies of a Cable Record Book, which shall include cable numbers, terminators, cable lengths, attenuation, OTDR, TDR printouts.

1.14.2 Contractor shall provide approximate lengths of each cable run in the cable record document

at the completion of the project prior to system acceptance.

1.15.0 ACCEPTANCE

1.15.1 Contractor shall provide 'as built,' site and drawing plans, detailed legends of symbols and abbreviations used and Cable Test records prior to the scheduling of acceptance tests.

1.15.2 Contractor shall demonstrate cable plant connectivity with all systems as a minimum requirement for acceptance.

1.15.3 Use of the network shall not constitute acceptance.

1.15.4 Acceptance shall be defined as the cable networks ability to function with all installed voice, data and video systems and a successful performance test of the systems on the network and patch panel system utilizing a Fluke Model 658 or 6000 or equal. These shall be witnessed by the College Project Manager. A permanent record of the display shall be provided with the closeout documents. All Category 6 cables shall be tested for all specified values. OTDR readings shall be taken for all fiber optic cables.

1.15.5 The acceptance test shall be performed on a random test quantity, based on the submitted cable book and its accompanying as built drawings. The test quantity shall be no less than ten (10) percent of the total wire pulls. No deviation from the test results shall be permitted. Any deviation will require an additional five (5) percent quantity to be inspected. Any further failures or deviations shall result in a failure of the acceptance test and will require a submission of new test data.

1.15.6 All documentation will be provided in a neat and professional manner.

1.16.0 CONTRACTOR/VENDOR REQUIREMENTS

The following are additional requirements of all bidders in order to be considered compliant with these specifications:

1. Contractor/Vendor providing the cabling systems shall be Telecommunications/communications certified by DBC of the State of New Jersey.

2. The Bidder/Contractor shall currently be an authorized and certified installer of the cable and terminating devices manufacturers. Contractors shall supply copies of current certificates.

3. Vendor to include literature for all wire, cable, connecting devices and patch panels in both bid packages.

4. Contractor shall have a demonstrated ability and experience with TDR and OTDR equipment and copper and fiber cable installations.

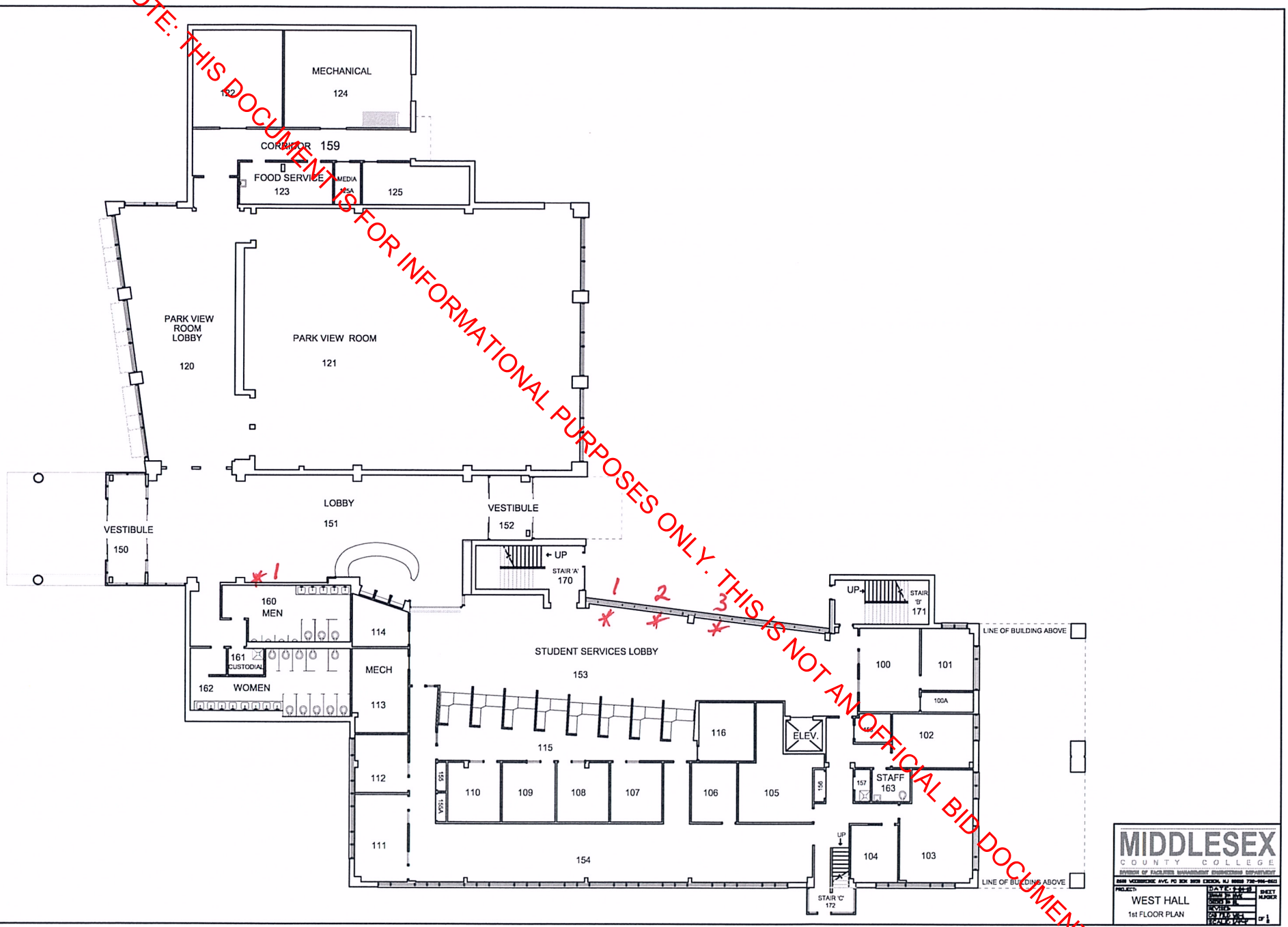
NOTE: THIS DOCUMENT IS FOR INFORMATIONAL PURPOSES ONLY. THIS IS NOT AN OFFICIAL BID DOCUMENT.

MIDDLESEX COUNTY COLLEGE
DIVISION OF FACILITIES MANAGEMENT ENGINEERING DEPARTMENT
2600 WOODBRIDGE AVE. PO BOX 3050 EDISON, NJ 08818 732-906-2511

PROJECT:
WEST HALL
2nd FLOOR PLAN

DATE: 9-24-13
DRAWN BY: KVK
CHKD BY: JL
REVISED
CAD FILE NO.
SCALE: 1/16"

SHEET NUMBER



West Hall Additions

Room #	Location#	Voice	Data	
151	1		1	
153	1		6	Pull into existing conduit
153	2		6	Pull into existing conduit
153	3		6	Pull into existing conduit
200	1		2	
202	1		2	
232	1		2	
241	1		3	
241	2		4	
250	1		4	Pull into existing conduit
250	2		4	Pull into existing conduit
250	3		4	Pull into existing conduit
251	1		2	
		0	46	
	Total		46	