

WCSD  
STRUCTURED  
CABLING  
STANDARD  
WCSD-SCS-  
014

November 14,

2018

Washoe County School District  
Information Technology Department  
Network Support / Structured Cabling Div.  
425 East Ninth Street  
Reno, NV 89520  
(775) 789-3456 Fax: (775) 333-6042



# **WASHOE COUNTY SCHOOL DISTRICT**

## **STRUCTURED CABLING SYSTEMS STANDARD**

***DOCUMENT NO.***

WCSD-SCS-014

NOVEMBER 14, 2018

CREATED BY: WASHOE COUNTY SCHOOL DISTRICT  
INFORMATION TECHNOLOGY DEPARTMENT  
NETWORK SUPPORT / STRUCTURED CABLING DIV.  
425 EAST NINTH STREET  
RENO, NEVADA 89520  
(775) 789-3456 FAX: (775) 333-6042

# TABLE OF CONTENTS

<b>SECTION 1 –GENERAL</b>	<b>6</b>
1.1 ABOUT THIS DOCUMENT	6
1.2 SECTION APPLICABILITY	6
1.3 DEFINITIONS	7
1.4 INTERPRETATION OF CONTRACT DOCUMENTS	10
1.5 VARIATION FROM PROJECT SPECIFICATIONS	10
1.6 SUBMITTALS	11
1.7 REGULATORY REFERENCES	11
1.8 QUALITY ASSURANCE	12
1.9 APPROVED VENDOR	12
1.10 APPROVED PRODUCTS	13
1.11 EQUIVALENT PRODUCTS	13
1.12 DELIVERY, STORAGE AND HANDLING	14
1.13 WARRANTY AND SERVICES	14
1.14 SYSTEM DOCUMENTATION	14
1.15 ACCEPTANCE	16
1.16 TESTING	17
1.17 FIRE STOPPING	18
1.18 GENERAL CABLING REQUIREMENTS	19
1.19 GENERAL REQUIREMENTS FOR RACKS AND CABINETS	21
1.20 GENERAL GROUNDING AND BONDING REQUIREMENTS	22
1.21 GENERAL LABELING REQUIREMENTS	22
1.22 GENERAL REQUIREMENTS FOR PATHWAY	23
1.23 GENERAL REQUIREMENTS FOR WORK AREAS	24
<b>SECTION 2 –EXISTING FACILITIES: GENERAL CONSIDERATIONS</b>	<b>25</b>
2.1 INCLUSIONS	25
2.2 SECTION APPLICABILITY	25
2.3 CEILINGS AND WALLS	25
2.4 WORKING ENVIRONMENT	25
2.5 WORKING HOURS	26
2.6 ABANDONED CABLES	26
2.7 MATERIAL DISTURBANCE PERMIT (MDP) REQUIREMENTS	26
2.8 PATHWAY REQUIREMENTS	27
<b>SECTION 3 –EXISTING FACILITIES: SPECIFICATION DETAIL</b>	<b>30</b>
3.1 INCLUSIONS	30
3.2 SECTION APPLICABILITY	30
3.3 INSTALL CATEGORY 6A HORIZONTAL CABLING	30
3.4 INSTALL SIX-STRAND OPTICAL FIBER CABLING	31
3.5 UPGRADE AN EXISTING TE	31
3.6 INSTALL NEW SMALL TE	33
3.7 RETROFIT AN EXISTING SMALL TE	33
3.8 INSTALL A MINI-ER	33
3.9 INSTALLATION OF A STANDARD TR	33
3.10 INSTALLATION OF A SIX-FOOT WALL-MOUNT TE	34
3.11 UPGRADE AN EXISTING POS SYSTEM	34
3.12 PROJECT DRAWINGS FOR EXISTING FACILITIES	35
<b>SECTION 4 –MOBILE AND MODULAR BUILDINGS</b>	<b>49</b>
4.1 INCLUSIONS	49
4.2 SECTION APPLICABILITY	49
4.3 SYSTEM DESCRIPTION: MODULAR BUILDINGS	49
4.4 INSTALLATION OF SCS SERVICES WITHIN A MODULAR BUILDING	52

4.5	SYSTEM DESCRIPTION: MOBILE BUILDINGS.....	52
4.6	INSTALLATION OF A PRIMARY OR SECONDARY MOBILE .....	54
4.7	PROJECT DRAWINGS FOR MOBILE BUILDINGS .....	55
<b>SECTION 5 –NEW FACILITIES / BUILDING ADDITIONS / MODERNIZING EXISTING FACILITIES .....</b>		<b>61</b>
5.1	INCLUSIONS.....	61
5.2	SECTION APPLICABILITY .....	61
5.3	WORKING HOURS (MODERNIZED FACILITIES ONLY) .....	61
5.4	SYSTEM DESCRIPTION .....	61
5.5	TO (TELECOMMUNICATIONS OUTLET) PLACEMENT GUIDELINES .....	64
5.6	POS SYSTEM (NEW AND MODERNIZED FACILITIES ONLY).....	68
5.7	WIRELESS ENCLOSURES (WE).....	69
5.8	HORIZONTAL CABLING REQUIREMENTS.....	70
5.9	BACKBONE CABLING REQUIREMENTS .....	70
5.10	COAXIAL CABLING REQUIREMENTS (NEW FACILITIES AND BUILDING ADDITIONS ONLY) .....	71
5.11	GROUNDING AND BONDING.....	71
5.12	PATHWAY REQUIREMENTS.....	71
5.13	ER / TR REQUIREMENTS.....	72
5.14	POWER AT THE WORK AREA .....	75
5.15	CUTOVER AND REMOVAL OF ABANDONED SYSTEMS (MODERNIZED FACILITIES ONLY).....	75
5.16	WORK INCLUDED .....	75
5.17	PROJECT DRAWINGS FOR NEW AND MODERNIZED FACILITIES .....	76

# INDEX OF DRAWINGS

<b>EXISTING FACILITIES</b>		
EF-R1	OVERLENGTH SMALL TE	36
EF-R2	ALTERNATE MINI-ER	37
EF-R3	STANDARD TR RACKS	38
EF-R4	SIX-FOOT WALL-MOUNT TE	39
EF-C1	BACKBONE CABLING	40
EF-C2	CAT6A CABLING	41
EF-C3	WE CABLING	42
EF-L1	BACKBONE LABELING	43
EF-L2	HORIZONTAL LABELING	44
PP-T1	PATCH PANEL TERMINATION	45
EF-S1	LADDER RACK (FRONT VIEW)	46
EF-S2	POWER AND RACK PLACEMENT	47
EF-S3	LADDER RACK (OVERVIEW)	48
<b>MOBILE BUILDINGS</b>		
MB-S1	MOBILE CLUSTER DESIGN CONCEPT	56
MB-R1	MOBILE BUILDING TE	57
MB-C1	CABLING	58
MB-L1	FIBER AND ANALOG UTP LABELING	59
MB-L2	DATA UTP LABELING	60
<b>NEW AND MODERNIZED FACILITIES</b>		
NF-S1	ER LAYOUT (RACK FRONTS)	77
NF-S2	ER LAYOUT (OVERVIEW)	78
NF-S3	ER LAYOUT (LOWER LADDER RACK)	79
NF-S4	ER LAYOUT (UPPER LADDER RACK)	80
NF-S5	ER LAYOUT (POWER)	81
NF-S2-A1	ER LAYOUT (OVERVIEW) ALT 1	82
NF-S2-A2	ER LAYOUT (OVERVIEW) ALT 2	83
NF-S3-A1	ER LAYOUT (LOWER LADDER RACK) ALT 1	84
NF-S4-A1	ER LAYOUT (UPPER LADDER RACK) ALT 1	85
NF-S5-A1	ER LAYOUT (POWER) ALT 1	86
NF-S6	ALTERNATE TR LAYOUT (RACK FRONTS)	87
NF-S7	ALTERNATE TR LAYOUT (OVERVIEW)	88
NF-S8	STANDARD TR LAYOUT (LADDER RACK)	89
NF-S9	STANDARD TR LAYOUT (POWER)	90
NF-R1	STANDARD TR RACKS	91
NF-R2	ER SERVER RACK	92
NF-R3	ER FIBER RACK	93
NF-R4	ER COPPER RACKS	94
NF-R5	ER VOICE AND VIDEO RACK	95
NF-R6	ER FIBER AND VOICE RACK	96
NF-R7	WALL-MOUNT TE	97
NF-R8	COMPUTER LAB TE	98
NF-C1	HORIZONTAL CABLING	99
NF-C2	BACKBONE CABLING	100
NF-C3	COAXIAL CABLING	101
NF-L1	HORIZONTAL LABELING	102
NF-L2	BACKBONE LABELING	103
NF-L3	COAXIAL LABELING	104

## SECTION 1 – GENERAL

### 1.1 ABOUT THIS DOCUMENT

#### A. DOCUMENT PURPOSE

1. Cabling requirements for the following systems are contained within this document:
  - a. Data communications (All Facilities)
  - b. Voice communications (New and Modernized Facilities)
  - c. CATV and POS system distribution (New and Modernized Facilities)

#### B. DOCUMENT STRUCTURE

1. This document is sectionalized in order to enable the document to be used in a modular fashion. Therefore, for a particular project type, this document may be included with one or more sections omitted due to lack of relevance and in the interest of minimizing document size.

#### C. DOCUMENT CURRENCY

1. This document is updated periodically. Versions may be distinguished from one another by the Document Number printed on the title page, and at the bottom of every following page.

#### D. DOCUMENT ACCURACY

1. Any inaccuracies, ambiguities, or contradictions found within this document shall be reported immediately to:

Washoe County School District  
Information Technology Department  
425 East Ninth Street  
Reno, Nevada 89520  
(775) 789-3456 Fax: (775) 333-6042

2. No assumptions are to be made should an inaccuracy, ambiguity, or contradiction be discovered. The Vendor is responsible for obtaining written clarification of the issue prior to bidding on the project.

### 1.2 SECTION APPLICABILITY

Refer to the following table below to determine which sections of this document are relevant to a particular project type.

PROJECT TYPE	SECTIONS
Construction of a New Facility	1, 5
Construction of a Building Addition	1, 2, 5
Modernization of an Existing Facility (with mobile or modular buildings)	1, 2, 3, 4, 5
Modernization of an Existing Facility (no mobile or modular buildings)	1, 2, 5
Existing Facility Projects ( <i>misc. project tasks at an existing facility</i> )	1, 2, 3
New or Relocated Mobile and Modular Building(s)	1, 2, 3, 4

### 1.3 DEFINITIONS

#### BICSI®

Building Industry Consultant Services International®. A worldwide not-for-profit organization dedicated to providing resources and training for the cabling infrastructure industry.

#### Bundle / Cable Bundle

Within this document, the term bundle shall refer to any group of cables either bound together or ran directly adjacent to one another along a common path.

#### Customer / The Customer

The entity purchasing a Structured Cabling System or component of said System from The Vendor. For all intensive purposes, within this document and all documents of which this document is inclusive, the term The Customer shall indicate ALL of the following groups and entities: WCSD Plant Facilities Division, WCSD Capitol Projects and Planning, WCSD Information Technology Department, and The Site.

#### Consolidation Point (CP)

A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways or other non-permanent pathways.

#### Entrance Facility (EF)

An entrance to the building for both private and public network service cables including the entrance point at the building wall and continuing to the entrance room or space.

#### Equipment Room (ER)

A centralized space for telecommunications equipment that serves the occupants of a facility. Equipment housed therein is distinct from a telecommunications room because of the nature of its complexity. The ER houses the Main Cross-Connect (MC). There is only one ER per facility.

#### Existing Facility

A facility consisting of one or more buildings, having already been constructed.

#### Horizontal Cross-Connect (HC)

A group of connectors (e.g., patch panel or punch-down block) that allows equipment and backbone cabling to be cross-connected with patch cords or jumpers.

#### Intermediate Cross-Connect (IC)

The connection point between a backbone cable that extends from the main cross-connect and the backbone cable from the horizontal cross-connect.

#### Main Cross-Connect (MC)

The cross-connect normally located in the Equipment Room (ER) for cross-connection and interconnection of entrance cables, first-level backbone cables, and equipment cables.

#### Modernization

A classification of work in which an Existing Facility is modernized. Refer to Modernized Facility.

#### Modernized Facility

A facility consisting of one or more buildings having already been constructed which is to have its entire Structured Cabling System upgraded / retrofit.

#### New Construction

A classification of work in which a New Facility is constructed. Refer to New Facility.

#### New Facility

A facility to be constructed and not yet existent. The New Facility may consist of one or more buildings.

#### Project Documents

All contract documents, specifications, drawings, and blueprints to include this document issued in combination as an RFP/Bid Document for a particular project.

#### Site / The Site

The facility and entity(s) occupying the facility in which a Structured Cabling System or component of said System is to be installed.

#### Structured Cabling System (SCS)

For the purposes of this document, the term Structured Cabling System (SCS) refers to the physical cable plant, including all pathways, spaces, support structures, and associated hardware supporting data communications (as well as voice communications at Modernized Facilities, and both voice and video communications at a New Facilities).

#### Telecommunications Enclosure (TE)

A case or housing for telecommunications equipment, cable terminations, and cross-connect cabling. Within this document, the term refers specifically to a wall-mount,

lockable cabinet housing an HC and serving a dedicated area (a room or cluster of rooms) with horizontal UTP cabling.

#### Telecommunications Outlet (TO)

A connecting device in the Work Area on which horizontal cable or outlet cable terminates. A TO is not to be equated with a faceplate on which network jacks are mounted, but rather with the jacks themselves. Therefore, if a faceplate in a Work Area is populated with two jacks, there are then two TOs.

#### Telecommunications Room (TR)

An enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling.

#### UTP

Unshielded Twisted Pair cabling.

#### Vendor / The Vendor

The telecommunications contractor furnishing and installing a complete Structured Cabling System or component of said System, as specified.

#### WCSD/IT

Washoe County School District / Information Technology Department.

#### Project Manager (PM)

The Vendor's WCSD primary point of contact for the duration of the project.

#### Work Area

An area associated with a group of TOs mounted within a single faceplate. For the purposes of this document, a Work Area is a single faceplate or enclosure on/in which TOs are mounted.

## 1.4 INTERPRETATION OF CONTRACT DOCUMENTS

### A. PRECEDENCE

1. Precedence of Project Documents shall be as follows:
  - a. If any discrepancy or conflict within the Project Documents exists, the most stringent or highest quantity version has precedence.
  - b. Any and all discrepancies shall be resolved by written direction from the Project Manager.

### B. OMISSIONS

1. The omission of express reference to any parts necessary for, or reasonably incidental to, a completed installation shall not be construed as a release from providing such parts.

### C. ANCILLARY AND ACCESSORY ITEMS

1. No exclusion from, or limitations in, the language used in the Project Documents shall be interpreted as meaning that the accessories necessary to complete any required system or item of equipment are to be omitted.

### D. DRAWINGS

1. It shall be understood that the drawings contained within this document are diagrammatic. They are included to show the intent of specifications made within this document and to aid The Vendor in bidding the job. The Vendor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the Project Documents.
2. The Vendor shall verify all dimensions at The Site and be responsible for their accuracy.
3. Prior to submitting the bid, The Vendor shall call the attention of the Project Manager to any materials or apparatus The Vendor believes to be inadequate and to any necessary items of work omitted.

## 1.5 VARIATION FROM PROJECT SPECIFICATIONS

- A. The Vendor shall not deviate from the specified scope of work as indicated in the Project Documents. Deviations include (but are not limited to):
  1. Alteration of TO locations from those specified in Project Blueprints or Project Maps.
  2. Installation of additional horizontal cables not requested.
    - a. If a cable is installed to an incorrect location and an additional cable must be placed, The Vendor may wish to leave the mis-installed cable in order to avoid costs associated with removal. In most cases this shall be acceptable, provided the cable is installed, tested, and labeled under the same specifications as the requested cables. Contact the Project Manager for authorization.

3. Provision of patch cords or jumpers of a length, type, or color differing from those specified (patch cords longer than 15' are not permitted on the WCSD Network).
  4. Installation of horizontal cables to a different ER/TR/TE than is indicated in the Project Blueprints or Project Maps.
- B. Any deviation from the requirements listed above shall be considered a breach of contract. Please note that staff at the facility where the project is under way does not have the authorization to alter the specifications made in the Project Documents. Should any issue related to the above arise, contact the Project Manager immediately for prompt resolution.

## 1.6 SUBMITTALS

- A. For all projects requiring the installation of more than 100 horizontal cables or more than five optical fiber cables:
1. Prior to the start of work, The Vendor shall:
    - a. Submit copies of the certification of the company and names of staff that shall be performing the installation to provide proof of compliance with this document.
    - b. Submit cut sheets for all products, hardware, and cabling.
    - c. Submit a project plan.
  2. Work shall not proceed without The Customers approval of the submitted items.

## 1.7 REGULATORY REFERENCES

- A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code, FCC guidelines, and present manufacturing standards. All applicable national, regional, and local codes and ordinances shall be strictly adhered to by The Vendor. It is the responsibility of The Vendor to ensure the most current or adopted edition of each applicable reference is used.
- B. All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- C. The cabling system described in this document is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:

ANSI/TIA/EIA-568-C

ANSI/TIA/EIA-568-C.0

ANSI/TIA/EIA-569-B and its addendum

ANSI/TIA/EIA-606-B

ANSI J-STD-607-A

ANSI/ICEA S-90-661

ANSI/ICEA S-80-576

ANSI/TIA/EIA 942-A

ANSI/TIA/EIA 570-C

ANSI/TIA/EIA-598

ANSI/TIA/EIA-455

ANSI/TIA/EIA-604

ISO/IEC 11801 2nd edition

CENELEC EN50173

IEC 603-7

BICSI® TDMM (Telecommunications Distribution Methods Manual)

BICSI® NDRM (Network Design Reference Manual)

BICSI® ITS (Information Transport Systems) Installation Manual

BICSI® CO-OSP (Customer-Owned Outside Plant) Design Manual

- D. If the Project Documents or any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Vendor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
- E. This document does not replace any code, either partially or in its entirety. The Vendor shall be held responsible for following all applicable local codes that may impact the current Project.

## 1.8 QUALITY ASSURANCE

- A. All equipment and materials required for installation by the Project Documents shall be new (less than one year from date of manufacture) and without blemish or defect.

## 1.9 APPROVED VENDOR

- A. Formal, written evidence of the following shall be presented to the WCSD Project Manager during the BID process and before contract is awarded:
  - 1. The Vendor, including any subcontractor, must have BICSI® Registered Installers and Technicians on staff and assign them to the current Project. The project shall be staffed at all times by Installers and Technicians who, in the role of lead craftsperson, shall be able to provide leadership and technical resources for the remaining craftspersons on the project. At all times on any project a minimum of 30 percent of on-site Vendor personnel shall be BICSI® registered telecommunications installers. For all projects requiring the installation of more than 100 horizontal cables or more than five optical fiber cables, the Field Supervisor must be a BICSI® Technician

or RCDD. For all other projects the Field Supervisor must be BICSI® Technician or Installer Level II certified, or a BICSI® RCDD.

2. If requested, the Vendor, including any subcontractor, shall show proven expertise in the implementation of cabling projects. This expertise can be illustrated through the inclusion of details of at least three projects involving the design and installation of Category 6A unshielded twisted-pair cabling systems and optical fiber cabling systems within the past two year period. Names, addresses, and telephone numbers of references for the three projects shall be included.
3. When applicable, The Vendor shall accept complete responsibility for the design, installation, acceptance testing and certification of the IBDN System 10GX, IBDN System 2400, and/or IBDN FiberExpress System. Objections to design stipulations made within this document shall be made prior to bidding on the project.
4. In the event subcontractors are used for any portion of the installation or acceptance testing, The Vendor shall be responsible for any subsequent corrective action required on that portion.

#### 1.10 APPROVED PRODUCTS

- A. All components of installed systems shall be as specified in this document, or shall match exact function, dimension, quality, color, durability, etc. of the specified components, and shall not deter or alter the design functionality of the system in any way or alter any provision of the system warranty provided by the manufacturer of the specified component or system.
- B. In general (except where otherwise indicated in the Project Documents):
  1. All cabling and connectivity components shall be manufactured by BELDEN/CDT.
  2. All freestanding racks and cabinets, Large TEs, cable management, ladder rack, and Grounding/Bonding components shall be manufactured by Chatsworth Products, Inc.
  3. All surface-mount raceway shall be manufactured by Wiremold.
  4. All Small TEs and Mobile Building TEs shall be manufactured by Chatsworth Products Inc.
- C. All products required by the Vendor to form a complete system not explicitly detailed in this document, and which are not manufactured by BELDEN/CDT, Chatsworth Products, Inc., or Wiremold, must harmonize with the installed system both functionally and aesthetically.

#### 1.11 EQUIVALENT PRODUCTS

- A. All products shall be as specified within this document. No equivalent products shall be accepted unless explicitly indicated within this document.

#### 1.12 DELIVERY, STORAGE AND HANDLING

- A. Any and all items to be installed as a component of the Structured Cabling System for the current Project shall be stored according to manufacturer's recommendations as a minimum. In addition, all items must be stored in a location protected from vandalism and weather. Items shall not be stored outside. If air temperature at cable storage location shall be below 40 degrees F, the cable shall be moved to a heated (50 degrees F minimum) location. If necessary, cable shall be stored off site at The Vendors expense.
- B. If The Vendor wishes to have a trailer on site for storage of materials, arrangements shall be made with The WCSD Project Manager.
- C. Delivery of all items specified to be provided but not installed shall be provided directly to the WCSD/IT PM unless otherwise indicated.

#### 1.13 WARRANTY AND SERVICES

- A. The installed IBDN System 10GX, IBDN System 2400, and/or IBDN FiberExpress System shall be covered by a certification program provided by BELDEN/CDT and the Certified System Vendor if applicable.
- B. All Vendor-installed cabling shall be IBDN Certified as per BELDEN/CDT requirements for IBDN System 10GX, IBDN System 2400, and/or IBDN FiberExpress System. Any requirements for IBDN Certification not specified within the Project Documents but necessary for IBDN Certification are assumed.

#### C. LIFETIME APPLICATION ASSURANCE

- 1. IBDN certification shall provide the assurance that all present and future applications engineered for the performance level of the cabling system used shall work for the lifetime of the certified IBDN System 10GX, IBDN System 2400, and/or IBDN FiberExpress System.
- 2. Should the certified IBDN System 10GX, IBDN System 2400, or IBDN FiberExpress System fail to support the application(s) designed to operate over it—whether at the time of cutover to the new cabling system, during subsequent use, or after upgrading to a newer supported application (for example, to a Gigabit Ethernet or an ATM network from a lower-speed network environment)—BELDEN/CDT and The CSV shall take prompt corrective action.

#### D. 25-YEAR PRODUCT WARRANTY

- 1. IBDN certification shall provide a twenty-five year product warranty for all IBDN passive components used in the installed IBDN System 10GX, IBDN System 2400, and/or IBDN FiberExpress System. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to The Customer.

#### 1.14 SYSTEM DOCUMENTATION

- A. A current copy of the calibration certificate for the Vendor's test equipment shall be provided to the WCSD Project Manager prior to cable testing.

- B. Three (3) full sets of documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.) to the WCSD Project Manager. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. The Vendor shall provide copies of the original test results.
- C. WCSD/IT shall perform a 10% random field re-test. If Vendor submitted test results do not reasonably match WCSD/IT test results, WCSD/IT shall require: a 10% random (WCSD/IT supervised) field re-test to be conducted by The Vendor on the cable system, at no additional cost. Tests shall be a repeat of those defined above. If findings contradict the documentation originally submitted by The Vendor, additional testing can be requested of The Vendor to the extent determined necessary by WCSD/IT, including a 100% re-test. This re-test shall be at no additional cost to The Customer.

D. TEST RESULTS

- 1. Test documentation for every installed cable shall be provided in a CD or PDF electronic format, or on a USB storage device prior to inspection by WCSD/IT. Test documentation shall be saved in the latest file format version of Fluke LinkWare and must include:
  - a. Test results as downloaded from the tester. The following information shall be included in the test results:
    - 1. Record of test frequencies.
    - 2. Cable type.
    - 3. Conductor pair and cable I.D.
    - 4. Measurement direction.
    - 5. Reference setup.
    - 6. Technician name(s).
  - b. Additional documentation required to provide the following (if not included in test results):
    - 1. Test equipment name, manufacturer, model number, serial number, software version and last calibration date.
    - 2. The test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
    - 3. Any required information not listed in test results (technician, etc.).
- 2. The CD shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year).
- 3. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is required on all test equipment used for this installation. Vendor must provide a copy of the last calibration certification with submitted test results.

4. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C.0. The appropriate level III tester shall be used to verify Category 6 and Category 6A cabling systems.
5. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

#### E. AS-BUILT DRAWINGS

1. Information in this section applies to all Vendor installations of 100 or more horizontal cables, or more than five optical fiber cables.
2. The drawings are to include cable routes for all installed backbone and horizontal cabling, as well as the locations and identifiers of all ERs, TRs, TEs, and TOs.
3. Separate drawings representing all associated ERs, TRs, TEs, and TOs shall be provided for each of The Vendor installed systems below:
  - a. Backbone cabling systems
  - b. Horizontal cabling systems
  - c. Grounding systems
4. Include the following information for each above installed system:
  - a. Pathway type
  - b. Pathway size
  - c. Pathway manufacturer and model
5. All installed SCS Elements shall be identified by their sequential number as defined specifically for each project type within the Project Documents.
6. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Customer shall provide floor plans in paper and electronic (AutoCAD) formats on which as-built construction information can be added. These documents shall be modified accordingly by The Vendor to denote as-built information as defined above and a copy shall be submitted to WCSD/IT.
7. The Vendor shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD) form.

### 1.15 ACCEPTANCE

#### A. GENERAL

1. All installed cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, couplers, patch panels, and connector blocks shall be repaired or replaced at no cost to the

Customer in order to ensure 100% useable conductors in all cables installed.

2. All installed Pathways and Spaces items shall be inspected for damage, proper installation, code and standard compliance, proper sizing, grounding and bonding requirements, proper labeling, proper clearances, etc. prior to final Acceptance. Any defect shall be repaired or replaced at no cost to the Customer.
3. Horizontal Cat6 and Cat6A data cables shall be grouped together at the patch panel by room number. For example, the data drops serving each individual room shall be grouped and terminated in a contiguous numerical sequence at the patch panel. Additional Cat6 cabling for intercom and audio enhancement shall be terminated at the end of the group.
4. Any component of the installed system found to be installed by any method other than those specified within manufacturer installation guides, unless otherwise specified within the Project Documents, shall not be considered acceptable.

#### B. INSPECTION OF WORK

1. WCSD/IT shall perform an inspection of all Vendor work prior to final acceptance. Any items that are found to be in error at this time shall be documented.
2. Documentation shall then be provided to The Vendor, who shall provide a date (within 10 days of WCSD/IT inspection) by which all items shall be corrected. The Vendor has the option to coordinate a site visit with the Project Manager in order to clarify and/or dispute the issues.
3. WCSD/IT shall perform a re-inspection of all Vendor work. Any remaining or additional items that are found to be in error shall again be documented.
4. WCSD/IT shall inspect the following items, as a minimum:
  - a. Above ceiling inspection of cable tray installation and use, proper cable colors and jackets, firewall penetrations, sleeve installations, improper cable or pathway attachment to other trade work.
  - b. Classroom / Office inspection to ensure work debris has been removed, faceplate installation, label placements, label to as-built drawing comparison.
  - c. ER/TR/TE inspection to ensure proper cable support, proper labeling, proper cable termination, work debris removed, patch cord delivery, as-built documentation posting, general cable bundling practices.
  - d. Test results (copper and fiber).
  - e. As-built format and clarity.
  - f. Fiber Optic labeling.
  - g. Ceiling tile conditions.

## 1.16 TESTING

### A. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, resistance, opens and performance. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a level III test unit for Category 6 or Category 6A performance compliance.

### B. Fiber Testing

1. All fiber testing shall be performed on all fibers in the completed end to end system. There shall be no splices unless clearly defined elsewhere in the Project Documents. Testing shall consist of an end to end power meter test performed per TIA/EIA-455-53A.
2. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm bi-directionally.
3. Test set-up and performance shall be conducted in accordance with ANSI/TIA/EIA-526-7 and/or ANSI/TIA/EIA-526-14 Standards, and to the manufacturer's application guides.
4. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

## 1.17 FIRE STOPPING

- A. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire stopped. All cabling pathways and sleeves entering an ER/TR shall be STI EZ-PATH Series 44+. EZ-Firestop Grommets small through penetrations and membrane penetrations.

### B. Fire stopping References

1. ASTM E814, Standard Method of Fire Tests of Through-Penetration Fire Stops.
2. ASTM E 119, Fire Tests of Building Construction and Materials (for fire-rated architectural barriers).
3. 2002 NFPA National Electrical Code, Section 800-52, Paragraph 2(b), Spread of Fire and Products of Combustion.
4. Latest edition of the BICSI® Telecommunications Distribution Methods Manual.

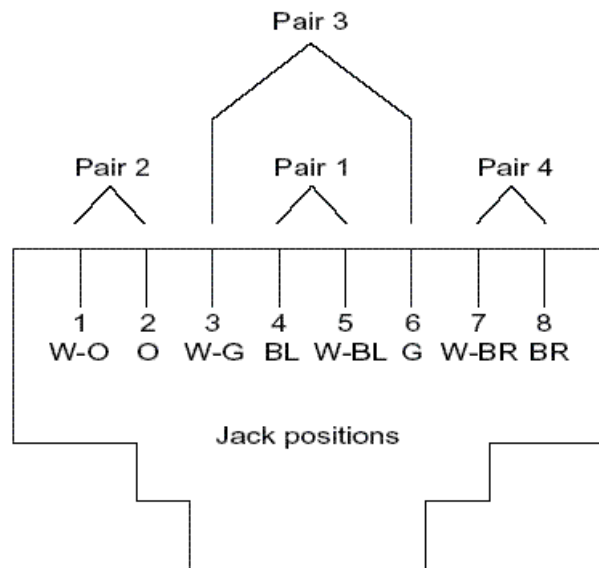
## 1.18 SLEEVE INSTALLATIONS

- A. All wall penetrations, to include non-fire-rated walls and all block type walls, shall have EZ-Firestop Grommets installed, where applicable, for all cable pass-throughs. All ER/TR wall penetrations, to include non-fire rated walls and block type walls, shall use the STI EZ-PATH Series 44+. The Vendor shall not share the sleeves for Cat6 and Cat6A cabling. Separate sleeves are required for all Cat6 system cabling and Cat6A system cabling. Sleeves shall not exceed a 40% fill rate.

#### 1.19 GENERAL CABLING REQUIREMENTS

- A. Horizontal cables shall be installed separately from backbone cables, utilizing a separate pathway at all points within the distribution system. At the ER / TR, separate entrance conduit or sleeves shall be used. Ladder rack may be shared between horizontal and backbone cabling, providing a minimum separation of six inches is maintained at all points within the ladder rack between horizontal and backbone cabling of each type (UTP, optical fiber, coaxial) except where cables cross at 90 degrees. Where this is not possible, a multi-level ladder rack system shall be used. At the TE, multi-channel raceway may be used to segregate backbone and horizontal cables.
- B. Where cables are housed in conduits, backbone and horizontal cables shall be installed in separate conduits.
- C. A plastic or nylon pull cord with a minimum test rating of 200 lbs shall be co-installed with all cable installed in any conduit, innerduct, ladder rack, or cable tray.
- D. Cable raceways and conduits shall not be filled greater than the ANSI/TIA/EIA-569-A maximum fill for the particular raceway type or 40% upon initial install, whichever consists of fewer cables. For cable tray, maximum fill is 50%.
- E. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- F. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.
- G. Where cables are installed in an air return plenum, either plenum rated cabling shall be used or riser rated cable shall be installed in metallic conduit.
- H. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturers requirements and reference documents.
- I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the sprinkler system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

- J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, The Vendor shall install appropriate carriers to support the cabling.
- K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by The Vendor prior to final acceptance at no cost to The Customer.
- L. Cables shall be identified by a self-adhesive label in accordance with Identification and Labeling specifications made in the Project Drawings for each respective project classification. At the TO, 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. At the ER/TR/TE, 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. Cables labeled within the bundle where the label is obscured from view shall not be acceptable.
- M. Cables shall be installed in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard document, manufacturer's recommendations and installation guides, and best industry practices.
- N. Plastic "zip-ties" shall not be permitted within the Structured Cabling System. "Velcro" type (hook and loop) tie wraps shall be used for the purpose of bundling / managing horizontal and backbone cabling (must be plenum rated if installed within a plenum space).
- O. Within ER/TR spaces, horizontal cables shall be loosely bundled (uncombed) from the point of cable entrance to their respective panels or blocks. Bundles shall be loose enough that a 1" diameter cylindrical object could easily slip between the Velcro and the cables. This provides some manageability while avoiding potential alien cross talk issues.
- P. For horizontal cabling, where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.
- Q. Horizontal UTP pair untwist at the termination shall not exceed 0.25".
- R. Jack pin/pair assignments shall be T568B for all installed or re-terminated horizontal cabling unless otherwise specified within the Project Documents. T568B Jack pin/pair assignments are as follows:



- A. For horizontal cabling, if a J-hook or Bridal Ring System is used to support cable bundles all horizontal cables shall be supported at a maximum of 60" intervals. J-hooks or Bridal Rings must be secured to a permanent, stable component of the building structure. J-Hooks or Bridal Rings shall not be attached to wires, cables, etc. The horizontal pathway shall not permit any motion in cabling it supports. Cat6 cable quantities shall not exceed J-Hook or Bridal Ring System manufacturer recommendations or 50 cables, whichever is fewer. Cat6A cable quantities shall not exceed J-Hook or Bridal Ring System manufacturer recommendations or 30 cables, whichever is fewer.
- B. At no point shall cables rest on acoustic ceiling grids or panels, or be attached to any portion of the building except conduit/innerduct, raceway, ladder rack, cable tray, J-hooks, or bridal rings.
- C. Horizontal Cat6 distribution cables shall be bundled or distributed together in groups of no more than 50 cables, no more than 30 cables for Cat6A. When larger quantities are distributed together in ladder rack or cable tray, cables shall be separated into groups of fifty or fewer cables with a minimum of two inches of separation maintained between them at all points.
- D. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- E. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- F. Three feet of fiber slack shall be neatly coiled within the fiber enclosure. Ten feet of fiber slack shall be stored at the ER/TR in an extended loop or figure-eight configuration.
- G. Each optical fiber cable shall be individually attached to its enclosure by mechanical means. The cables strength member shall be securely attached

the cable strain relief bracket in the enclosure. Refer to manufacturer installation instructions.

- H. All Horizontal Cabling shall be grouped together at the patch panel by room number. For example, the data drops serving each individual room shall be grouped and terminated in a contiguous numerical sequence at the patch panel. Additional Cat6 cabling for intercom and audio enhancement shall be terminated at the end of the group.

#### 1.20 GENERAL REQUIREMENTS FOR RACKS AND CABINETS

- A. Vendor-installed racks and cabinets shall be securely attached to the concrete floor using a minimum of 3/8" hardware or as required by local codes.
- B. Racks and cabinets shall be placed with a minimum of 36" clearance from the walls on at least three sides (two of which must be front and rear) of the rack. When mounted in a row, maintain a minimum of 36" from the wall behind and in front of the row of racks and from the wall to at least one end of the row.
- C. All Vendor-installed racks, free-standing cabinets, and wall-mount cabinets shall be grounded in accordance with the section titled Grounding and Bonding within this document.
- D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack or cabinet upon completion of the installation.
- E. Rack mount termination equipment fields shall be installed as per the requirements specified by the manufacturer's installation guides.

#### 1.21 GENERAL GROUNDING AND BONDING REQUIREMENTS

##### A. GENERAL

- 1. All installed cabinets, racks, TEs, ladder-rack, cable-tray, sleeves, etc., must be properly grounded and bonded as per ANSI J/STD-607-A.
- 2. All Grounding and Bonding components shall be manufactured by Chatsworth products, and be specifically designed for telecommunications grounding systems. Electrical ground bus bars are not adequate and shall not be accepted at any point in the grounding system.

#### 1.22 GENERAL LABELING REQUIREMENTS

- A. Specific labeling requirements for each project type may be found in the specifications made for each project classification within this document.
- B. It is the responsibility of The Vendor to ensure that final room numbers are used when labeling. The Project Manager shall provide final authorization for the room numbers used.

- C. If room numbers are not apparent or are not specifically indicated in the Drawings, Blueprints, or elsewhere in the Project Documents, obtain written instructions from the Project Manager on how to proceed with labeling.
- D. All ER and TR doors shall be properly numbered with plastic or acrylic label plates (if not already present) which match the style and appearance of those installed on doors located in the immediate vicinity.
- E. TE doors shall be properly numbered with the room number in which the TE is installed preceded by the letters "TE" and followed by ".1" (".2" if another pre-existing TE is within the room). A space shall separate the Letters "TE" from the room number. Therefore, a TE installed in room A6 or room 224 shall be labeled "TE A6.1" or "TE 224.1" respectively. If room 224 already has a TE installed which is not being upgraded, the new TE shall be labeled "TE 224.2". Engraved acrylic or plastic label plates shall be mounted with the top edge of the label two inches below the top of the door. The label plate shall be centered horizontally on the door, and shall: be 3" H x 4" W; have a black or dark-grey foreground with white lettering. The colors of the label plate foreground and lettering shall be chosen to create an aesthetically pleasing appearance when installed.
- F. Space IDs used in labeling cabling systems shall match exactly label plates used on the doors of ERs, TRs, and TEs.
- G. The Grounding, Fire stop, and Pathway Systems shall be labeled as per the recommendations made in ANSI/TIA/EIA-606-A.

### 1.23 GENERAL REQUIREMENTS FOR PATHWAY

- A. All Vendor-installed cabling must be run in a pathway compliant with national, regional, and local codes and ANSI/EIA/TIA standards.
- B. Initial fill for all new, Vendor-installed raceways and sleeves shall not exceed 40% max fill. Initial fill for all Vendor-installed J-Hook systems shall not exceed 50 cables for Cat6 and 30 cables for Cat6A, or recommended manufacturers fill capacity.
- C. J-Hook systems are permitted in accessible ceiling spaces.
- D. Surface-Mount Raceway / Conduit
  - 1. Application
    - a. Install to support cabling where walls and ceiling spaces are non-present or unusable.
  - 2. General
    - a. Must be correctly sized:
      - 1. Do not exceed 40% fill for all Vendor-installed raceway.
      - 2. Do not exceed 60% fill within existing raceway.
    - b. Surface-mount raceway must be properly anchored to the wall by appropriate hardware (screws, bolts, brackets, and anchors) as well as by the adhesive included with the raceway.
      - 1. Anchor to wall at ends of every length of raceway (within 6" of ends).

2. Anchor to wall every 24" along length of raceway.
3. If raceway manufacturer requirements are stricter than items a. or b. above, follow manufacturer recommendations.
3. Approved Raceway Systems
  - a. Wiremold PN10 System (White) (Existing Facilities only)
  - b. Wiremold 5400 Series (White)
  - c. Wiremold 5500 Series (White)
4. Metallic conduit
  - a. Install within plenum rated spaces to support non-plenum cabling traversing those spaces.
  - b. Install to support installed cabling where appropriate in order to remain consistent with existing pathway in the immediate vicinity.
  - c. Conduit stub-ups shall be one inch in diameter minimum.
  - d. Conduit must be appropriately grounded as per applicable codes and standards.
  - e. All conduit two inches or greater in diameter and used for backbone (inter-ER/TR/TE) cabling shall have MaxCell innerduct installed within it (refer to section titled **MaxCell Innerduct** below).
5. MaxCell Innerduct
  - a. Install MaxCell Innerduct within all conduits two inches or greater in diameter which provide pathway for backbone (inter-ER/TR/TE) cabling.
    1. 2" conduit shall have (1) 2" 3-Cell pack installed
    2. 3" conduit shall have (1) 2" 3-Cell packs installed
    3. 4" conduit shall have (2) 2" 3-Cell packs installed
6. Corrugated Innerduct
  - a. Install for all optical fiber cabling where not routed within conduit.
  - b. Must be plenum rated if traveling through a plenum rated space.
  - c. Must be non-split, and bright orange in color.
7. A pull string must be co-installed with all installed cabling.
- E. Cabling for other trades shall not occupy any pathway utilized for communications cabling.

#### 1.24 GENERAL REQUIREMENTS FOR WORK AREAS

- A. Work Area outlets and connectors shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.
- B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard document, manufacturer's recommendations and best industry practices.
- C. Pair untwist at the termination shall not exceed 0.25".

- D. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.

## **SECTION 2 – EXISTING FACILITIES: GENERAL CONSIDERATIONS**

### **2.1 INCLUSIONS**

- A. All requirements contained and referred to in **SECTION 1 – GENERAL** of this document, apply to this section as if bound herein.

### **2.2 SECTION APPLICABILITY**

- A. This section is applicable to any project which occurs at an Existing Facility.

### **2.3 CEILINGS AND WALLS**

- A. Carefully remove existing tiles as required. Store removed tiles in a location specified by The WCSD Project Manager.
- B. Do not modify the grid structure in any way (unless required for the installation of a ceiling mounted panel).
- C. Any tiles that are damaged during the installation process must be replaced and installed by the contractor. New tiles must match the type and design of the adjacent areas.
- D. Any grid members that are damaged during the installation process must be replaced and installed by the contractor.
- E. The contractor must repair any solid ceiling area that may become damaged during the installation process.
- F. All wall surfaces shall be restored to their original finish (i.e. must match the appearance of the adjacent surfaces).
- G. Brick penetrations must be sleeved for cable pass-throughs and must be patched with a mortar that matches the color of the brick.
- H. Fire stop products and Silicone type sealants shall not be used to seal masonry penetrations.

### **2.4 WORKING ENVIRONMENT**

- A. All Vendor employees shall sign in and out at the office each working day. A visitor's badge (or sticker) is required at all times.
- B. It is preferred that all contractor employees wear an identification badge with photograph. This badge shall have the company name as a minimum. Shirts with a company logo shall be accepted as an alternate means of identification.
- C. Interactions with The Site (administrators, faculty, or students) shall be professional and courteous at all times. Under no circumstances shall The Vendor engage in an argument with The Site. Any issues shall be immediately referred to the WCSD Project Manager by The Vendor.
- D. All work shall be performed in a neat and workman like manner. All methods of construction, details of workmanship that are not specifically described or indicated shall be subject to the approval of the WCSD Project Manager.

- E. All computer equipment and furniture shall be covered during the project to keep down the debris residue.
- F. Daily clean up is required of all site areas.
- G. Equipment, cables, and personnel shall not be in the hallways during classroom changes.
- H. Rope off any areas that may become a safety concern, especially if they are not monitored overnight or on a weekend.
- I. Store equipment and supplies only in areas designated by the WCSD Project Manager.
- J. Any disruption in service (Data, Voice, etc.) must be scheduled and coordinated with BOTH the WCSD Project Manager and The Site staff.

## 2.5 WORKING HOURS

- A. Working hours for work in existing facilities shall typically be between 3:00 PM and 11:00 PM after students and faculty have left for the day. In most cases, alternative schedules may be arranged provided they do not have a negative impact on curriculum or administrative functions. Coordinate alternative schedules with the Project Manager.

## 2.6 ABANDONED CABLES

- A. An abandoned cable is a cable which is not properly terminated at both the ER/TR/TE and the TO.
- B. All Vendor-replaced cables shall be completely removed from the ceiling and riser areas, raceway, and conduit segments.
- C. Any abandoned cables that are identified outside the scope of each project shall be reported to the WCSD Project Manager. The additional cables may be added as an alternate to the original scope if deemed necessary. The Vendor shall positively identify these cables before they are to be removed.
- D. The Vendor shall remove the debris, and arrange for off-site disposal.
- E. All open wall penetrations that result from the removal of abandoned cables shall be properly sealed.

## 2.7 MATERIAL DISTURBANCE PERMIT (MDP) REQUIREMENTS

### A. GENERAL

- 1. The Site may contain potentially hazardous asbestos locations requiring special handling. The Vendor shall not perform any work at The Site without first signing and submitting a material disturbance permit to the WCSD Project Manager.
- 2. The district shall be reimbursed for any costs incurred due to the unauthorized or improper procedures resulting in the disturbance of asbestos. All building penetrations (including screws, nails, taps, etc.) must be performed in accordance with specifications provided in the Material Disturbance Permit.

## B. MDP PROCEDURE

1. A Vendor-signed MDP must be on hand at all times while on site, whether or not a disturbance shall be made. If an MDP cannot be produced upon request, The Vendor shall be asked to leave the premises until one is procured.

2. WCSSD AHERA must be notified prior to creating a disturbance.

- a. Contact Information:

WCSSD AHERA Program Manager  
Huffaker Maintenance Center  
Plant Facilities Division  
(775) 851-5675

- b. The WCSSD AHERA Program Manager must be notified of the exact location, type, and timeframe of any disturbance.
    - c. If the WCSSD AHERA Program Manager cannot be reached via the phone number above, leave a message detailing:
      1. The facility where the disturbance shall occur.
      2. Building, room, or location where disturbance shall occur.
      3. Work request number.
      4. Type of disturbance.
      5. Timeframe the disturbance shall be performed.
  3. All penetrations are to be considered disturbances if the material to be penetrated is listed as *Asbestos Containing* in the MDP. Typical penetrations include:
    - a. **Installation of raceway** (must be fastened securely to wall by appropriate hardware)
    - b. **Mounting of Surface Mount Boxes** (must be fastened securely to wall by appropriate hardware)
    - c. **Mounting of Wall-Mount Cabinets** (must be fastened securely to wall by appropriate hardware)
    - d. **Installation of Sleeves**
    - e. **Installation of J-Hooks**

## 2.8 PATHWAY REQUIREMENTS

### A. Acceptable pathway systems:

1. Ceiling Spaces

- a. Use accessible ceiling spaces wherever possible for both backbone and horizontal cabling distribution. Spaces are considered accessible provided installed pathway can be easily accessed every ten feet at minimum. Acceptable methods of distribution within ceiling spaces are:
    1. Ladder Rack or Cable Tray
    2. J-Hook System

- b. Where ceiling spaces are not available or accessible, The Vendor has the option to create an accessible ceiling space by one of the following methods:
  - 1. Install a drop-ceiling: All affected existing lighting fixtures, signs, fire-alarm detectors, etc. must be re-located/re-installed to The Customers satisfaction.
  - 2. Install a soffit: All affected existing lighting fixtures, signs, fire-alarm detectors, etc. must be re-located/re-installed to the Customers satisfaction. Must be painted to match existing walls and ceiling. A J-Hook system or conduit system must be installed within the soffit, either wall-mounted or ceiling mounted, along entire length of soffit. Access panels must be provided at intervals not exceeding 20’.
  - 3. Install large, multi-channel raceway: Refer to the following section titled **Surface-Mount Raceway / Conduit**.
- 2. Wall Spaces
  - a. Wall spaces shall be used whenever possible or reasonable to route horizontal cabling to the TO. Examples of where it is not possible or reasonable to install cabling within walls spaces include:
    - a. Suitable surface-mount pathway is already in place.
    - b. The wall is solid, filled, and/or inaccessible.
    - c. Above-ceiling space is nonexistent, inaccessible, or otherwise unusable.
- 3. Surface-Mount Raceway / Conduit
  - a. Application
    - 1. Install to support cabling where wall and ceiling spaces are non-present or unusable.
  - b. General
    - 1. Must be correctly sized:
      - a. Do not exceed 40% fill for all Vendor-installed raceway.
      - b. Do not exceed 60% fill within existing raceway.
    - 2. Surface-mount raceway must be properly anchored to the wall by appropriate hardware (screws, bolts, brackets, and anchors) as well as by the adhesive included with the raceway.
      - a. Anchor to wall at ends of every length of raceway (within 6” of ends).
      - b. Anchor to wall every 24” along length of raceway.
      - c. If raceway manufacturer requirements are stricter than items a. or b. above, follow manufacturer recommendations.
  - c. Approved Raceway Systems
    - 1. Refer to **GENERAL PATHWAY REQUIREMENTS** in Section 1.
  - d. Metallic conduit
    - 1. Refer to **GENERAL PATHWAY REQUIREMENTS** in Section 1.

- B. Should The Vendor choose to utilize a preexisting pathway, the pathway must be modified to comply with current codes, standards, and best practices. For example:
1. The Vendor shall install any missing fittings from surface-mount raceway (elbows, drop-ceiling covers, couplers, etc.). Fittings must be of the same manufacture and color as existing raceway.
  2. Surface-mount raceway improperly mounted to wall (crooked, hanging, not anchored every two feet) must be straightened and anchored to wall every two feet minimum (without damaging the wall or paint) or a new pathway must be installed.
  3. If power is currently ran in a communications cabling path (code violation), the violation must be corrected (power rerouted as per NEC) or a new path must be installed. Note that the violation must be reported to the Project Manager along with any proposed additional costs immediately following discovery. The Project Manager shall make the final determination as to whether or not to have The Vendor correct the code violation at that point or to run a new path and correct the violation through alternate means.
  4. If an existing conduit, raceway, or sleeve exceeds 60% fill, the path may not be used and a new sleeve shall be installed.
  5. If an existing pathway penetration is improperly fire stopped, the entire penetration must be properly fire stopped or a different pathway and / or penetration must be used / installed and the Project Manager notified immediately of the existing code violation.

## SECTION 3 – EXISTING FACILITIES: SPECIFICATION DETAIL

### 3.1 INCLUSIONS

- A. All requirements contained and referred to in **SECTION 1 – GENERAL** and **SECTION 2 – EXISTING FACILITIES: GENERAL CONSIDERATIONS** of this document apply to this section as if bound herein.

### 3.2 SECTION APPLICABILITY

- A. This section is applicable to any project which occurs at an Existing Facility and which requires one or more of the following, but does not require a complete modernization of the facilities:
  - 1. INSTALLATION CATEGORY 6 AND CATEGORY 6A CABLING
  - 2. INSTALLATION OF SIX-STRAND OPTICAL FIBER CABLING
  - 3. UPGRADE OF AN EXISTING TE
  - 4. INSTALLATION OF A NEW TE
  - 5. RETROFIT OF AN EXISTING TE
  - 6. INSTALLATION OF A MINI-EQUIPMENT ROOM
  - 7. INSTALLATION OF A STANDARD TR
  - 8. UPGRADE OF AN EXISTING POS SYSTEM
- B. The items contained in this section are intended to be referenced specifically within a request for quotation (RFQ), request for proposal (RFP), or bid request as a portion of the work to be performed by The Vendor.

### 3.3 INSTALL CATEGORY 6 AND CATEGORY 6A HORIZONTAL CABLING

The Vendor shall provide all labor and materials required for the installation of Category 6 and Category 6A horizontal cabling as per the specifications below and as indicated elsewhere in the Project Documents.

- A. DETERMINING APPROPRIATE CABLING TYPE
  - 1. In general, Category 6A cabling shall be installed at all existing and new facilities only. Category 6 cabling shall only be installed for alternative systems (I.E. intercom, audio enhancement etc.).
- B. CATEGORY 6 AND CATEGORY 6A CABLING SPECIFICATIONS
  - 1. Install Category 6 and Category 6A cabling as per specifications made in **Project Drawing EF-C2** at the end of this section.
  - 2. The Vendor shall terminate installed cabling to the ER/TR/TE, rack, patch panel, and ports specified in the Project Documents.
- C. TELECOMMUNICATION OUTLET (TO) SPECIFICATIONS: IF INSTALLING TO AN EXISTING WORK AREA:
  - 1. Where installing to an existing Work Area, The Vendor shall consolidate TOs as per the option below. The Vendor **SHALL NOT** install a separate system (to include raceway) directly adjacent to an

existing system unless explicitly instructed to do so elsewhere in the Project Documents. All consolidated existing cables shall be tested and relabeled at both TO and ER/TR/TE as per **Project Drawing EF-L2** at the end of this section. Test results shall be provided to the WCSD Project Manager.

- a. **TO Consolidation Method:** The Vendor shall replace existing non-BELDEN/CDT modules, adapters, faceplates, inserts, etc. with BELDEN/CDT inserts in order to consolidate TOs at an existing Work Area. The Vendor shall ensure faceplates, boxes, enclosures, and raceway match in color and style. The Vendor shall replace existing raceway to ensure proper sizing (40% max fill) if necessary. If new raceway is required, size raceway to obtain 40% fill as specified in the raceway manufacturers documentation for the type and quantity of cabling which shall occupy the raceway.

#### D. HORIZONTAL CABLE LABELING SPECIFICATIONS:

1. Use the specifications provided in **Project Drawing EF-L2** for labeling horizontal cabling and hardware. Any issues regarding implementation of the labeling scheme shall be resolved via written instruction from the WCSD Project Manager.
2. Refer to the Project Documents or consult WCSD/IT to find the Space ID.

### 3.4 INSTALL SIX-STRAND OPTICAL FIBER CABLING

The Vendor shall provide all labor and materials required for the installation of six-strand optical fiber cabling as per the specifications below and as indicated elsewhere in the Project Documents.

- A. Install six-strand optical fiber cabling as per specifications made in **Project Drawing EF-C1** at the end of this section.
- B. Use the specifications provided in **Project Drawing EF-L1** for labeling optical fiber cabling and hardware. Any issues regarding implementation of the labeling scheme shall be resolved via written instruction from the WCSD Project Manager.

### 3.5 UPGRADE AN EXISTING TE

The Vendor shall provide all labor and materials required for the Upgrade of an Existing Telecommunications Enclosure (TE) as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED:

1. Remove existing wall-mount TE.
2. Install wall-mount TE as indicate elsewhere in the Project Documents and as per specifications made in the following drawings at the end of this section:

- a. **Project Drawing EF-R1** – Small TE
  - b. **Project Drawing EF-R3** – High Capacity TE
  - c. **Project Drawing EF-R** – Six-Foot Wall-Mount TE
- 3. Install optical fiber cabling as per specifications made in **Section 3.4 INSTALL SIX-STRAND OPTICAL FIBER CABLING** of this document (unless fiber optic cabling is already in place). Refer to the following decision sequence:
  - a. If fiber optic cabling has already been installed, it must be properly mounted at both the ER and the TE in an enclosure designed for housing optical fiber terminations.
  - b. If existing fiber optic terminations are not properly mounted within an enclosure at either the ER or TE, The Vendor shall install an enclosure as specified in the drawings (i.e., FiberExpress Panel or FiberExpress Small Wall Mount Patch Panel at the ER, and Multimedia Outlet Box at the TE) and all fiber terminations shall be re-terminated with LC type connectors.
  - c. Fiber mounted on an open frame, modular panel (with no enclosed space for housing and protecting fiber connections) shall not be accepted.
  - d. If existing fiber optic cabling is utilized, The Vendor is responsible for installing connectors on all un-terminated strands and testing the cabling as per current standards. Provide the test results to the WCSD Project Manager for review.
  - e. If existing fiber optic cabling is utilized, The Vendor is responsible for installing a 1" minimum conduit between the TE and optical fiber enclosure.
- 4. Re-terminate existing horizontal cabling served by the TE.
  - a. The Vendor is responsible for ensuring a consistent wiring scheme is used at the TE. All terminations shall be 568B. The WCSD standard wiring scheme is 568B, which shall be used.
  - b. The Vendor is responsible for factoring in all costs associated with re-termination at the TO, whether to ensure a consistent termination scheme (as detailed above) or to terminate pairs which were previously un-terminated. All pairs shall be terminated at both the TO and TE.
  - c. The Vendor shall test all re-terminated cables as per the appropriate standard for the cabling category. If a failure occurs, The Vendor shall re-terminate at both TO and TE to correct. If this does not rectify the failure:
    - 1. Save the test results.
    - 2. Compose a list of the failures using the revised labeling scheme.
    - 3. Provide the list of failures to the WCSD Project Manager ASAP for review. WCSD/IT may re-terminate and test the drops to verify Vendor findings.

5. Label all re-terminated cabling and associated termination hardware as per specifications made in **Project Drawings EF-L1 and EF-L2** at the end of this section.

### 3.6 INSTALL NEW SMALL TE

The Vendor shall provide all labor and materials required for the installation of a Small TE as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED

1. Install wall-mount Telecommunications Enclosure (TE) as per specifications made in **Project Drawing EF-R1** at the end of this section.

### 3.7 RETROFIT AN EXISTING SMALL TE

The Vendor shall provide all labor and materials required for the Retrofit of an Existing Small TE as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED

1. Remove existing wall-mount TE.
2. Remove existing cabling and associated termination hardware served by existing wall-mount TE.
3. Install wall-mount Telecommunications Enclosure (TE) as per specifications made in **Project Drawing EF-R1** at the end of this section.

### 3.8 INSTALL A MINI-ER

The Vendor shall provide all labor and materials required for the installation of a Mini-Equipment Room (ER) at an Existing Facility as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED

1. Install a Mini-ER as per specifications made in **Project Drawings EF-R2, EF-S1, EF-S2, and EF-S3** at the end of this section. As exact dimensions of spaces at Existing Facilities shall vary, refer to the project scope of work / description of work for exact positioning of racks, ladder-rack, sleeves, etc.

### 3.9 INSTALLATION OF A STANDARD TR

The Vendor shall provide all labor and materials required for the installation of a Standard TR at an Existing Facility as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED

1. Install a Standard TR as per specifications made in **Project Drawings EF-R5, EF-S1, EF-S2, and EF-S3** at the end of this section. As exact dimensions of spaces at Existing Facilities shall vary, refer to the

project scope of work / description of work for exact positioning of equipment.

### 3.10 INSTALLATION OF A SIX-FOOT WALL-MOUNT TE

The Vendor shall provide all labor and materials required for the installation of a Six-foot Wall-Mount TE as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. WORK INCLUDED

1. Install wall-mount Telecommunications Enclosure (TE) as per specifications made in **Project Drawing EF-R6** at the end of this section.

### 3.11 UPGRADE AN EXISTING POS SYSTEM

The Vendor shall provide all labor and materials required for the Upgrade of an Existing POS System as per the specifications below and as indicated elsewhere in the Project Documents.

#### A. POS System Description

1. POS outlets shall be located at various serving lines, windows, and outlying locations. An additional two (2) POS TOs shall be located within the kitchen office at a location designated for the kitchen manager's desk. One (1) TO shall be in place to connect the kitchen manager's computer to the POS system 66-block, and the other shall be used to connect the kitchen manager's computer to the SP demarcation for WAN services.
2. POS TOs shall be located as indicated elsewhere in the Project Documents. Final TO locations may differ from original TO placement.
3. Each POS station shall have one (1) cat6 cable to be run to the ER/TR and one (1) cat6 cable to be run to a 66-block to be installed in a junction box in the kitchen manager's office. All POS station cables terminated on the 66-block shall be cross-connected together in parallel.
4. Where POS stations are placed against a wall, mount TOs on or in-wall. POS TOs shall not be installed within the floor. POS TOs in student common areas shall be installed within secured, lockable, faceplates or wall-mount boxes (surface-mount or flush-mount). If a surface mount box is used, it must be no larger than a typical double-gang surface mount box and must be pre-approved by WCSD/IT.
5. Label the POS Station patch panel "POS Stations" using Brady P/N XC-500-422.
6. POS TOs shall be labeled "POS-" followed by the POS Station 66-block pin number. Therefore, the POS station terminated on pins one through eight of the POS Station 66-block shall be labeled "POS-1". Use labels specified in drawing **EF-L2** for POS TOs.

B. WORK INCLUDED

1. Remove existing POS cabling and associated termination hardware. Locations where POS cables are removed and not replaced shall have blank inserts or faceplates installed (where applicable).
2. Install POS System junction box and associated TOs as per the POS System Description above and as indicated elsewhere in the Project Documents.
3. Install POS TOs as per drawing **EF-C3** and as indicated elsewhere in the Project Documents.

3.12 PROJECT DRAWINGS FOR EXISTING FACILITIES

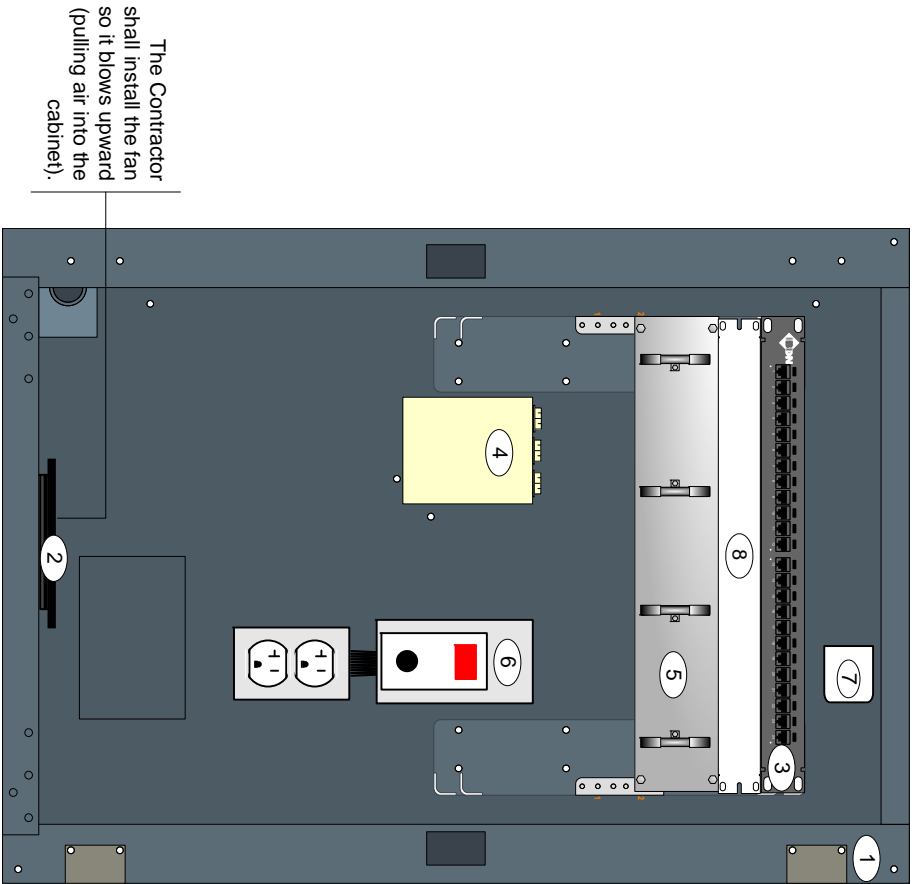
- A. Refer to drawings contained in the following pages.
- B. The following drawings form a portion of a larger project specification and in no way are intended to represent the entirety of the project requirements.

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Vertical On-Wall Enclosure	CPI	13050-223
2	Fan Kit	CPI	13051-001
3	10GX RevConnect Patch Panel, 24-port	BELDEN/CDT	RVAPPF1U24BK
4	Multimedia Outlet Box, White	BELDEN/CDT	AO643207
	LC Duplex Adapter, MM	BELDEN/CDT	AX102211
	LC Duplex Adapter, SM	BELDEN/CDT	AX102215
5	Organizer Ring Panel	BELDEN/CDT	AO403977
6	Line Thermostat	DAYTON	4LZ94
7	KeyConnect Side Entry Box, White	BELDEN/CDT	AX102652
8	Filler Panel, 1U, 19"W, Black	CPI	30024-701

NOTES

1. The Contractor will install one duplex, single-gang power outlet fed from a dedicated circuit as shown. The top outlet shall be clearly labeled "T-STAT" using a Brady P/N X-29-422.
2. The Contractor shall install the Line Thermostat directly above the single-gang power outlet as shown. The Line Thermostat shall be installed so as to apply power to the top outlet of the Contractor-installed duplex power outlet when the temperature within the TE exceeds 90 degrees F. This shall apply power to the fan at 90 deg. F.
3. All Contractor-installed power within the Enclosure will be installed within metallic flex conduit, and will be routed along the walls of the enclosure (left, right, top, or bottom), and secured to the rear of the enclosure.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

The Contractor shall install the Line Thermostat and electrical outlet on the non-hinged side of the cabinet. The Line Thermostat shall be wired so as to apply power to the left two outlets of the Contractor-installed quad power outlet when the temp. within the TE exceeds 90 deg. F. This shall apply power to the fan at 90 deg. F.




Installation Note:

Install lowest leading edge of cabinet at or below 27 in above the finished floor (ADA Section 4.4.1).

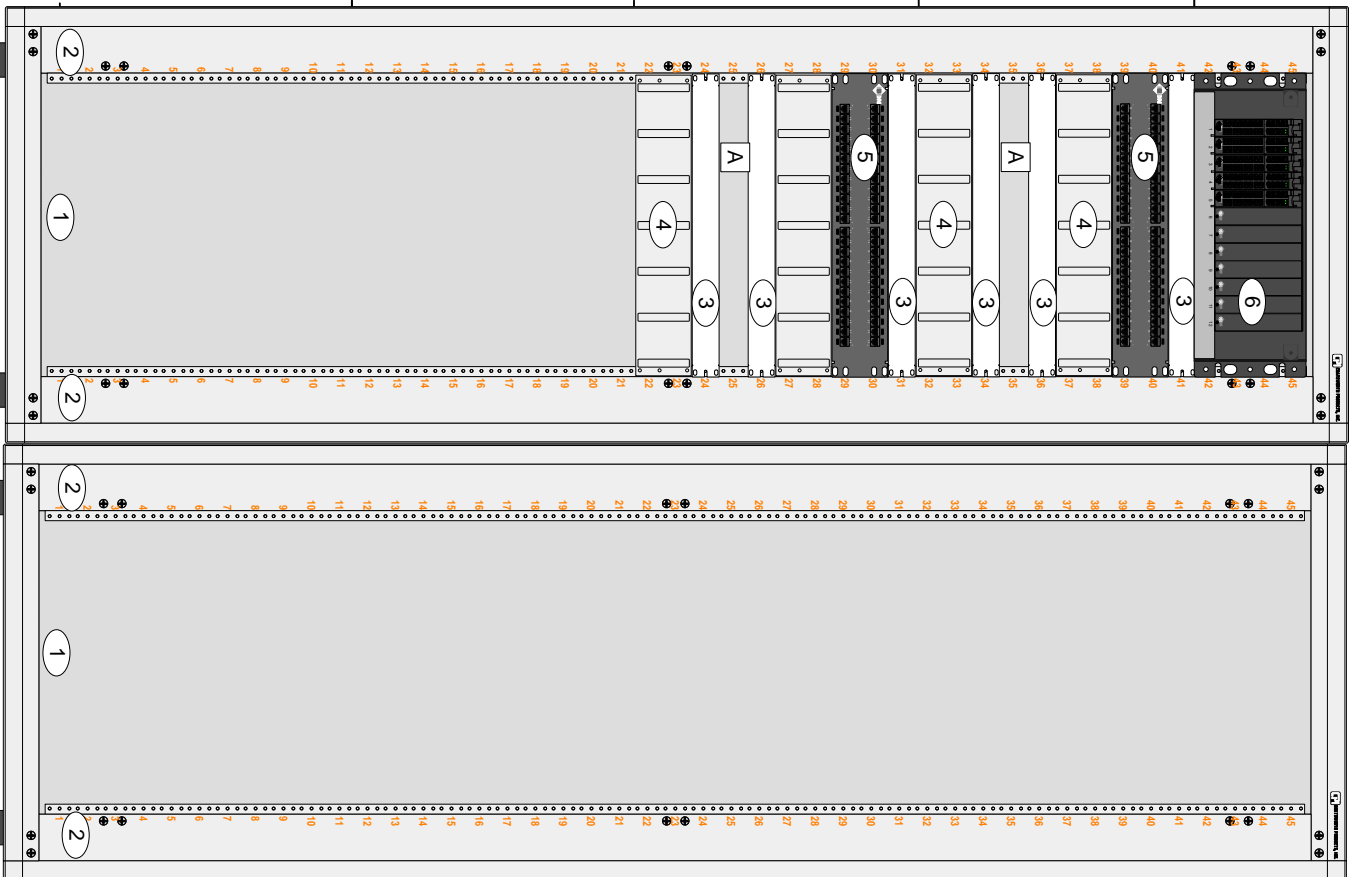
ADDITIONAL NOTES

1. TE doors will be properly numbered with the room number in which the TE is installed preceded by the letters "TE" and followed by ".1". A space will separate the Letters "TE" from the room number. Therefore, a TE installed in room A6 or room 224 will be labeled "TE A6.1" or "TE 224.1" respectively. Engraved acrylic label plates [A] shall be mounted with the top edge of the label two inches below the top of the door. The label plate will be centered horizontally on the door, and will be: 3" H x 4" W, have a black or dark-grey foreground with white lettering.

		Washoe County School District Information Technology	
PROJECT DRAWINGS FOR EXISTING FACILITIES		DWG TITLE	
LOCATION N/A		Overlength Small TE	
SCALE NTS	JLC	DWG#	EF-R1

# COPPER RACK (Cabinet 2)

# SERVER RACK (Cabinet 1)



Wall

## MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N
1	CPI Megarframe Cabinet	CPI	M1033-741
2	Vertical Cabling Ring Manager for Megarframe	CPI	12465-707
3	Filler Panel, 1U, 19" W, Black	CPI	30024-701
4	Large Horizontal Ring Panel, Black	CPI	11564-719
	Slip-on Cover	CPI	11764-719
5	10GX RevConnect Patch Panel, 48-port	BELDEN/CDT	RVAPPF2U48BK
6	FiberExpress ECX Cable Manager Shelf	BELDEN/CDT	ECX-04U
	FiberExpress ECX Module, LC Duplex, MM	BELDEN/CDT	FFAX12LD
	FiberExpress ECX Module, LC Duplex, SM	BELDEN/CDT	FFSX12LD

## NOTES

1. Leave 1U at **A**.
2. All UTP cabling terminated on **5** will be terminated and dressed as per manufacturer instructions.
3. Access Modules 1-2B shall be Cat6A RevConnect preloaded panels. One additional Access Module will be installed for future cables. For instance, if 88 Cat6A cables are to be installed, Access Modules 1A (48 cables), 1B (40 cables), and 2 (0 cables) will be installed.
4. Additional Copper Racks will be installed as required to accommodate total Contractor-installed horizontal cabling.
5. The Contractor shall install all rack mount equipment using 1/2"24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 1/2"24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.
6. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION

ER

DWG TITLE

Alternate Mini-ER

SCALE

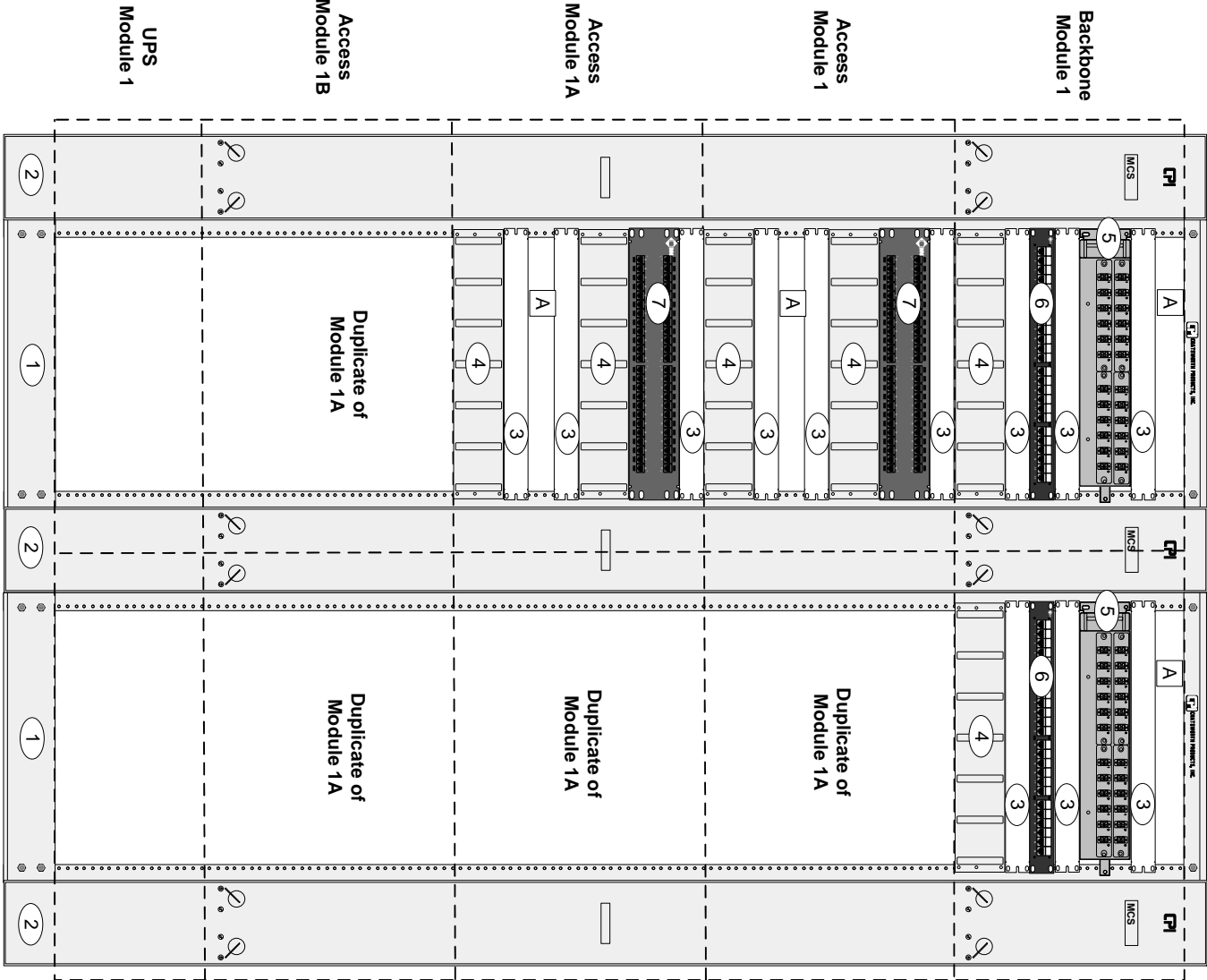
NTS

JLC

DWG#

EF-R2

# TR (typical)



MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	
1	Quad/Rack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7	CPI	30163-703	
3	Filler Panel, 1U, 19" W, Black	CPI	30024-701	
4	Large Horizontal Ring Panel, Black	CPI	11564-719	
5	Slip-on Cover	CPI	11764-719	
6	FiberExpress ECX Panel, 2U, Black	BELDEN/CDT	ECX-02U	
7	6 LC Duplex ECX Adapter Strip, MM	BELDEN/CDT	FF4X12LD	
8	6 LC Duplex ECX Adapter Strip, SM	BELDEN/CDT	FFSX12LD	
9	Blank ECX Adapter Strip	BELDEN/CDT	FFZX00BB	
10	PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258	
11	Rear Cable Bracket	BELDEN/CDT	AX100463	
12	10GX RevConnect patch Panel, 48-port	BELDEN/CDT	RVAPPF2U48BK	

- NOTES**
- Leave 1U Space at **A**.
  - Install (4) 6 LC Duplex ECX Adapter strips for mounting 12 & 6 strand Multimode and 12 & 6 strand singlennode cable terminations.
  - All UTP cabling terminated on **6** be terminated and dressed as per manufacturer instructions using Rear Cable Brackets for PSSE panels.
  - Access Modules 1-2B shall be Cat6A RevConnect preloaded panels. One additional Access Module will be installed for future cables. For instance, if 88 Cat6A cables are to be installed, Access Modules 1A (48 cables), 1B (40 cables), and 2 (0 cables) will be installed.
  - Terminate 25-pair Cat5e served from a Contractor provided 110 block at a location indicated in the project blueprints on ports 1-6 of **6** (one orphan pair (violet/white) in 25-pair cable will not be terminated).
  - Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

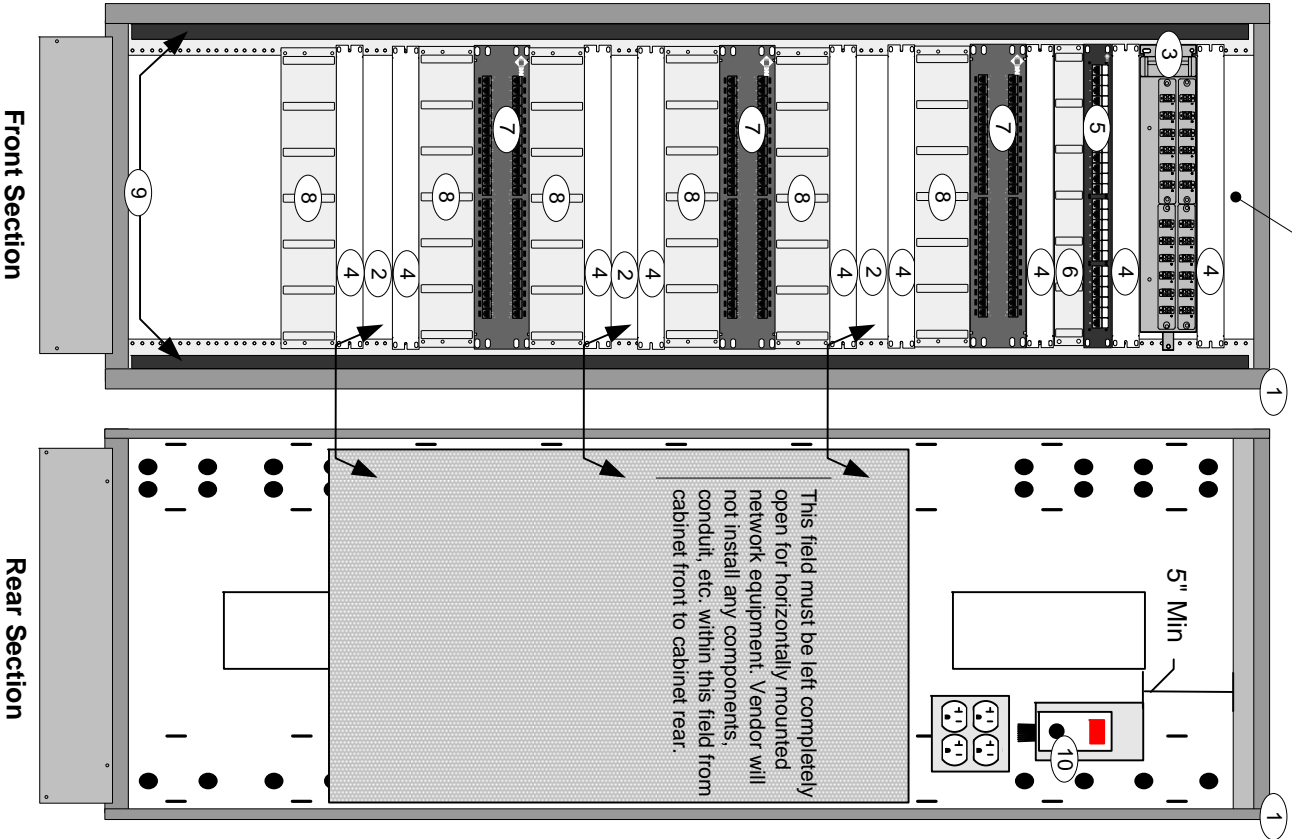


Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION		DWG TITLE	
TR		Standard TR Racks	
SCALE	NTS	JLC	DWG#
			EF-R3

Leave 1U of open space at top of rack.



**DESIGN NOTE:**  
This cabinet configuration is designed to serve up to two adjacent computer labs or a small building requiring less than 144 horizontal cables.

#### ELECTRICAL NOTES

1. The Contractor will install one quad power outlet fed from a dedicated circuit as shown. The left two outlets shall be clearly labeled "T-stat" using a Brady P/N X-29-422.
2. The Contractor shall install the Line Thermostat and electrical outlet on the non-hinged side of the cabinet. The Line Thermostat shall be wired so as to apply power to the left two outlets of the Contractor-installed quad power outlet when the temp. within the TE exceeds 90 deg. F. This shall apply power to the fan at 90 deg F.
3. All Contractor-installed power within the Enclosure will be installed within metallic flex conduit, and will be routed along the walls of the Enclosure (left, right, top, or bottom), and secured to the rear section of the Enclosure. Contact WCS/D/IT for sample electrical installation pictures.

#### MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N
1	Cube-IT PLUS Cabinet, 72" H, 18" D, Metal Door	CPI	13493-772
	Cube-IT Fan Kit	CPI	12804-701
2	1U Open Space For Network Equipment		
3	FiberExpress ECX Panel, 2U, Black	BELDEN/CDT	ECX-02U
	6 LC Duplex ECX Adapter Strip, MM	BELDEN/CDT	FF4X12LD
	6 LC Duplex ECX Adapter Strip, SM	BELDEN/CDT	FFSX12LD
4	1U Filler Panel, Black	CPI	30024-701
5	PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258
6	Rack Cabling Manager, 1U, Black	CPI	11752-719
7	10GX RevConnect patch Panel, 48-port	BELDEN/CDT	RVAPPF2U48BK
8	Large Horizontal Ring Panel, Black	CPI	11564-719
	Slip-on Cover	CPI	11764-719
9	Cube-IT Vertical Cable Manager, 72" H	CPI	13485-772
10	Line Thermostat	DAYTON	4LZ94

#### NOTES

1. Install (4) 6 LC Duplex ECX Adapter strips for mounting multi-mode and single-mode cable terminations.
2. All UTP cabling will be terminated and dressed as per manufacturer instructions.
3. Terminate 25-pair Cat5e served from the building voice demarc on ports 1-6 of PSSE patch panel (one orphan pair (violet/white) in 25-pair cable will not be terminated).
4. The Cube-IT cabinet shall typically be installed to hinge on the left-hand side. Verify final placement with WCS/D/IT prior to installation.
5. TE doors will be properly labeled as indicated in General Labeling Requirements in section 1 of this document.
6. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

N/A

DWG TITLE

Six-Foot Wall-Mount TE

SCALE

NTS

JLC

DWG#

EF-R4

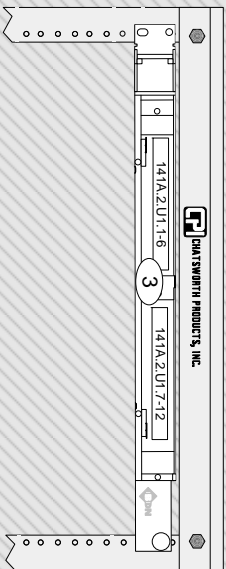
ER

Select one termination interface option below (refer to Notes section):

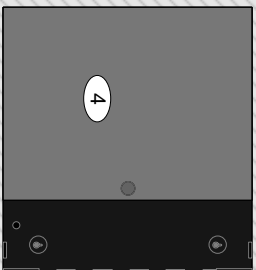
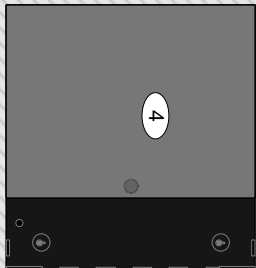


TR or TE

Select one termination interface option below (refer to Notes section):



Small TE applications only



### ADDITIONAL NOTES

1. Ten feet of cable slack will be provided at the ER and three feet of cable slack will be provided at the TE and TO for each installed cable in an extended loop or figure-eight configuration for every installed cable.
2. For indoor cabling, The Contractor will install plenum-rated cabling and innerduct if routed through a plenum-rated space. In all other instances The Contractor will install riser-rated cabling and innerduct. The Contractor will pipe all indoor/outdoor rated optical fiber cabling via 1" min conduit through plenum rated spaces. All intra-building cabling will be Distribution Series. All inter-building cabling will be Tight Buffered Campus Indoor/Outdoor Series.

### MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N
1	FX4000 50u 6F Distribution Riser Series	BELDEN/CDT	F14D006R9
	FX4000 50u 6F Distribution Plenum Series	BELDEN/CDT	F14D006P9
	FX4000 50u 6F Tight Buffered Campus Indoor/Outdoor Riser Series	BELDEN/CDT	FD4D006R9
	SM 6F Tight Buffered Indoor/Outdoor Riser Series	BELDEN/CDT	FDS0006R9
2	Multimedia Outlet Box, White	BELDEN/CDT	A0643207
	LC Duplex Adapter, MM	BELDEN/CDT	AX102211
	LC Duplex Adapter, SM	BELDEN/CDT	AX102215
3	FiberExpress Panel, 1U, Black	BELDEN/CDT	AX100041
	FiberExpress Cover, 1U	BELDEN/CDT	AX100045
	6 LC Duplex Adapter Strip, MM	BELDEN/CDT	AX101729
	6 LC Duplex Adapter Strip, SM	BELDEN/CDT	AX101731
4	Small FiberExpress Wall Mount Patch Panel, Black	BELDEN/CDT	AX103928
	6 LC Duplex Adapter Strip, MM	BELDEN/CDT	AX101729
	6 LC Duplex Adapter Strip, SM	BELDEN/CDT	AX101731

### NOTES

1. For every Contractor-installed fiber optic cable The Vendor will terminate both ends of every fiber strand with:  
Fusion-Splice LC 50u MM Connector BELDEN/CDT FT4LC900FS01
2. For every Contractor-installed fiber optic cable The Vendor will provide:  
(2) Hybrid Patch Cord, FX4000, 50u, BELDEN/CDT FP4LDD003M  
LC duplex-LC duplex, 3m R2XA  
(2) Hybrid Patch Cord, FX4000, 50u, BELDEN/CDT FP4LDD005M  
LC duplex-LC duplex, 5m R2XA
3. Install (3) where existing rack space is available. Install directly below existing fiber panel (where present) or at top of rack. WCSO/IT shall be responsible for relocating any existing equipment within racks or cabinets to facilitate installation of FiberExpress Panel. Contact the Project Manager to coordinate.
4. Install (2) within Standard or Mobile Building TEs only.



Washoe County School District  
Information Technology

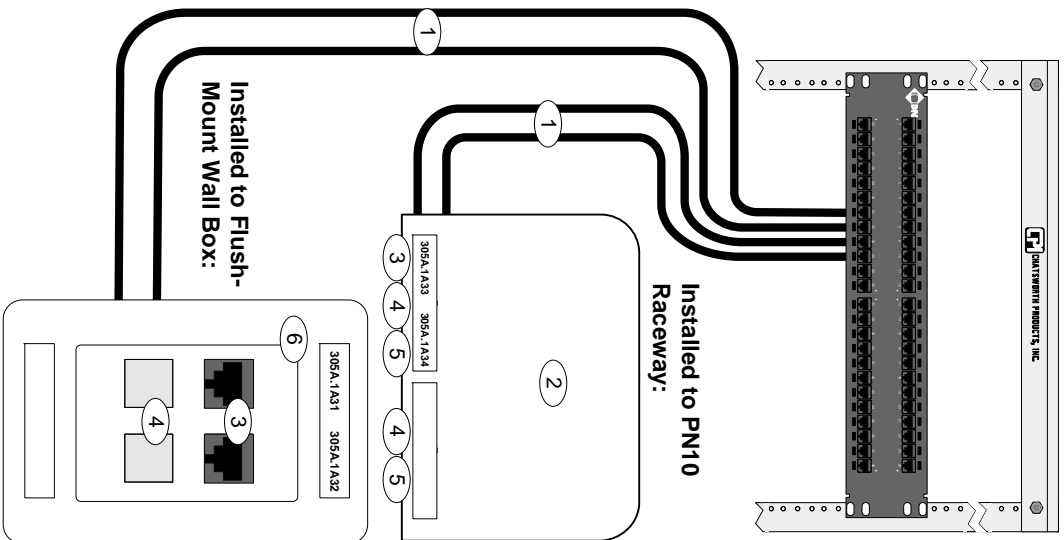
PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION N/A DWG TITLE

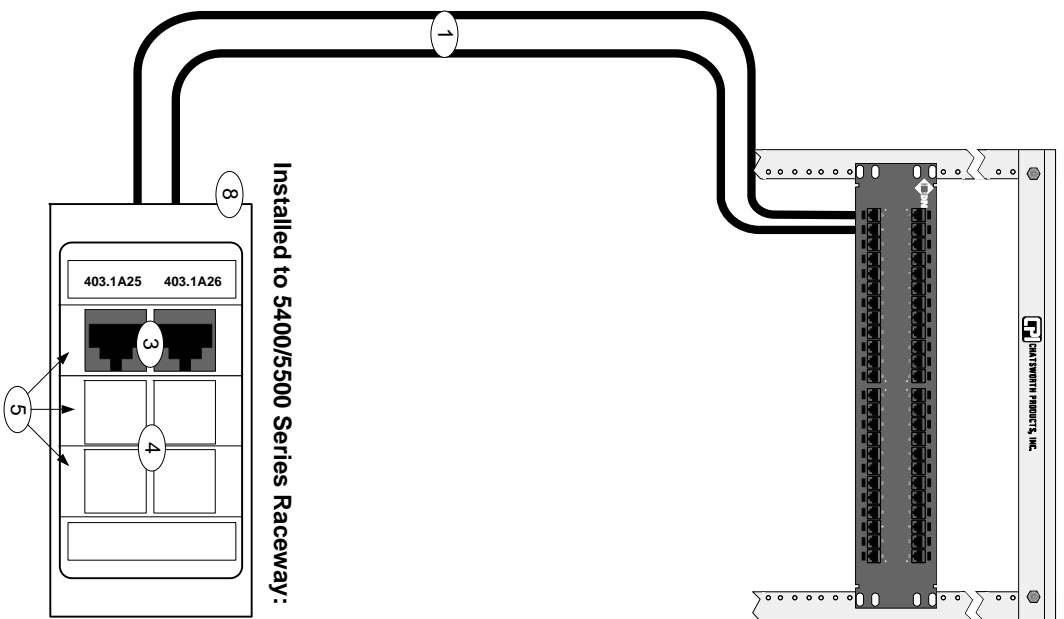
Backbone Cabling

SCALE NTS JLC DWG# EF-C1

TR 305A



TR 403



### ADDITIONAL NOTES

- If installing into an existing multi-channel raceway system and none of the above options will suffice, install a Belden/CDT 4-port KeyConnect 106 Adapter (PN AX104124). Installed faceplate must be produced by the same manufacturer as the existing raceway system, and must include labeling windows. Contact the Project Manager if circumstances do not permit any options listed on this page.

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Cat6A UTP IBDN 10GXS13, CMP, Yellow	BELDEN/CDT	10GXS13 0041000
2	Cat6A UTP IBDN 10GXS12, CMR, Yellow	BELDEN/CDT	10GXS12 0041000
3	Large Data Box, White	Wiremold	PDB2CMWH
4	Cat6A RevConnect Module, Yellow	BELDEN/CDT	RVAMJUKVLS-1
5	KeyConnect Blank Insert, White	BELDEN/CDT	AX102262
6	Dual Flushmount Module	Wiremold	CM2-U2KEYA-WH
7	SG4P Interface Plate, KeyConnect, White	BELDEN/CDT	AX102249
8	Twin Cover Device Bracket, White	Wiremold	40N2F31WH
9	End Plate, White	Wiremold	CM-EPLAWH
10	Not Used		

### NOTES

- For every installed Category 6A cable, The Vendor will provide:
 

(1) 10GX Modular Cord, 4', Yellow	BELDEN/CDT	CA21104004
(1) 10GX Modular Cord, 15', Yellow	BELDEN/CDT	CA21104015
- Ten feet of cable slack shall be stored at the ER/TR and three feet of cable slack will be provided at the TE and TO for each installed cable in an extended loop or figure-eight configuration. Five inches of cable slack will be stored behind each TO, if possible without compromising minimum bend radius.
- All horizontal cables will be installed in cable bundles upon entry into every TR. Cable bundles will not exceed 30 cables per bundle, and will be loosely bound with velcro straps. Cables in a bundle should be uncombed until entry into each rack's vertical cable management, where the cables are to be combed and dressed together until terminated on each patch panel.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION

N/A

DWG TITLE

Cat 6 Cabling

SCALE

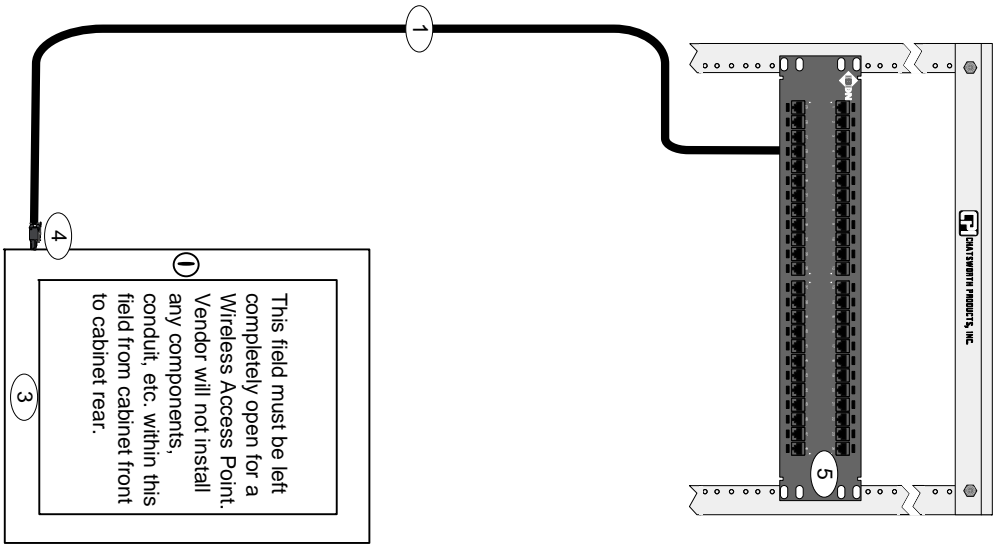
NTS

JLC

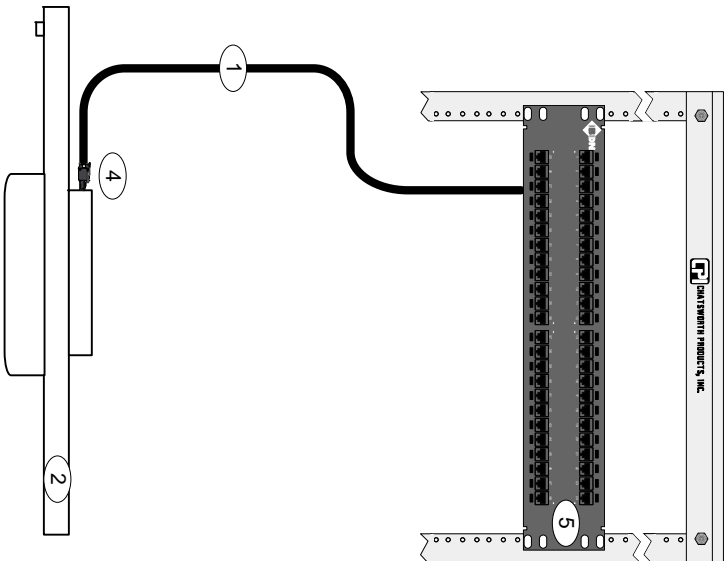
DWG#

EF-C2

TR 305A



TR 403



MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Cat6A UTP IBDN 10GXS13, CMP, Yellow	BELDEN/CDT	10GXS13 0041000
2	Cat6A UTP IBDN 10GXS12, CMR, Yellow	BELDEN/CDT	10GXS12 0041000
3	Drop Ceiling Wireless Enclosure	TerraWave	V2-ID-CTEN-12124W
4	Wall Mount Wireless Enclosure	TerraWave	CV12106KC-NH
5	10GXS Cat6A Modular Plug	BELDEN/CDT	RVAFPUBK-S1
6	10GXS RevConnect Patch Panel, 48-port	BELDEN/CDT	RVAPPF2U48BK

NOTES

- For every installed Category 6A cable, The Vendor will provide:  
(1) 4' Cat6A UTP Patch Cord-White BELDEN/CDT CA21108004
- Ten feet of cable slack will be provided at the ER/TR and three feet of cable slack will be provided at the TE and TO for each installed cable in an extended loop or figure-eight configuration for every installed cable. Five inches of cable slack will be stored behind each TO, if possible without compromising minimum bend radius.
- Cable bundles will not exceed 30 cables and will be loosely bound with velcro straps. Cables in a bundle should be uncombed until entry into each rack's vertical cable management, where the cables are to be combed and dressed together until terminated on the patch panel.
- All Cat6 WE cables shall be ran into the wireless enclosure and terminated with Belden 10GXS modular plugs (P/N RVAFPUBK-S1).

ADDITIONAL NOTES

- The Vendor shall terminate the WE cabling with Belden 10GXS modular plugs (P/N RVAFPUBK-S1) and leave the cable coiled up inside the enclosure. No side-entry box is needed with the modular plugs as it will plug directly into the wireless access point.

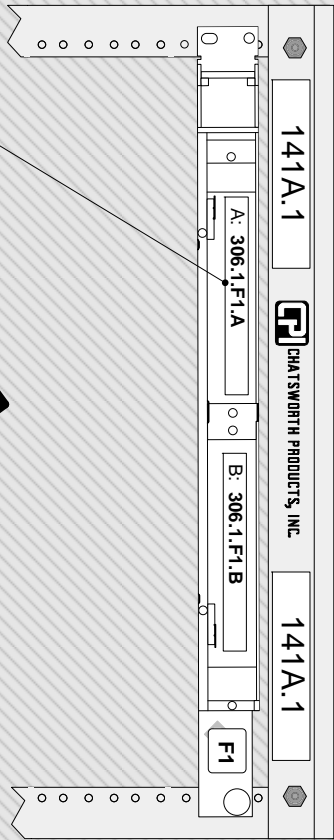


Washoe County School District  
Information Technology

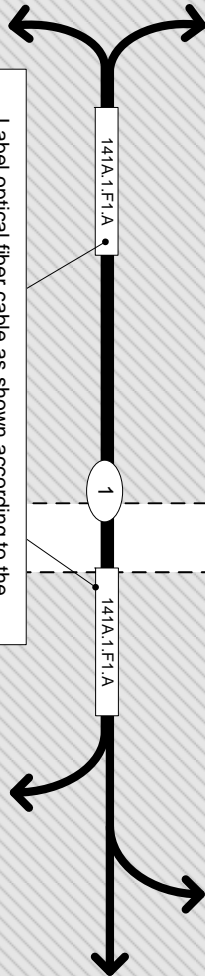
PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION		DWG TITLE	
N/A		WE Cabling	
SCALE	NTS	JLC	DWG# EF-C3

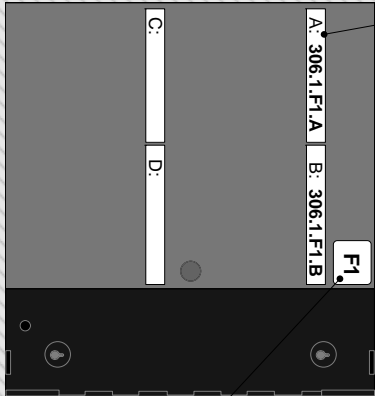
ER 141A (In room 141A)



A label will be affixed to the FiberExpress cover / door for each Optical Fiber Adapter Strip as shown using the Backbone Cable Labeling Scheme. Use Brady P/N XC-500-422 or approved equivalent.

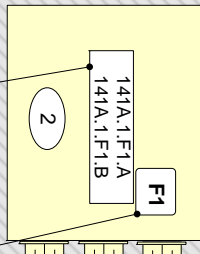
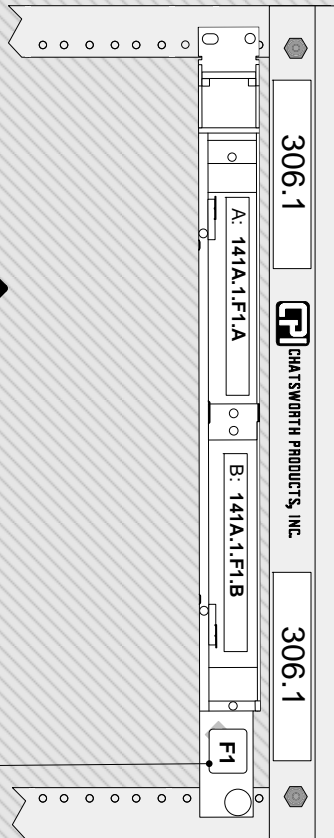


Label optical fiber cable as shown according to the Backbone Cable Labeling Scheme below. At the TE, install label internal to the TE and external to Multimedia Box in a clearly visible location. At the FiberExpress Cabinet or Wall Mount Patch Panel, install label both within the cabinet / panel and immediately external to the Cabinet in a clearly visible location. Use Brady P/N XSL-32-427 or approved equivalent.



Label all fiber patch panels with Panel ID as shown. Use Brady P/N X-7-422 or approved equivalent.

TR 306 (In room 306)



Label all fiber patch panels with Panel ID as shown. Use Brady P/N X-7-422 or approved equivalent.

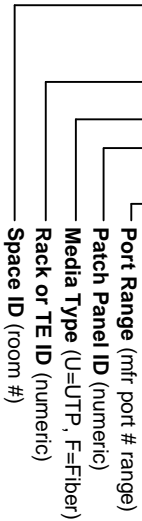
A label will be affixed to the Multimedia Box for each installed fiber optic cable as shown using the Backbone Cable Labeling Scheme. Use Brady P/N XC-500-422 or approved equivalent.

### Backbone Cable Labeling Scheme

#### BACKBONE LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All fiber optic terminations point to the termination at the opposite end of the cable. Therefore, CABLE LABELS and TE (HC) TERMINATION LABELS both indicate the module/strip on which they are terminated at the ER (MC), while ER (MC) TERMINATION LABELS indicate the module/strip on which they are terminated at the TR (HC).

SSSS.R.MP.N-N



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

Backbone Labeling

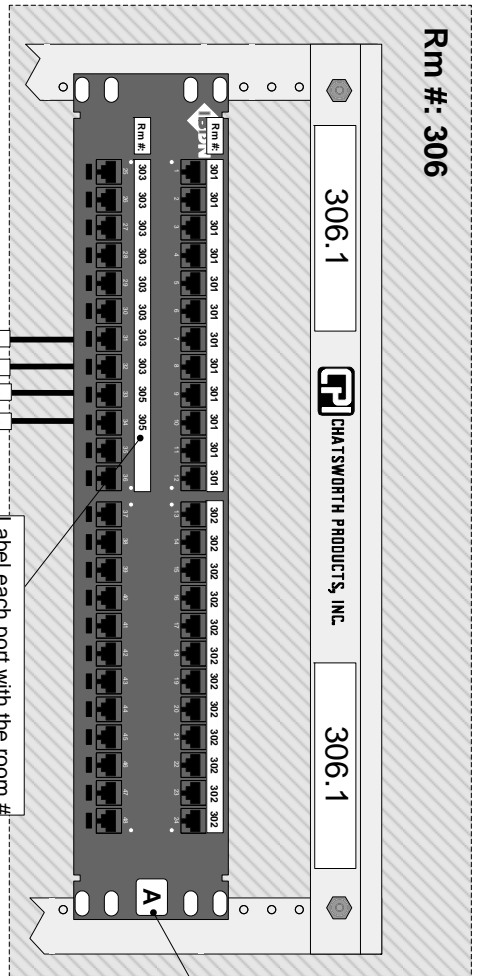
SCALE NTS

JLC

DWG#

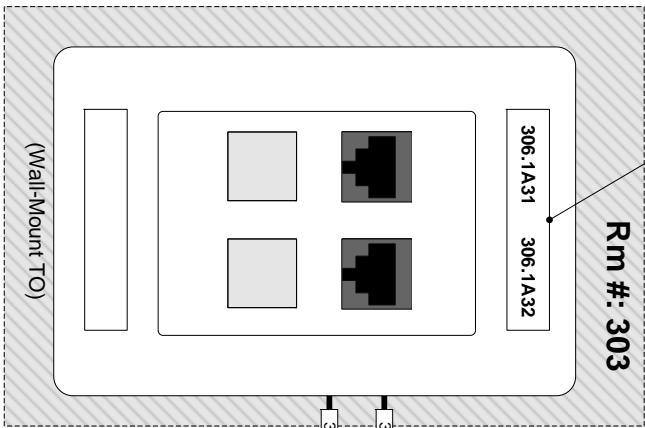
EF-L1

Label each port according to the Horizontal Cable Labeling Scheme below. Label must be machine-printed and inserted in faceplate label window.

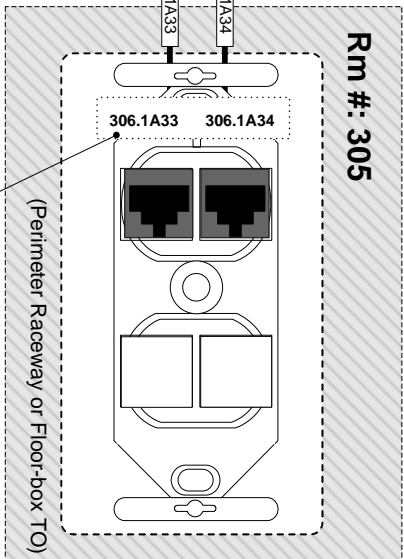


Label with Panel ID as shown. Use **Brady P/N X-7-422** or approved equivalent.

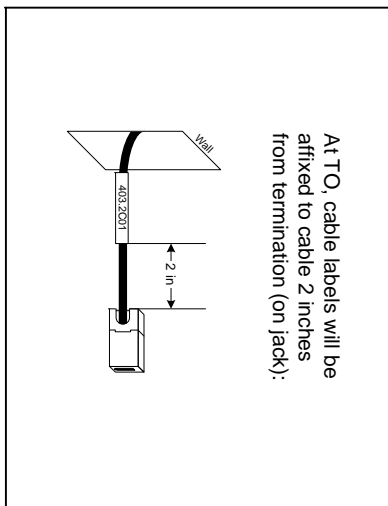
Label each port with the room # of the room housing the TO. Use **Brady P/N XC-375-422** or approved equivalent.



Label each cable according to the Horizontal Cable Labeling Scheme below. Use **Brady P/N XSL-32-427** or approved equivalent.

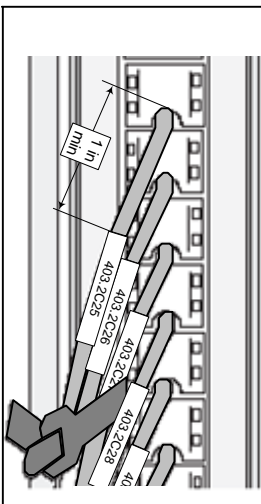


Label each port according to the Horizontal Cable Labeling Scheme below. Label must be machine-printed and inserted in faceplate label window. If no window exists, label with **Brady P/N X-29-422** (or approved equivalent).



At TO, cable labels will be affixed to cable 2 inches from termination (on jack):

At TR, cable labels will be affixed to cable a minimum of 1 inch from termination (on patch panel), and placed in such a way as to be clearly visible:



## Horizontal Cable Labeling Scheme

### SSSS.RPNN

Port Number (mfr port number)  
Patch Panel ID (alpha)  
Rack or TE ID (numeric)  
Space ID (room #)

### HORIZONTAL LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All patch panel PORT LABELS and TO LABELS point to the termination at the opposite end of the cable. Therefore, CABLE LABELS and TO LABELS both indicate the ports on which they are terminated at the serving TR/TE, while patch panel PORT LABELS indicate the room in which the TO is located.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION

N/A

DWG TITLE

Horizontal Labeling

SCALE

NTS

JLC

DWG#

EF-L2

Rm #: 306

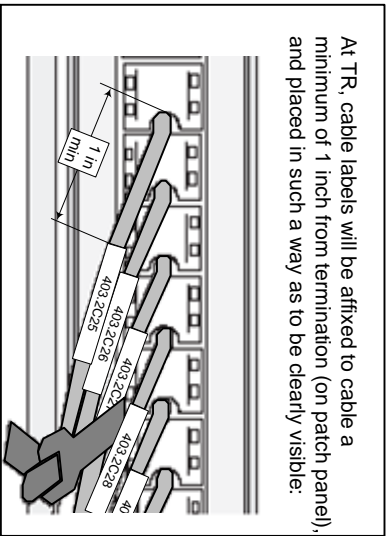
306.1



306.1

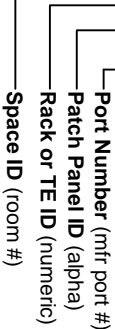
Horizontal Cat6A cables shall be grouped together at the patch panel by room number. For example, the Cat6A drops serving a room shall be terminated in a contiguous numerical sequence at the patch panel. Additional Cat6 cabling for intercom and audio enhancement shall terminate at the end of the group.

Label with Panel ID as shown. Use **Brady P/N X-7-422** or approved equivalent.



Horizontal Cable Labeling Scheme

SSSS.RPNN

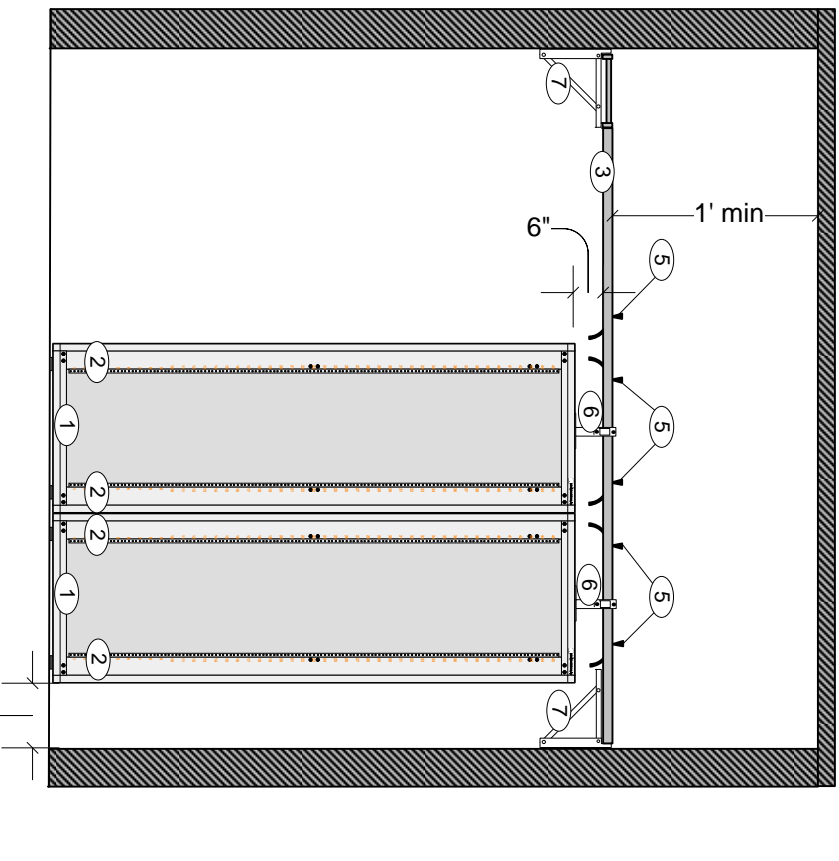


HORIZONTAL LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All patch panel PORT LABELS and TO LABELS point to the termination at the opposite end of the cable. Therefore, CABLE LABELS and TO LABELS both indicate the ports on which they are terminated at the serving TR/TE, while patch panel PORT LABELS indicate the room in which the TO is located. Cables shall be grouped together in a contiguous numerical sequence by room number.



Washoe County School District Information Technology	
PROJECT DRAWINGS FOR NEW AND MODERNIZED FACILITIES	
LOCATION N/A	DWG TITLE <b>PATCH PANEL TERMINATION</b>
SCALE NTS	JLC DWG# PP-T1



# **INSTALLATION NOTE:**


IN A MIN-ER, SERVER RACK WILL ALWAYS BE INSTALLED CLOSEST TO THE WALL.

ADDITIONAL COPPER RACKS WILL BE INSTALLED AS REQUIRED TO ACCOMMODATE TOTAL INSTALLED HORIZONTAL CABLING. INSTALL ADDITIONAL LADDER RACK AND RADIUS DROPS TO ACCOMMODATE ANY ADDITIONAL COPPER RACKS.

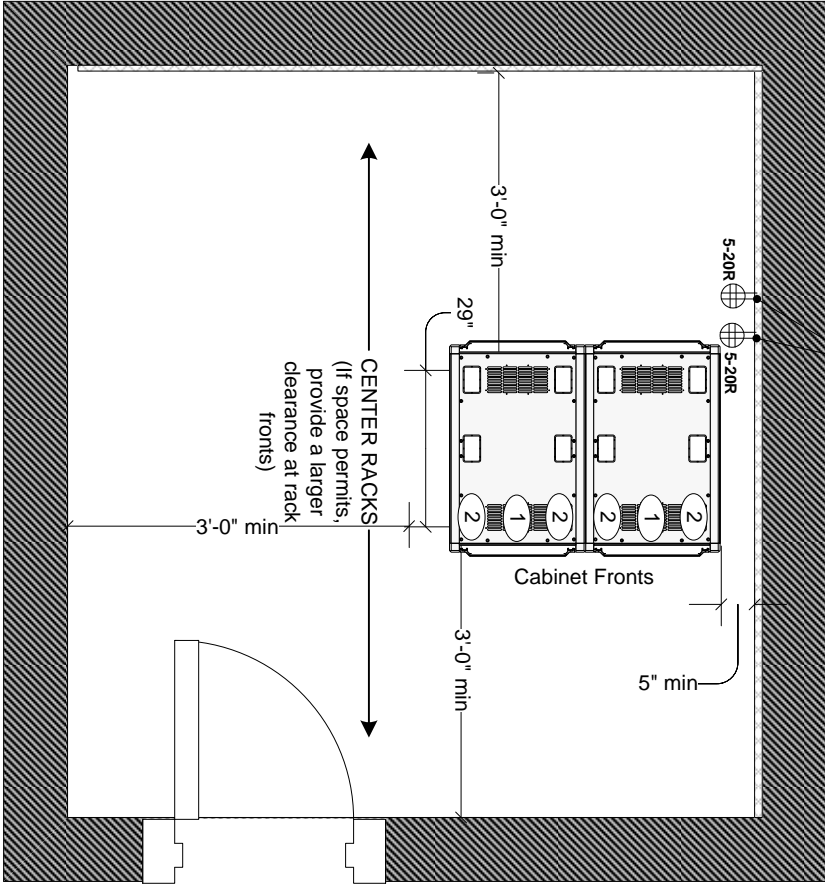
MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	CPI Megafame Cabinet	CPI	M1033-741
2	Vertical Cabling Ring Manager for Megafame	CPI	12465-707
3	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718
4	Not Used		
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718
6	Cable Runway Elevation Kit, Rack, Black	CPI	10506-706
	3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718
7	Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718

## **NOTES**

- The Contractor will install all components as shown.
- Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
- Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

		Washoe County School District Information Technology	
PROJECT DRAWINGS FOR EXISTING FACILITIES			
LOCATION <b>ER/TR</b>	DWG TITLE <b>Ladder Rack (Front View)</b>		
SCALE <b>NTS</b>	<b>JLC</b>	DWG#	<b>EF-S1</b>

INSTALL TWO DEDICATED QUAD 5-20R ELECTRICAL OUTLETS. EACH QUAD OUTLET WILL BE FED BY ITS OWN DEDICATED CIRCUIT. REMAINDER OF WALLS SHALL BE LINED EVERY SIX FEET WITH QUAD 5-20R OUTLETS (NON-DEDICATED).



**INSTALLATION NOTE:**  
IN A MINI-ER, SERVER RACK WILL ALWAYS BE INSTALLED CLOSEST TO THE WALL.  
ADDITIONAL COPPER RACKS WILL BE INSTALLED AS REQUIRED TO ACCOMMODATE TOTAL INSTALLED HORIZONTAL CABLING.

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	CPI Megafame Cabinet	CPI	M1033-741
2	Vertical Cabling Ring Manager for Megafame	CPI	12465-707

**NOTES**

- The Contractor will install all components as shown.
- Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact the WCSD Project Manager for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
EXISTING FACILITIES

LOCATION  
**ER/TR**

DWG TITLE  
**Power and Rack Placement**

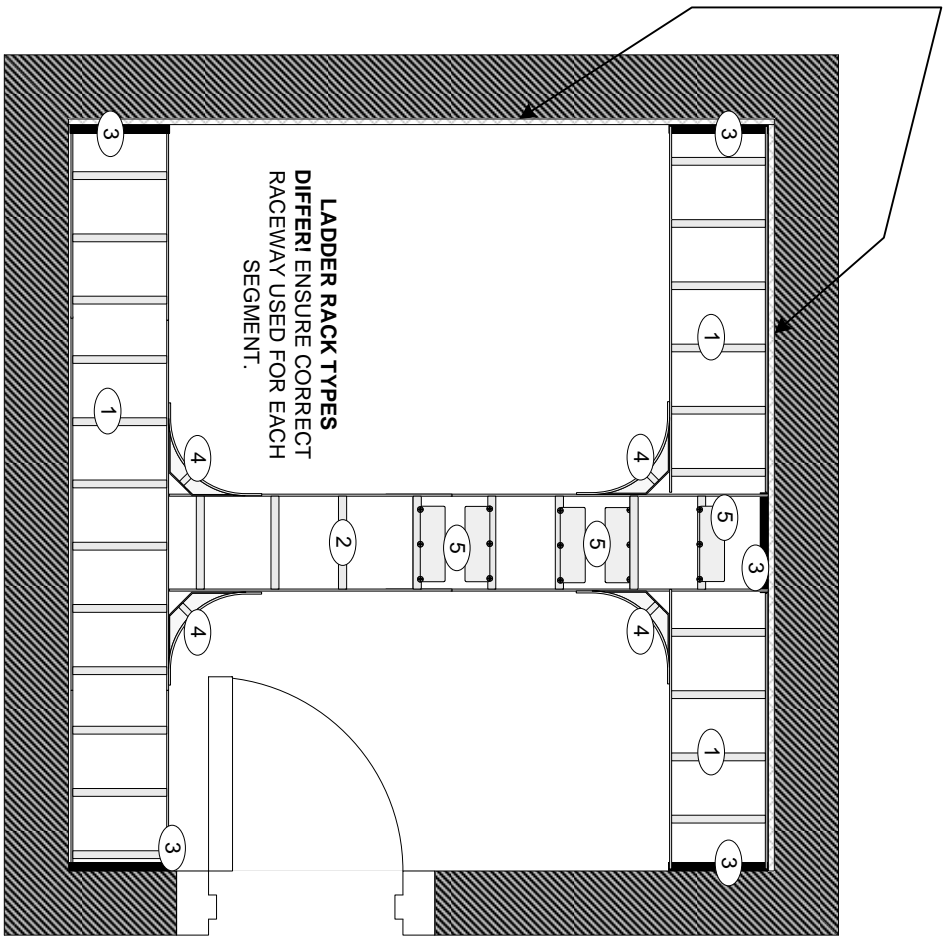
SCALE  
**NTS**

**JLC**

DWG#

**EF-S2**

INSTALL ¾" VOID-FREE PLYWOOD ALONG THE ENTIRETY OF ALL WALLS AS SPECIFIED ELSEWHERE IN THE PROJECT DOCUMENTS OR AS APPROVED IN WRITING BY THE WCSD/IT PM. PLYWOOD MUST BE 8' HIGH AND PAINTED WITH 2 COATS OF FIRE RETARDANT PAINT. PAINT MUST BE WHITE IN COLOR.



**INSTALLATION NOTE:**

IN A MIN-ER, SERVER RACK SHALL ALWAYS BE INSTALLED CLOSEST TO THE WALL.

INSTALL A MINIMUM OF FOUR 2" SLEEVES INTO OVERHEAD OR THROUGH WALL(S) AND INTO ADJACENT HALLWAYS AS SPECIFIED ELSEWHERE IN THE PROJECT DOCUMENTS OR AS APPROVED IN WRITING BY THE WCSD/IT PM.


MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Universal Cable Runway, 18" W, Black	CPI	10250-718
2	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718
3	Wall Angle Support Kit, Cable Runway	CPI	11421-718
4	Cable Runway Corner Bracket, 15" W, Black	CPI	11359-715
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718

**NOTES**

1. The Contractor will install all components as shown.
2. Use the following components as per manufacturer instructions to build a complete system:

Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701	
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701	
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718	
3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718	
Cable Runway Elevation Kit, Rack, Black	CPI	10506-706	
Cable Runway Ground Strap	CPI	40164-001	

3. Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

	Washoe County School District Information Technology	
	PROJECT DRAWINGS FOR EXISTING FACILITIES	

LOCATION	DWG TITLE	
ER/TR	Ladder Rack (Overview)	
SCALE	NTS	EF-S3

## SECTION 4 – MOBILE AND MODULAR BUILDINGS

### 4.1 INCLUSIONS

- A. All requirements contained and referred to in **SECTION 1 – GENERAL**, **SECTION 2 – EXISTING FACILITIES: GENERAL CONSIDERATIONS**, and **SECTION 3 – EXISTING FACILITIES: SPECIFICATION DETAIL** of this document apply to this section as if bound herein.

### 4.2 SECTION APPLICABILITY

- A. This section is applicable to any project which includes SCS services provided to or for one or more Mobile or Modular Buildings.

### 4.3 SYSTEM DESCRIPTION: MODULAR BUILDINGS

#### A. GENERAL

- 1. Horizontal distribution within modular buildings shall be provided by a Large/Small TE, which is fed by optical fiber cabling from a permanent building belonging to the Site.

#### B. Large/Small TE

- 1. A Large/Small TE typically serves all TOs within the modular building with horizontal cabling. The TE shall be mounted in an environmentally controlled space (24/7) with dedicated thermostatic control. A minimum of three feet walkway clearance shall be provided at the front of the cabinet. The cabinet must be placed in a location where the door may be opened fully without obstruction.

#### C. WORK AREAS

- 1. Each Work Area consists of a single-gang faceplate with two (2) standards compliant TOs.
- 2. Each TO shall consist of one (1) four-pair Category 6A UTP cable, installed from the TE to the Work Area.

#### D. TO (TELECOMMUNICATIONS OUTLET) PLACEMENT GUIDELINES

##### 1. GENERAL

- a. TOs shall be located within three feet of a power outlet and shall be installed at the same height, except where indicated elsewhere in the Project Documents.

##### 2. STANDARD CLASSROOMS

##### a. Student and Instructor TOs

Typically, four TOs shall be distributed throughout the standard classroom at various Work Areas. Two TOs shall be intended for student use, and two TOs shall be intended for instructor use.

- 1. Design goals for TO placement within the classroom:

- a. FLEXIBILITY: A duplex network outlet shall be placed with a serving area radius of 12 linear feet along all wall space where it is reasonable to place a computer. Restated, any place where it is reasonable to place a computer should be within reach (12 linear feet) of a duplex network outlet.
- b. POD OF FOUR: Each standard classroom shall have at least one location within a room where a pod of four computers can be grouped. An overlapping serving area is defined as a location within the room, along a single wall or within a corner, within 12 linear feet of two distinct network outlets.
- c. STANDARDIZED QUANTITY: The standard classroom shall typically receive four drops (two duplex outlets). Room size and useable wall space shall be considered when determining drop quantity within a standard classroom. Roughly, a duplex drop shall be allotted to a standard classroom for every 25' of useable wall space. Useable wall space shall be defined as wall space where the wall is directly accessible and where furniture or devices are not placed in a permanent or semi-permanent manner (if it cannot be relocated by one or two people without tools).

### 3. COMPUTER LABS

- a. In a computer lab, TO distribution shall be as follows:
  - 1. Student and Instructor TOs
    - a. Forty-Two (42) TOs shall be distributed throughout the classroom at various Work Areas as specified in the Project Blueprints. Thirty-eight (38) TOs shall be intended for student use, two (2) TOs shall be intended for instructor use, and two (2) TOs shall be intended for printers.
    - b. In modernized facilities, TOs are typically placed within large, surface mount raceway along walls (where possible, unoccupied by whiteboards, chalkboards, windows, heaters, etc.).
    - c. In new facilities, in-floor boxes may be used in conjunction with surface mount raceway along walls, but must comply with ANSI/TIA/EIA standards and must support faceplates or modules designed to support BELDEN/CDT RevConnect jacks (note that faceplates or modules housing jacks must have labeling windows).
    - d. Computer labs should be designed with the following criteria in mind:
      - 1. Students should all face the same direction

2. The teacher station should be positioned within 25' of the teaching wall due to A/V cabling length limitations.
  3. The teaching wall should be at the front of the class and should have room for white boards, projector screens, etc. The teaching wall should not contain any windows, cabinets, or other obstructions.
  4. The standard computer desk shall be considered three feet wide and six feet long.
  5. Spacing between computer desks and along walkways shall be at minimum three feet, and where possible shall be at minimum four feet.
  6. In modernized facilities, where computer labs are served by a dedicated TE, the TE shall be located in a position where it is away from where desks are to be placed so as to be easily accessible.
- b. Pathway within Computer Labs may consist of appropriately sized multi-channel raceway, conduit, poke-thrus, and voids in walls not asbestos-containing (power poles are not permitted).

#### 4. OFFICES AND COMMON AREAS

- a. Design goals for TO placement in offices, potential offices (currently allotted to storage), and common areas (not including gyms, workout rooms, student dining areas, and theaters):
1. FLEXIBILITY: A duplex network outlet shall be placed with a serving area radius of 12 linear feet along all wall space where it is reasonable to place a computer. Restated, any place where it is reasonable to place a computer should be within reach (12 linear feet) of a duplex network outlet.
  2. STANDARDIZED QUANTITY: Room size and useable wall space shall be considered when determining drop quantity within an office or common area. Roughly, a duplex drop shall be allotted to an office or common area for every 25' of useable wall space. Useable wall space shall be defined as wall space where the wall is directly accessible and where furniture or devices are not placed in a permanent or semi-permanent manner (if it cannot be relocated by one or two people without tools).

### E. CABLING

#### 1. OPTICAL FIBER

- a. One (1) Six-strand, Laser Optimized 50um and one (1) six-strand SM optical fiber cable shall be installed between the ER and the small TE. Two twelve-strand, Laser Optimized 50um and one (1) twelve-strand SM optical fiber cable shall be installed between the ER and the large TE.
- b. In some cases, depending on placement of the modular building and location of the ER, the Large/Small TE may be serviced by

routing optical fiber cabling through a more locally situated TR in route to the ER.

## 2. HORIZONTAL UTP

- a. Category 6A UTP shall be installed between the TE and TOs within the modular building

## 4.4 INSTALLATION OF SCS SERVICES WITHIN A MODULAR BUILDING

- A. The Vendor shall be responsible for installing the following components, unless already installed, to form a complete system.
- B. Should a component of the system already be in place (i.e. TE, TOs, optical fiber, etc.), which does not match the specifications made in this section, it is the responsibility of The Vendor to contact the Project Manager for clarification on how to proceed PRIOR TO BIDDING THE PROJECT.
- C. Vendor Responsibilities:
  1. Demo existing data cabling and TE (if present) unless explicitly instructed not to elsewhere in the Project Documents.
  2. Install Large/Small TE as per specifications made in **Project Drawings MB-R1 and MD-R1**.
  3. Install optical fiber cabling back to the ER from the TE as per specifications made in **Project Drawing EF-C1**.
  4. Install horizontal cabling from TE to TOs as per specifications made in **Project Drawing EF-C3**.
  5. Label installed systems as per specifications made in **Project Drawings EF-L1 and EF-L2**.

## 4.5 SYSTEM DESCRIPTION: MOBILE BUILDINGS

### A. MOBILE BUILDING TERMINOLOGY

1. Mobile Cluster—A group of up to four closely grouped mobile buildings of which one is a Primary Mobile and up to two are Secondary Mobiles.
2. Primary Mobile—Mobile building containing a wall-mount TE which is served by optical fiber backbone cabling from the ER located within a permanent building belonging to the Site. A Primary Mobile serves all Mobile buildings within a Cluster with backbone copper cabling, and all TOs within the Primary Mobile with horizontal copper cabling.
3. Secondary Mobile—Mobile building containing a wall-mount TE which is served by OSP (dry fill) Category 6A copper backbone cabling from a Primary Mobile TE. A Secondary Mobile serves all TOs located within that mobile.
4. Mobile Side—The typical mobile building is designed to contain two classrooms. Each classroom shall be considered a “side” of the mobile building.

5. Mobile Half—Mobile buildings are designed to be split in half lengthwise for transport. When “half” of a mobile is discussed here, it indicates one or the other halves from this split line.

#### B. GENERAL

1. One Primary Mobile and up to two Secondary Mobiles shall together form a Cluster. All mobile buildings (both Primary and Secondary) shall have a wall-mount TE installed to serve all horizontal cabling within that mobile. The Primary Mobile TE is fed by optical fiber cabling from a permanent building belonging to the Site, and the Secondary Mobile TE is served by OSP (dry fill) 4-pair Category 6A copper backbone cabling from a Primary Mobile TE.
2. Analog voice and fax connectivity shall be provided via a 25-pair cable installed from the Primary Mobile EF Box back to a permanent building belonging to the Site, a 25-pair cable routed between the Primary Mobile EF Box to each Secondary Mobile EF Box, and two 4-pair Cat 6 copper cables between each EF box and the TE.
3. There are currently two types of mobile buildings within the WCSD: mobile buildings without bathrooms and mobile buildings with bathrooms. Configurations for both types of mobile buildings are identified in **Project Drawing MB-S1**, Mobile Cluster Design Concept.

#### C. WORK AREAS

1. Each Work Area consists of a single-gang faceplate with two (2) standards compliant TOs.
2. Each TO shall consist of one (1) four-pair Category 6A UTP cable, installed from the TE to the Work Area.

#### D. CLASSROOMS

1. TO distribution throughout the mobile building shall be as indicated in **Project Drawing MB-S1**.
2. Mobile buildings with bathrooms receive a total of four (4) duplex outlets (8 TOs), and Mobile buildings without bathrooms receive a total of four (4) duplex outlets (8 TOs).

#### E. CABLING

##### 1. OPTICAL FIBER

- a. One (1) six-strand, Laser Optimized 50um and one (1) six-strand SM optical fiber cable shall be installed between the ER (typically) and the Primary Mobile TE.
- b. In some cases, depending on placement of the mobile building and location of the ER, the Primary Mobile TE optical fiber cable may be ran through a more locally situated TR in route to the ER. This shall only be the case when outlined clearly elsewhere in the Project Documents. The Vendor shall install Belden/CDT 50um fiber optic cabling and components.

##### 2. BACKBONE ANALOG UTP

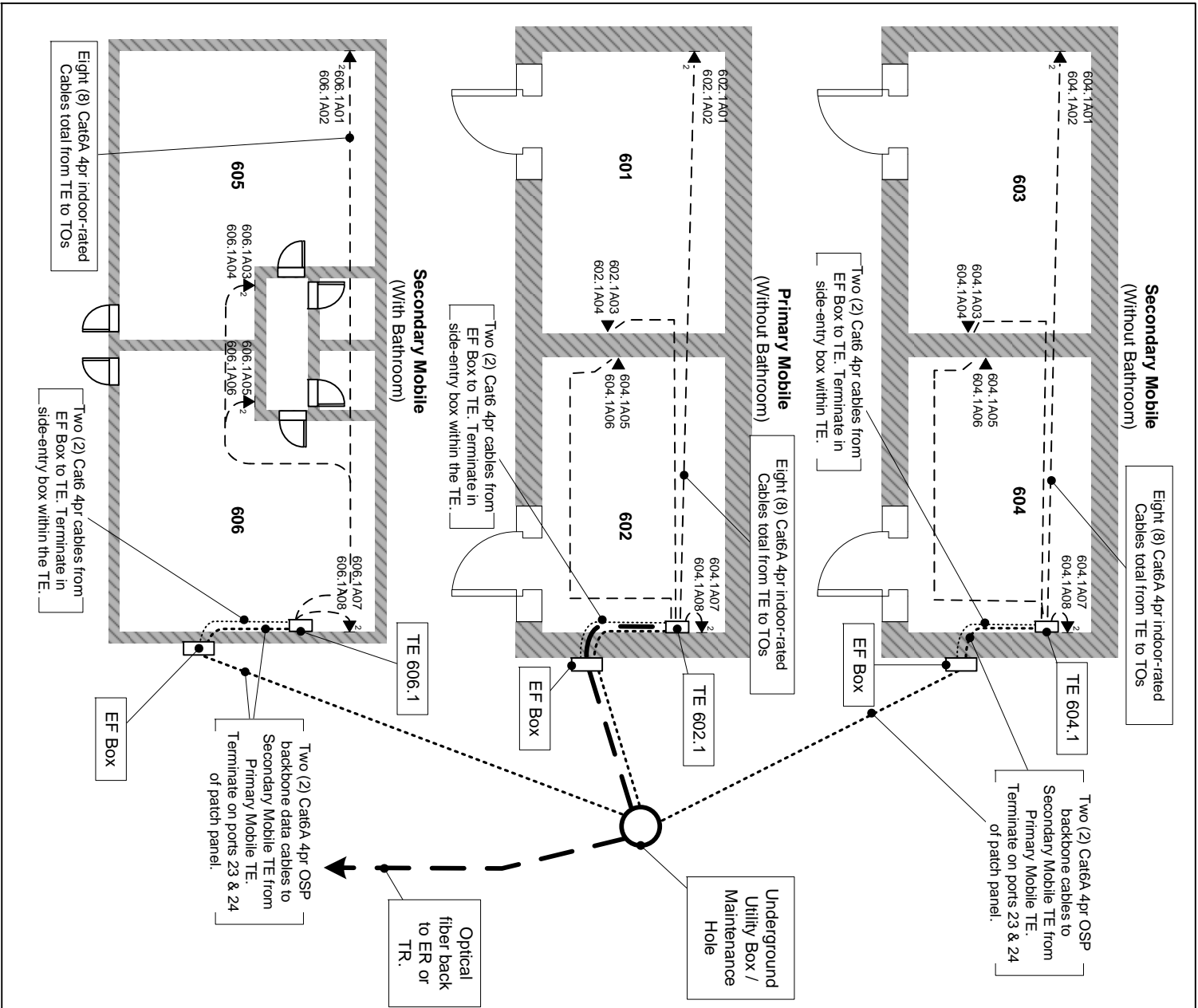
- a. A 25-pair cable shall be installed from the Primary Mobile EF Box back to a permanent building belonging to the Site. Terminate at the permanent building at a cross-connection point to be indicated within the project blueprints. Terminate at the EF box on a 66-block Porta Entrance Protector (Model 24025-66-M66P). .
  - b. A 25-pair cable shall be routed between the Primary Mobile EF Box to each Secondary Mobile EF Box. Terminate at each EF Box on a 66-block Porta Entrance Protector (Model 24025-66-M66P).
  - c. Two (2) 4-pair Cat 6 copper cables shall be installed between the EF box and the Mobile TE in each mobile. At the Mobile TE, these cables shall not be terminated at the TE patch panel, but rather in a Small Data Box (BELDEN/CDT) located within the TE. Terminate at the EF box on a 66-block Porta Entrance Protector (Model 24025-66-M66P).
3. BACKBONE DATA UTP
- a. A total of two (2) 4-pair Cat6A OSP (dry fill) copper cables shall be installed between Primary and Secondary Mobiles. These cables shall be terminated on the last two ports (ports 23-24) of the Primary and Secondary Mobile TE patch panels. When terminating to an existing Primary Mobile TE patch panel and ports 23-24 are utilized for servicing an existing Secondary Mobile, terminate to ports 21-22, etc. If no ports are available at the existing patch panel, an additional patch panel shall be installed and backbone UTP cables shall be terminated on ports 23-24.
4. HORIZONTAL UTP
- a. Category 6A indoor-rated, 4-pair UTP shall be installed between the TE within each mobile and TOs within both Primary and Secondary Mobiles.
5. ENTRANCE FACILITIES (EF) BOX / CAN
- a. The EF Box shall provide ingress and egress for cabling into and out of each mobile building.
  - b. The EF Box shall provide a minimum of two 3" conduit feeds (dedicated to data cabling only) back to a localized underground utility box or maintenance hole. Additionally, the EF Box shall provide a minimum of two 2" conduit feeds (dedicated to data cabling only) into the mobile building overhead.
6. CONDUIT SYSTEM
- a. All underground conduit systems shall provide at minimum two (2), 3" conduit feeds (dedicated to data cabling only) back to a permanent structure which houses the ER/TR which shall serve as the uplink for data communications.

#### 4.6 INSTALLATION OF A PRIMARY OR SECONDARY MOBILE

- A. The Vendor shall be responsible for installing the following components, unless already installed, to form a complete system as specified in Project Drawings for Mobile Buildings.
- B. Should a component of the system already be in place (i.e. TE, TOs, optical fiber, etc.), which does not match the specifications made in the Project Documents, it is the responsibility of The Vendor to contact the Project Manager for clarification on how to proceed PRIOR TO BIDDING THE PROJECT.
- C. Vendor Responsibilities:
  - 1. Remove existing wall-mount TE (if present and non-compliant with this standard).
  - 2. Remove existing cabling and associated termination hardware served by existing wall-mount TE (if present and non-compliant with this standard).
  - 3. Install wall-mount TE as per specifications made in **Project Drawing MB-R1**.
  - 4. Install optical fiber cabling back to the ER from the Primary Mobile TE as per specifications made in **Project Drawing MB-C1**.
  - 5. Install horizontal cabling from TE to TOs as per specifications made in **Project Drawing MB-C1**.
  - 6. Install backbone analog cabling as per specifications made in **Project Drawing MB-C1** and consistent with "BACKBONE ANALOG UTP" system description above.
  - 7. Install backbone data cabling as per specifications made in **Project Drawing MB-C1** and consistent with "BACKBONE DATA UTP" system description above.
  - 8. Label installed systems as per specifications made in **Project Drawings MB-L1** and **MB-L2**.

#### PROJECT DRAWINGS FOR MOBILE BUILDINGS


- A. Refer to inserted drawings contained in the following pages.
- B. The following drawings form a portion of a larger project specification and in no way are intended to represent the entirety of the project requirements.



# NOTES

- There must not be more than two 90 degree bends in any communications conduit between pull-points (180 degrees total). This includes 45 degree bends (two 45 degree bends equals one 90 degree bend).
- There must not be more than 100' of communications conduit between pull-points.
- All underground communications conduit must be 3" in diameter minimum. Backbone conduit must be installed with one MaxCell 2" x 3 Cell innerduct (for 3" conduit), or two 2" x 3 Cell innerducts (for 4" conduit).
- All horizontal cabling shall be routed on the same half of the mobile (same side of the mobile center-line) as the TE which serves it (in mobiles containing restrooms, this is not possible for some drops).
- Within the Mobile, all cabling will be supported along the walls via J-Hooks at a maximum of 60 inch intervals. At no point shall cables rest on acoustic ceiling grids or panels.
- All equipment, devices, etc. shown in the drawing shall be installed on the side of the Mobile Center Line indicated.
- Cat6A cables from Primary Mobile TE to Secondary Mobile TE to terminate on ports 21 - 24 within Primary Mobile TE where applicable.

Refer to drawing MB-C1  
for breakdown of cabling  
types and requirements.

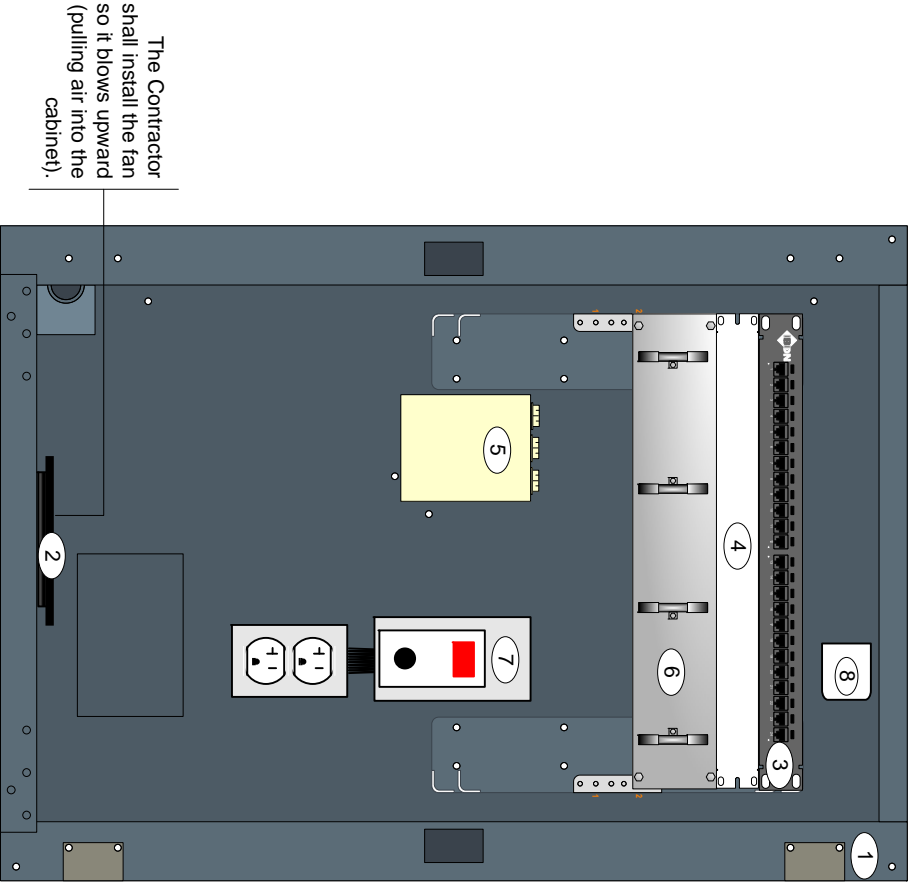
	Washoe County School District Information Technology  PROJECT DRAWINGS FOR MOBILE BUILDINGS
LOCATION Mobiles  SCALE NTS	DWG TITLE Mobile Cluster Design Concept  JLC DWG# MB-S1

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Vertical On-Wall Enclosure	CPI	13050-223
2	Fan Kit	CPI	13051-001
3	10GX RevConnect Patch Panel, 24-Port	BELDEN/CDT	RVAPPF-1U24BK
4	Filler Panel, 1U, 19"W, Black	CPI	30024-701
5	Multimedia Outlet Box, White	BELDEN/CDT	AO643207
	LC Duplex Adapter, MM	BELDEN/CDT	AX102211
	LC Duplex Adapter, SM	BELDEN/CDT	AX102215
6	Organizer Ring Panel	BELDEN/CDT	AO403977
7	Line Thermostat	DAYTON	4LZ94
8	KeyConnect Side Entry Box, White	BELDEN/CDT	AX102652

NOTES

1. The Contractor will install one duplex, single-gang power outlet fed from a dedicated circuit as shown. The top outlet shall be clearly labeled "T-stair" using a Brady P/N X-29-422.
2. The Contractor shall install the Line Thermostat directly above the single-gang power outlet as shown. The Line Thermostat shall be installed so as to apply power to the top outlet of the Contractor-installed duplex power outlet when the temperature within the TE exceeds 90 degrees F. This shall apply power to the fan at 90 deg. F. All Contractor-installed power within the Enclosure will be installed within metallic flex conduit, and will be routed along the walls of the Enclosure (left, right, top, or bottom), and secured to the rear of the Enclosure.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.
5. TE doors will be properly numbered with the room number in which the TE is installed preceded by the letters "TE" and followed by ".1". A space will separate the Letters "TE" from the room number. Therefore, a TE installed in room A6 or room 224 will be labeled "TE A6.1" or "TE 224.1" respectively. Engraved acrylic label plates [A] shall be mounted with the top edge of the label two inches below the top of the door. The label plate will be centered horizontally on the door, and will: be 3" H x 4" W; have a black or dark-grey foreground with white lettering.


The Contractor shall install the Line Thermostat and electrical outlet on the non-hinged side of the cabinet. The Line Thermostat shall be wired so as to apply power to the left two outlets of the Contractor-installed quad power outlet when the temp. within the TE exceeds 90 deg. F. This shall apply power to the fan at 90 deg. F.

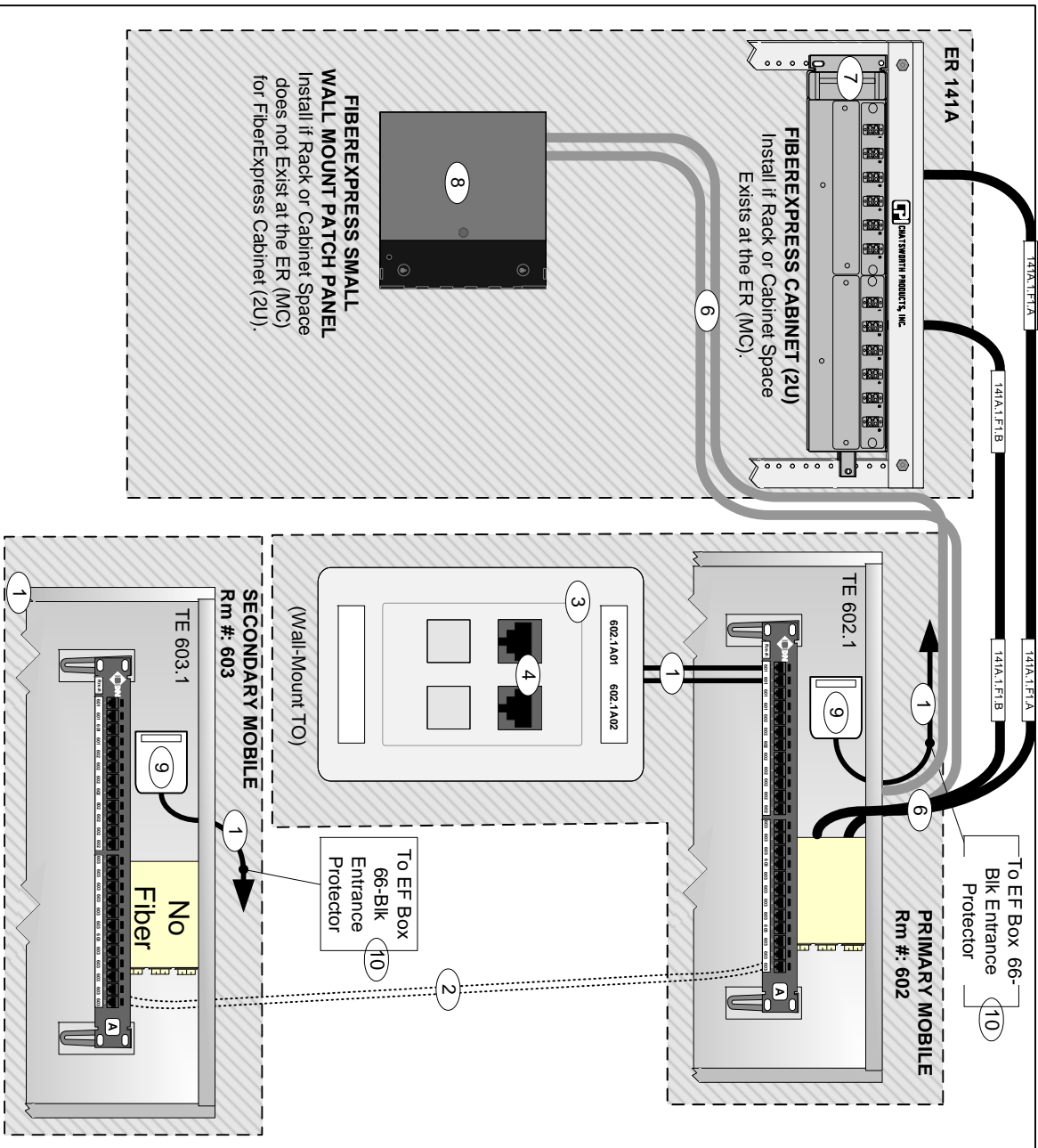


The Contractor shall install the fan so it blows upward (pulling air into the cabinet).

Installation Note:

Install lowest leading edge of cabinet at or below 27 in above the finished floor (ADA Section 4.4.1).

		Washoe County School District Information Technology	
PROJECT DRAWINGS FOR MOBILE BUILDINGS			
LOCATION Mobile Building	DWG TITLE Mobile Building TE		
SCALE NTS	JLC	DWG#	MB-R1



#### ADDITIONAL NOTES

- Ten feet of cable slack will be provided at the ER/TR and 50 feet of cable slack will be provided above drop-ceiling at the TE for each installed fiber optic cable in an extended loop or figure-eight configuration. Three feet of cable slack shall be provided at the TE and TO for Cat 6A cabling. Additionally, five inches of cable slack will be stored behind each TO, if possible without compromising minimum bend radius.
- Every Contractor-installed fiber optic cable shall be installed within a dedicated 1" innerduct (non-split) for the entire pathway between ER/TR and to a location directly above drop-ceiling at the TE (where not in conduit with MaxCell).
- If an existing BELDEN/CDT FiberExpress Manager, Cabinet, or Wall Mount Patch Panel is in place and termination space is available, use existing (install appropriate Modules, Adapter Strips, etc). Otherwise, The Contractor will install (7) (if RMU space exists at the ER) or (8) (if RMU space is not available at the ER). Use Blank Adapter Strips to fill in all empty slots. Coordinate placement of FiberExpress Cabinet or Wall Mount Patch Panel with WCSD/IT prior to installation.

#### MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N
1	Cat6A UTP IBDN, 10GXS13 CMP, Yellow	BELDEN/CDT	10GXS13 0041000
2	Cat6A UTP IBDN, 10GXS12 CMR, Yellow	BELDEN/CDT	10GXS12 0041000
3	Cat6A UTP IBDN Non-Bonded Outside Plant	BELDEN/CDT	OSP6AU 0101000
4	SG4P Interface Plate, KeyConnect, White	BELDEN/CDT	AX102249
5	Cat6A RevConnect Module, Yellow	BELDEN/CDT	RVAMJKUYL-S1
6	SM 6F Tight Buffered Indoor/Outdoor Riser Series	BELDEN/CDT	FPSD006R9
7	FX4000 50U 6F Tight Buffered Indoor/Outdoor Riser Series	BELDEN/CDT	FD4D006R9
8	FiberExpress ECX Panel, 2U, Black	BELDEN/CDT	ECX-02U
9	6 LC Duplex ECX Adapter Strip, MM	BELDEN/CDT	FF4X12LD
10	6 LC Duplex ECX Adapter Strip, SM	BELDEN/CDT	FFSX12LD
11	Blank ECX Adapter Strip	BELDEN/CDT	FFZX008B
12	Small FiberExpress Wall Mount Patch Panel, Black	BELDEN/CDT	AX103928
13	6 LC Duplex Adapter Strip, MM	BELDEN/CDT	AX101729
14	6 LC Duplex Adapter Strip, SM	BELDEN/CDT	AX101731
15	Blank Adapter Strip	BELDEN/CDT	AX100066
16	KeyConnect Side Entry Box, White	BELDEN/CDT	AX102652
17	Entrance Protector	PORTA	24025-66-M66P

#### NOTES

- For every installed Category 6A cable, The Vendor will provide:
 

(1) 4 Cat6A UTP patch cord, Yellow	BELDEN/CDT	CA21104004
(1) 15 Cat6A UTP patch cord, Yellow	BELDEN/CDT	CA21104015
- For every Contractor-installed fiber optic cable The Contractor will terminate both ends of every fiber strand with:
 

Fusion-Splice LC 50U MM Connector	BELDEN/CDT	FT4LC900FS01
-----------------------------------	------------	--------------
- For every installed fiber optic cable The Vendor will provide:
 

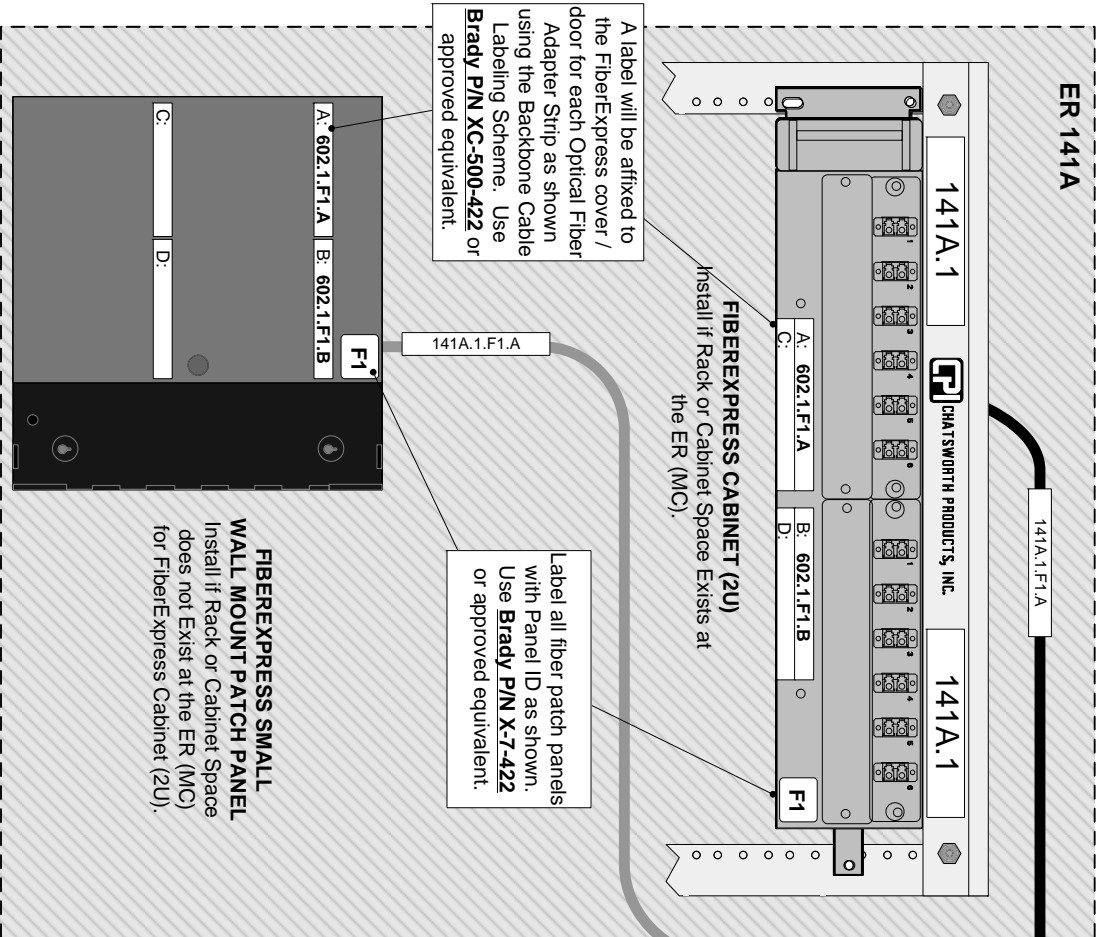
(4) Hybrid Patch Cord, FX4000, 50U, LC duplex-LC duplex, 3 m	BELDEN/CDT	FP4LDLD003M R2XA
(2) Hybrid Patch Cord, FX4000, 50U, LC duplex-LC duplex, 5 m	BELDEN/CDT	FP4LDLD005MR 2XA



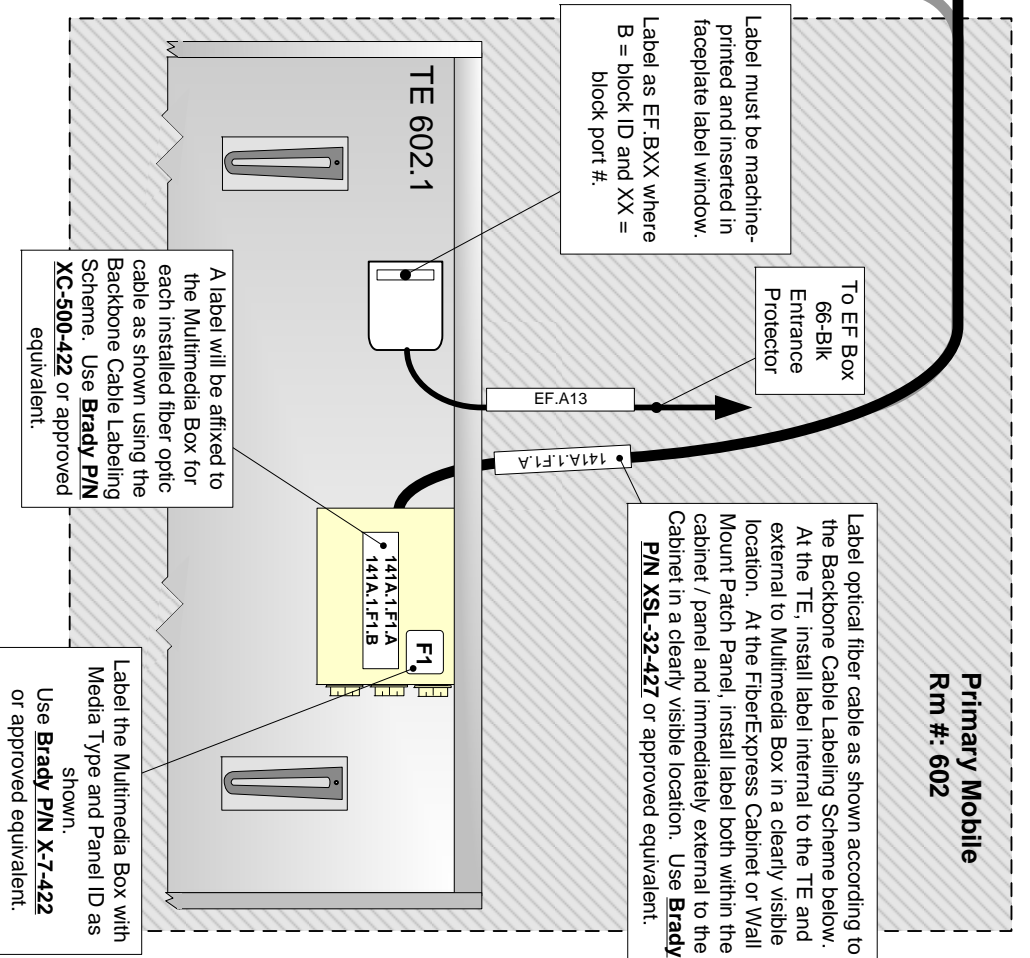
### Washoe County School District Information Technology PROJECT DRAWINGS FOR MOBILE BUILDINGS

LOCATION	DWG TITLE
Mobile Buildings	Cabling
SCALE NTS	JLC DWG# MB-C1

ER 141A



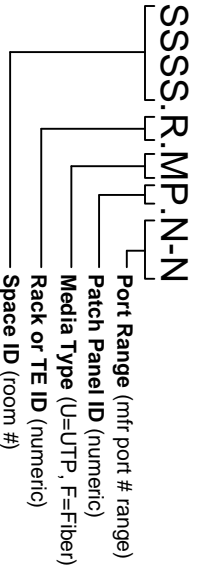
Primary Mobile  
Rm #: 602



### Fiber Backbone Cable Labeling Scheme

#### FIBER LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All fiber optic terminations point to the termination at the opposite end of the cable.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
MOBILE BUILDINGS

Fiber & Analog UTP Labeling

LOCATION  
Mobile Buildings

SCALE  
NTS

JLC

DWG#  
MB-L1

# PRIMARY MOBILE – Rm #: 602

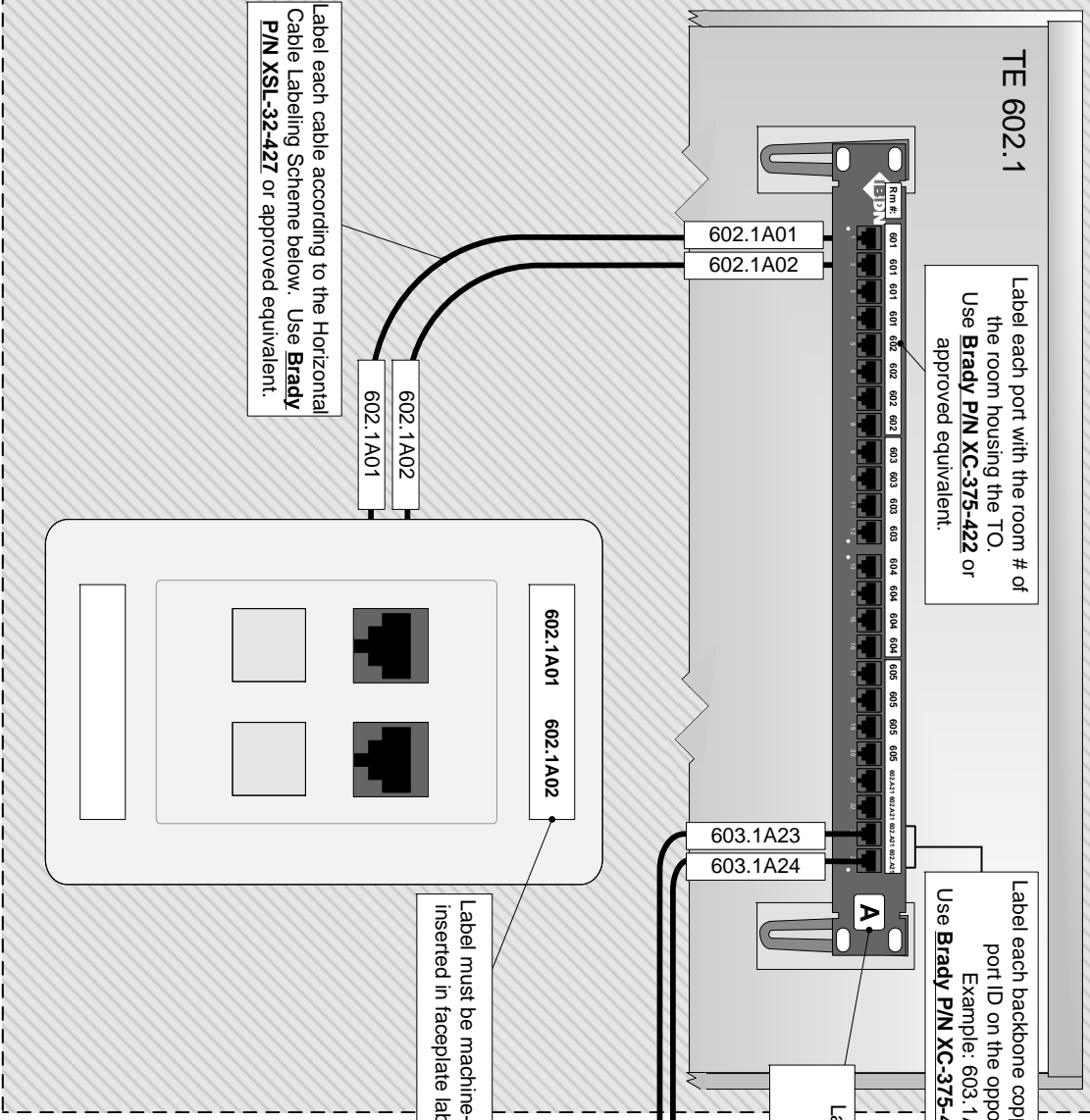
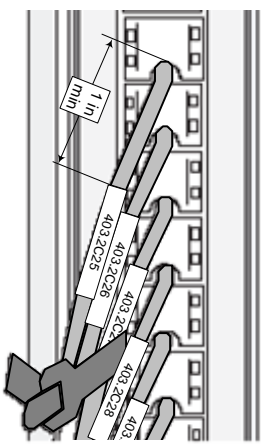
TE 602.1

Label each port with the room # of the room housing the TO. Use **Brady P/N XC-375-422** or approved equivalent.

Label each backbone copper port with the patch panel port ID on the opposite side of the cable. Example: 603.1A23 and 603.1A24 Use **Brady P/N XC-375-422** or approved equivalent.

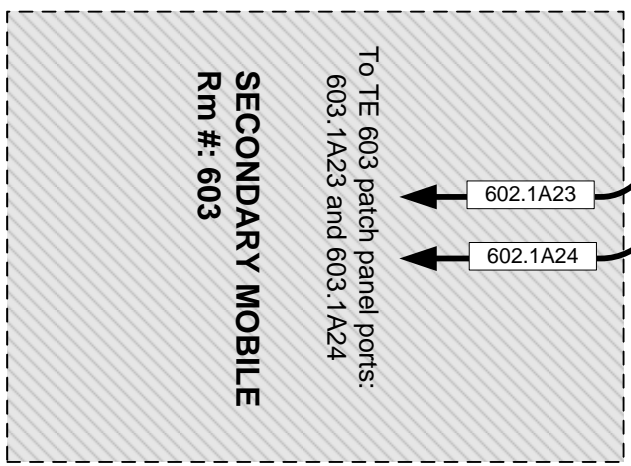
Label with Panel ID as shown. Use **Brady P/N X-7-422** or approved equivalent.

At TE, cable labels will be affixed to cable a minimum of 1 inch from termination (on patch panel), and placed in such a way as to be clearly visible:



Label each cable according to the Horizontal Cable Labeling Scheme below. Use **Brady P/N XSL-32-427** or approved equivalent.

Label must be machine-printed and inserted in faceplate label window.



Horizontal Cable Labeling Scheme

SSSS.RPNN

Port Number (mfr port #)
Patch Panel ID (alpha)
Rack, TE or CP ID (numeric)
Space ID (room #)

HORIZONTAL LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All patch panel PORT LABELS and TO LABELS point to the termination at the opposite end of the cable.

		Washoe County School District Information Technology	
LOCATION <b>Mobles Buildings</b>	<b>PROJECT DRAWINGS FOR MOBILE BUILDINGS</b>	DWG TITLE <b>Data UTP Labeling</b>	
SCALE <b>NTS</b>	<b>JLC</b>	DWG# <b>MB-L2</b>	

## **SECTION 5 – NEW FACILITIES / BUILDING ADDITIONS / MODERNIZING EXISTING FACILITIES**

### **5.1 INCLUSIONS**

- A. All requirements contained and referred to in **SECTION 1 – GENERAL** of this document apply to this section as if bound herein. Additionally, for facilities being modernized (hereafter termed Modernized Facilities) and for the existing portion of facilities receiving a Building Addition, all requirements contained and referred to in **SECTION 2 – EXISTING FACILITIES** of this document apply to this section as if bound herein.

### **5.2 SECTION APPLICABILITY**

- A. This section is specifically applicable to any project requiring the installation of a complete SCS, including the following situations:
  - 1. The construction of a New Facility by or for WCSD.
  - 2. The construction of a Building Addition by or for WCSD.
  - 3. The modernization, upgrade, and/or retrofit of an SCS at an existing facility owned or managed by WCSD.

### **5.3 WORKING HOURS (Modernized Facilities Only)**

- A. Vendor working hours typically start at 3:30 PM when students and faculty have left for the day and end at 11:00 PM. Vacation and holiday hours typically start at 7:00 AM and end at 3:00 PM. Coordinate alternative schedules with the Project Manager and The Site.

### **5.4 SYSTEM DESCRIPTION**

#### **A. GENERAL**

- 1. The data cabling system design shall provide a total of (4) Category 6A TOs within the typical classroom which shall be capable of providing converged services including: data, IP Telephony, IP Video, and analog voice/fax.
- 2. User access to converged services shall be seamless and immediate at every TO except in the case of analog voice or fax, which requires cross-connection at both TR/TE and ER. Analog TOs shall be identified with a blue bezel.
- 3. In New Facilities, Building Additions and Modernized Facilities, broadband video services shall be provided within each classroom via a coaxial cabling system.
- 4. In New Facilities, POS services shall be provided within the kitchen/cafeteria and various outlying serving areas via horizontal UTP cabling. POS TOs shall be identified with a green bezel.

#### **B. CABLING SYSTEM TOPOLOGY**

1. The cabling system shall be arranged in a star topology, with the ER at its center.
2. Facility SCS spaces shall consist of one ER and multiple TRs. In Modernized Facilities TEs may be required.
3. The ER shall serve all TRs within the facility with optical fiber, UTP, and coaxial backbone cabling.
4. In modernized facilities, the ER shall serve all TEs within the facility with optical fiber and UTP backbone cabling.
5. The ER, TRs, and TEs shall be responsible for all horizontal cabling distribution to TOs within each respective serving area.
6. The POS system shall be tied to the network at build out. Pathway shall be installed from the ER to the POS TE for fiber optic and UTP backbone cabling.

## C. CABLING

### 1. Optical Fiber Cabling

- a. ER to TR/TE backbone optical fiber cabling consists of 12-strand Laser Optimized 50/125 um multimode (24 strand or higher count fiber shall not be substituted) and 12-strand singlemode optical fiber cable.
- b. This backbone shall be used to create a dedicated optical fiber link from Core Layer electronics in the ER to Access Layer electronics in each TR/TE.
- c. Two (2) 12-strand multimode fiber optic cables and one (1) 12-strand SM fiber optic cable shall be provided to each Large TE and each rack within each TR, and one (1) 6-strand multimode fiber optic cable and one (1) 6-strand SM fiber optic cable shall be provided to each small TE in order to provide cable redundancy to the network core and also to provide for a logical and physical star topology. Benefits of this design include:
  1. Redundancy in the event of a cut or damaged cable
  2. Double the bandwidth via EtherChannel
  3. Simplified fiber optic jumper management
  4. Simplified troubleshooting
  5. Simplified documentation
  6. Faster MTTR (Mean Time to Repair)

### 2. UTP Cabling

- a. ER to TR/TE backbone UTP copper cabling consists of 25-pair Category 5e UTP installed to each rack.
  - b. Backbone UTP copper cabling shall be set in place to support analog connections (primarily for analog fax) over the horizontal cabling infrastructure.
  - c. Horizontal UTP copper cabling consists of Category 6A UTP installed between the TO and the ER/TR/TE serving that area.
- ### 3. Coaxial Cabling (New Facilities, Building Additions and Modernized Facilities)

- a. Backbone coaxial cabling consists of RG-11 Quad-Shield cabling installed between the ER and all TR/TEs throughout the facility.
- b. Horizontal coaxial cabling consists of RG-6 Quad-Shield installed between the CATV outlet at the teacher's station and the ER/TR/TE serving that area.
- c. All coaxial cabling and splitters shall be backboard terminated and mounted within the ER/TR. Video equipment shall be rack-mounted at the TR. In New Facilities, Video equipment shall be rack-mounted at the ER and wall-mounted at the TR.

D. ER (Equipment Room)

1. The ER serves:

- a. Each Large TE and each rack within each TR with:
  - 1. Two (2) 12-strand multimode optical fiber backbone cables.
  - 2. One (1) 12-strand singlemode optical fiber backbone cable.
  - 3. One 25-pair Category 5e copper backbone cable.
- b. Each TR/TE within the facility with:
  - 1. One (1) RG-11 quad-shield coaxial backbone cable (New Facilities and Modernized Facilities).
- 2. Two racks within the ER serve all local TOs within its area (identified as Copper Racks in the Project Drawings of this document).

E. TR (Telecommunications Room)

- 1. Each TR serves all TOs within its serving area with Category 6A horizontal cabling.
- 2. TRs are typically designed in a two-rack configuration and are permitted a maximum of 192 horizontal cables (two racks with a growth factor of 33.3% rack space) upon initial installation. This design is intended to maintain adequate separation between UTP bundles (each bundle not to exceed 30 cables), as well as to minimize horizontal distribution pathway size requirements. In modernized facilities, a TR may be permitted a total of 288 horizontal cables upon initial installation (three racks with a growth factor of 33.3% rack space) in an effort to minimize space requirements, though the two-rack configuration is preferred.

F. LARGE TE (MODERNIZED FACILITIES ONLY)

- 1. Each TE serves all TOs within its serving area with Category 6A horizontal cabling.
- 2. The Large TE is 72" H, 30" D, and 27.3" W. The TE is both wall-mount and floor-mount.
- 3. Computer Lab TEs are permitted a maximum of 144 horizontal cables upon initial install and are intended to serve one of the following functions:
  - a. Serve TOs in up to two adjacent computer labs. Where possible, the TE shall be installed on the common wall.

- b. Serve TOs within a small building requiring less than 144 horizontal cables. If more than 144 cables are required within the building, a TR shall be installed (do not use more than one TE to service a single building).

#### G. WORK AREAS

1. The typical Work Area consists of a single-gang plate with two (2) standards compliant TOs.
2. Each TO shall consist of one (1) four-pair Category 6A UTP cable, installed from the ER/TR/TE serving that area to the Work Area.

### 5.5 TO (Telecommunications Outlet) PLACEMENT GUIDELINES

#### A. GENERAL

1. TOs shall be located within three feet of a power outlet and shall be installed at the same height, except where indicated elsewhere in the Project Documents.

#### B. STANDARD CLASSROOMS

##### 1. Student and Instructor TOs

Typically, four (4) TOs shall be distributed throughout the standard classroom at various Work Areas. Two (2) TOs shall be intended for student use, and two (2) TOs shall be intended for instructor use.

##### a. Design goals for TO placement within the classroom:

1. FLEXIBILITY: A duplex network outlet shall be placed with a serving area radius of 12 linear feet along all wall space where it is reasonable to place a computer. Restated, any place where it is reasonable to place a computer should be within reach (12 linear feet) of a duplex network outlet.
2. POD OF FOUR: Each standard classroom shall have at least one, and where possible two (but no more than two), locations within a room where a pod of four computers can be grouped. An overlapping serving area is defined as a location within the room, along a single wall or within a corner, within 12 linear feet of two distinct network outlets.
3. STANDARDIZED QUANTITY: The standard classroom shall typically receive eight drops (four duplex outlets). Room size and useable wall space shall be considered when determining drop quantity within a standard classroom. Roughly, a duplex drop shall be allotted to a standard classroom for every 25' of useable wall space. Useable wall space shall be defined as wall space where the wall is directly accessible and where furniture or devices are not placed in a permanent or semi-permanent manner (if it cannot be relocated by one or two people without tools).

##### 2. IPTV TOs

- a. One additional TO may be provided specifically for IPTV in a dedicated outlet (refer to Project Blueprints for applicability).

3. Coaxial Outlets (New Facilities and Building Additions only)

- a. One RG-6 coaxial outlet shall be installed to the teachers' station.

C. COMPUTER LABS

1. In a computer lab, TO distribution shall be as follows:

a. Student and Instructor TOs

1. Forty-two (42) TOs (typical) shall be distributed throughout the classroom at various Work Areas as specified in the Project Blueprints. Thirty-eight (38) TOs shall be intended for student use, two (2) TOs shall be intended for instructor use, and two (2) TOs shall be intended for printers.
2. In modernized facilities, TOs are typically placed within large, surface mount raceway along walls (where possible, unoccupied by whiteboards, chalkboards, windows, heaters, etc.).
3. In new facilities, in-floor boxes may be used in conjunction with surface mount raceway along walls, but must comply with ANSI/TIA/EIA standards and must support faceplates or modules designed to support BELDEN/CDT RevConnect jacks.
4. Computer labs should be designed with the following criteria in mind:
  - a. Students should all face the same direction
  - b. The teacher station should be positioned at the rear of the class
  - c. The teaching wall should be at the front of the class and should have room for white boards, projector screens, etc. The teaching wall should not contain any windows, cabinets, or other obstructions.
  - d. The standard computer desk shall be considered three feet wide and six feet long, and shall support up to three computers.
  - e. Spacing between computer desks and along walkways shall be at minimum three feet, and where possible shall be four feet.
  - f. In modernized facilities, where computer labs are served by a Large TE, the TE shall be located in a position where it is away from where desks are to be placed so as to be easily accessible.

b. IPTV TOs

1. One (1) additional TO may be provided specifically for IPTV in a dedicated outlet (refer to Project Blueprints for applicability).

c. Coaxial Outlets (New Facilities, Building Additions and Modernized Facilities)

1. One (1) RG-6 coaxial outlet shall be installed to the teacher's station.

2. In New Facilities and Building Additions, Computer Labs shall be serviced by a Large or Small TE.

3. In Modernized Facilities, Computer Labs shall be serviced by a Large or Small TE. TEs shall be implemented to minimize horizontal pathway requirements and space requirements back to and within the ER/TRs.
4. Pathway within Computer Labs may consist of appropriately sized multi-channel raceway, conduit, poke-thrus, and voids in walls not asbestos-containing (power poles are not permitted). Columns with sufficient conduit for data and power are permissible in some cases.

#### D. SCIENCE LABS

1. In a science lab, TO distribution shall be as follows:
  - a. Student and Instructor TOs
    1. Typically, two (4) TOs shall be distributed throughout the science lab at various Work Areas. Two (2) TOs shall be intended for student use, and two (2) TOs shall be intended for instructor use.
  - b. IPTV TOs
    1. One (1) additional TO may be provided specifically for IPTV in a dedicated outlet (refer to Project Blueprints for applicability).
  - c. Coaxial Outlets (New Facilities, Building Additions and Modernized Facilities)
    1. One (1) RG-6 coaxial outlet shall be installed to the teacher's station.

#### E. OFFICES AND COMMON AREAS

1. Design goals for TO placement in offices, potential offices (currently allotted to storage), and common areas (not including gyms, workout rooms, student dining areas, and theaters):
  - a. FLEXIBILITY: A duplex network outlet shall be placed with a serving area radius of 12 linear feet along all wall space where it is reasonable to place a computer. Restated, any place where it is reasonable to place a computer should be within reach (12 linear feet) of a duplex network outlet.
  - b. STANDARDIZED QUANTITY: Room size and useable wall space shall be considered when determining drop quantity within an office or common area. Roughly, a duplex drop shall be allotted to an office or common area for every 25' of useable wall space. Useable wall space shall be defined as wall space where the wall is directly accessible and where furniture or devices are not placed in a permanent or semi-permanent manner (if it cannot be relocated by one or two people without tools).

#### F. LIBRARIES

1. Design goals for general TO placement in libraries:
  - a. FLEXIBILITY: A duplex network outlet shall be placed with a serving area radius of 12 linear feet along all wall space where it is reasonable to place a computer. Restated, any place where it

is reasonable to place a computer should be within reach (12 linear feet) of a duplex network outlet.

- b. **STANDARDIZED QUANTITY:** Room size and useable wall space shall be considered when determining drop quantity within an office or common area. Roughly, a duplex drop shall be allotted to an office or common area for every 25' of useable wall space. Useable wall space shall be defined as wall space where the wall is directly accessible and where furniture or devices are not placed in a permanent or semi-permanent manner (if it cannot be relocated by one or two people without tools). Do not consider walls with bookshelves useable wall space.
2. Librarian counters shall receive a minimum of one duplex network outlet at every place where a work station could be placed and where under counter space is available for a chair. Additionally, one duplex network outlet shall be provided for a network printer at or near the librarian counter.
3. Where possible, a full computer lab shall be installed within libraries. Treat the librarian desk as the teacher's station, if possible, so the computer screens may be visible by the librarian. If a full lab is not possible, provide a lab of at minimum twenty student computers. In modernized facilities, this may not be possible in some libraries due to space constraints. In this case, provide one or more locations where banks of computers can be placed throughout the library.

#### G. WIRELESS ACCESS POINT TELECOM OUTLETS

1. A TO shall be placed at the innermost corner of every other classroom (in the corner which is on the hallway, and closest to the center of the building), and in selected administrative and common areas, for a wireless access point. Wireless access point TOs shall be co-located with either a Domed Wireless Ceiling Enclosure (when a drop ceiling is present) or Wall-Mount Wireless Box (when a drop ceiling is not present). See the section titled **Wireless Enclosures (WE)** in the following pages.
2. In general, consider the wireless access point coverage area to be sixty feet in radius. All areas of the school shall be covered. Consider building construction when determining coverage area.

#### H. POS SYSTEM OUTLETS (New and Modernized Facilities Only)

1. POS system telecommunications outlets (POS TOs) shall be installed at all New Facilities.
2. POS TOs shall be installed at Modernized Facilities only if included in the project scope. A&E shall consult with WCSD Capitol Projects and Planning and WCSD Information Technology departments for applicability.
3. POS outlets shall be located at various serving lines, windows, and outlying locations. An additional two (2) POS TOs shall be located within the kitchen office at a location designated for the kitchen

manager's desk. One (1) TO shall be in place to connect the kitchen manager's computer to the POS system, and the other shall be used to connect the kitchen manager's computer to the SP demarcation for WAN services.

4. Each POS station shall receive a single TO. POS TOs may be located together in locations where multiple POS stations are grouped together. Install POS TOs as per drawing NF-C1.
5. Where POS stations are placed against a wall, mount TOs on or in-wall. POS TOs shall not be installed within the floor. POS TOs in student common areas shall be installed within secured, lockable, faceplates or wall-mount boxes (surface-mount or flush-mount). If a surface mount box is used, it must be no larger than a typical double-gang surface mount box and must be pre-approved by WCSD/IT.
6. Refer to POS System below for system description.

#### 5.6 POS SYSTEM (New and Modernized Facilities Only)

##### A. General

1. A POS system shall be installed at all New Facilities.
2. A POS system shall be installed at Modernized Facilities only if included in the project scope. A&E shall consult with WCSD Capitol Projects and Planning and WCSD Information Technology departments for applicability.
3. The POS system shall provide POS connectivity at various serving lines, windows, and outlying locations.
4. Each POS station shall receive a single TO. POS TOs may be located together in locations where multiple POS stations are grouped together.
5. Each POS station shall have one (1) cat6 cable to be run to the ER/TR and one (1) cat6 cable to be run to a 66-block to be installed in a junction box in the kitchen manager's office. All POS station cables terminated on the 66-block shall be cross-connected together in parallel.
6. Label the POS Station patch panel "POS Stations" using Brady P/N XC-500-422.
7. POS TOs shall be labeled "POS-" followed by the POS Station 66-block pin number. Therefore, the POS station terminated on pins one through eight of the POS Station 66-block shall be labeled "POS-1". Use labels specified in drawing **EF-L2** for POS TOs.

##### B. Specific Requirements

1. The Vendor shall install the POS System as specified in **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** at the end of this section.

#### 5.7 WIRELESS ENCLOSURES (WE)

A. General

1. A WE, co-located with a WE TO, shall be placed at the innermost corner of every other classroom (in the corner which is on the hallway, and closest to the center of the building), and in selected administrative and common areas, for a wireless access point.
2. A Domed Wireless Ceiling Enclosure or Wall-Mount Wireless Box shall be installed wherever indicated on the Project Drawings.
3. In general, consider the wireless access point coverage area to be forty feet in radius. All areas of the school shall be covered. Consider building construction when determining coverage area.
4. Exact quantities and locations for Wireless Enclosures shall be made in the project blueprints. If no specifications are made for Wireless Enclosures or if the above minimum quantities are not maintained within the Project Blueprints, The Vendor shall immediately bring the issue to the attention of The Customer PRIOR TO BIDDING ON THE PROJECT.
5. Every Wireless Enclosure location indicated within the Project Blueprints shall have a co-located Category 6 TO. The TO shall be installed within the enclosure and terminated with a REVConnect Plug (**P/N RVAFPUBK-S1**) for all WE installations. If a TO is not indicated in the Project Blueprints at each WE location, The Vendor shall immediately bring the issue to the attention of The Customer PRIOR TO BIDDING ON THE PROJECT.

B. Domed Wireless Ceiling Enclosure

1. Use the following part number for all enclosures to be installed within a drop ceiling:

**Domed Wireless Ceiling Enclosure**

**Mfr: TerraWave**

**P/N: CTEN-2X2-11113F-W**

2. Installation instructions:
  - a. The Domed Wireless Ceiling Enclosure is 2' X 2'. Should the ceiling height exceed 12 feet, the Vendor shall install a Wall Mount Enclosure in its place. The Vendor must coordinate any required alterations of the grid structure in order to accommodate the enclosure via the ceiling contractor and The Customer.

C. Wall-Mount Wireless Enclosure with Plexi Window

1. Use the following part number for all enclosures installed in areas where a drop ceiling is not present:

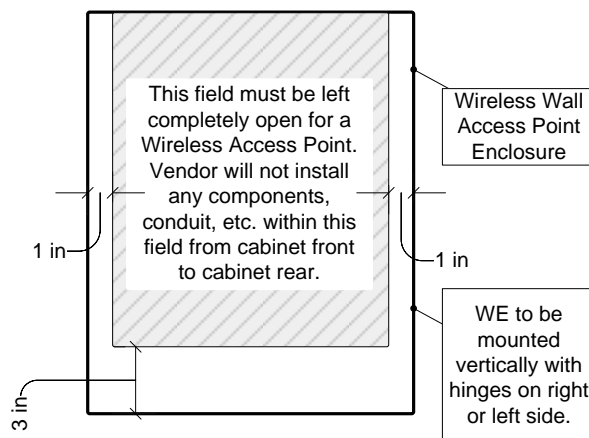
**Wall-Mount Wireless Enclosure with Plexi Window**

**Mfr: TerraWave**

**P/N: CV12106KC-NH**

## 2. Installation instructions:

- a. TOs co-located with Wireless Wall Access Point Enclosures shall be installed within the Enclosure and terminated with a REVConnect Plug (**P/N RVAFPUBK-S1**) as indicated in the following diagram. Wall Mount Enclosures must be installed no higher than 12 feet when height not specified on Project Drawings. Entry into the enclosure shall be made via 1/2" conduit at the provided knockouts, or via a Vendor-provided 1/2" minimum diameter drilled hole with bushing through the back plate. **NO CABLING MAY BE EXPOSED WITHIN THE ENCLOSURE. NO OTHER CABLES OR CABLE TYPES ARE TO BE PLACED IN OR PASS THROUGH THE WIRELESS ENCLOSURES.**



## 5.8 HORIZONTAL CABLING REQUIREMENTS

- A. The Vendor shall install all Horizontal Cabling as specified in **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** at the end of this section.

## 5.9 BACKBONE CABLING REQUIREMENTS

- A. The Vendor shall install all Backbone Cabling as specified in **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** at the end of this section.

## 5.10 COAXIAL CABLING REQUIREMENTS (New Facilities, Building Additions and Modernized Facilities)

- A. The Vendor shall install all Coaxial Cabling as specified in **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** at the end of this section.

## 5.11 GROUNDING AND BONDING

### A. SPECIFIC REQUIREMENTS

1. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI J/STD-607-A Telecommunications Bonding and Grounding Standard.
2. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each TR shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.
3. All racks, cabinets, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors. Refer to ANSI J/STD-607-A for proper conductor sizing.
4. All wires used for telecommunications grounding purposes shall be green in color. All cables and bus bars shall be identified and labeled in accordance with the recommendations made in ANSI/TIA/EIA-606-A.

## 5.12 PATHWAY REQUIREMENTS

### A. GENERAL

1. Conduit stub-ups shall be 1" diameter minimum for all Work Areas, providing a growth capacity of up to four horizontal cables.
2. Prior to cable installation, The Vendor shall verify that the Telecommunications Pathways System is installed as specified in the Project Documents. Any variations from or violations of the specifications made in these documents shall be immediately reported to the Project Manager. No portion of the Structured Cabling System shall be installed in any component of the Telecommunications Pathways and Spaces which deviates from the specifications made in

- the Project Documents. All cabling designated on the Blueprints as terminating within a specific ER or TR shall be installed as such unless otherwise specified in writing by the Project Manager.
3. Cabling for other trades may occupy SCS cable tray providing a divider is properly installed within the cable tray to ensure proper separation. Cabling for other trades may NOT occupy any SCS conduits, sleeves or ladder racking.
  4. A minimum of one spare 1", non-split innerduct with installed pull cord shall be provided to each TR from the ER (along all ladder rack segments). The innerduct shall be bright orange in color and shall be clearly tagged for fiber optic cable only.
- B. SPECIFIC REQUIREMENTS FOR MODERNIZED FACILITIES AND BUILDING ADDITIONS (Existing Building Portion)
1. For Modernized Facilities and the existing building portion of Building Additions, refer to pathway requirements for existing facilities in Section 2 of this document.
- C. SPECIFIC REQUIREMENTS FOR NEW FACILITIES AND BUILDING ADDITIONS (Building Addition Portion)
1. For New Facilities and the Building Addition portion of Building Additions, Ladder rack and / or cable tray shall be installed along all hallways for horizontal distribution, and between the ER and all TRs for backbone distribution. Cable tray shall have a divider installed throughout entire installation for co-location of other trades' cabling. This divider is to ensure proper cable separation. Where this is not possible, 4" conduit shall be placed with a 100% growth factor based on initial installed cable fill for both horizontal and backbone cabling of all types. These conduits shall be clearly labeled as dedicated for the particular cabling type only.

## 5.13 ER / TR REQUIREMENTS

### A. GENERAL

1. ERs and TRs shall consist of dedicated, fully secured spaces which shall house the ER or TRs serving a particular area. Each space shall be dedicated solely to telecommunications services.
2. ERs and TRs shall be placed in such a manner that (pathway limitations in mind) horizontal cabling shall not exceed 295' (which includes 10' of cable slack at all ERs and TRs, as well as 3' of cable slack in the overhead above every TO).
3. Each ER / TR shall be built as per the design guidelines for a Telecommunications Room outlined in the ANSI/EIA/TIA-569-A and BICSI® TDMM documents.
4. ERs TRs shall be located on floor areas designed with a minimum floor loading of 50 lbf/ft<sup>2</sup>.

5. ERs / TRs shall be located in spaces accessible by common areas (not via classrooms or offices), preferably hallways or corridors, as to limit disruptions while performing maintenance, MACs, or upgrades.
6. All walls shall be covered with rigidly fixed 3/4" A-C plywood, preferably void free, 8' high, capable of supporting attached equipment. Plywood shall be covered with two coats of fire retardant paint.
7. Lighting shall be a minimum of 50 foot candles measured 3' above the finished floor, mounted 8.5' minimum above finished floor. Lighting shall not be located directly over racks, but shall rather be located in such a manner as to provide sufficient lighting (as described above) both in front and at the rear of the racks.
8. For physical security reasons, false ceilings shall not be acceptable.
9. The door shall be a minimum of 36" wide and 80" high, without doorsill, hinged to open outward (codes permitting) or slide side-to-side, or be removable, and fitted with a lock.
10. Floors, walls, and ceiling shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting.

#### B. ENVIRONMENTAL CONTROL

1. Provide HVAC that shall:
  - a. Maintain continuous and dedicated environmental control (24 hours per day and 365 days per year). If emergency power is available, connect it to the HVAC system that serves the TR.
  - b. Maintain positive pressure with a minimum of one air change per hour in the TR.
  - c. Dissipate the heat generated by active devices.
  - d. Satisfy applicable building codes.
  - e. Maintain a temperature range from 64 °F to 72 °F and a humidity range from 30% to 55% relative humidity.
  - f. In all New Facilities, Building Additions and Modernized Facilities, all ER/TRs shall be environmentally sealed to maintain a controlled environment within the ER/TR and to prevent exposure to outdoor elements.
2. BTU/Hr Ratings
  - a. General
    1. The following calculations are based on growth to full equipment potential based on current trends in networking technology.
    2. Note that network, voice, and video equipment only are included in the following calculations. PA system, room serving UPS, and any other equipment are not included in these calculations.
  - b. ER

**60 KBTU/HR**

- c. Standard TR (two racks)

## 6 KBTU/HR

Note: Add 3 KBTU/HR for every additional rack installed at build out within the TR.

### C. POWER

1. Specific outlets for equipment and convenience along with their locations shall be indicated in the Project Drawings for New and Modernized Facilities at the end of this section.
2. A dedicated electrical distribution panel (panel serves only electrical requirements of the ER/TR) shall be installed to serve each ER/TR. If standby power is available, automatic switchover of power shall be provided.
3. Lighting fixtures shall not be powered from the same electrical distribution panel as the telecommunications equipment in the telecommunications closet. Dimmer switches shall not be used and emergency lighting and signs shall be properly placed such that an absence of light shall not hamper emergency exit.

### D. SIZING THE ER/TR

1. Refer to **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** for ER/TR sizing.
2. In new facilities, ERs/TRs shall not be permitted to serve more than 192 horizontal cables (two racks) upon initial install. Additional TRs shall be added to a section of the building requiring higher cable counts. In existing facilities, TRs shall not be permitted to serve more than a maximum of 288 horizontal (three racks) upon initial install.
3. A growth factor of 33% shall be factored into all ERs/TRs for horizontal cabling. For every two installed Access Modules (refer to Project Drawings for New and Modernized Facilities) one spare Access Module shall be provided.

### E. Specific Requirements

1. The Vendor shall install all components required in the ER/TR as specified in **PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES** at the end of this section.

## 5.14 POWER AT THE WORK AREA

- A. Each TO requires one duplex power outlet to be installed a maximum of three feet from the TO. Therefore, every duplex location (two horizontal cables) requires one quad power outlet or two duplex power outlets. Computer labs may have fewer electrical outlets, but must account for adequate circuits for each row of computers feeding off the wall.

- B. In Modernized Facilities, the existing electrical wiring system shall be overlaid and supplemented by additional electrical circuits and outlets fed from a Vendor-installed electrical distribution panel within the nearest ER/TR (separate panel from the dedicated panel serving the ER/TR). The Vendor shall assess the existing electrical wiring capacity within each room and supplement it with additional circuits and outlets to ensure maximum circuit load shall not be exceeded based on current systems in place, TOs to be installed, and industry best practices. The Vendor shall factor in a 3 A load for each TO, and size the system accordingly.
- C. Power installed to support TOs shall be on dedicated branch circuits, with a maximum of five TOs served by one 110 V / 20 A circuit. (Manufacturer load for a PC / monitor is approximately 3 A. De-rating the circuit to 80% permits a maximum of 16 A per circuit.).
- D. PLEASE NOTE: ISOLATED GROUND RECEPTACLES ARE NOT RECOMMENDED BY BICSI® TDMM AND IEEE 1100.

#### 5.15 CUTOVER AND REMOVAL OF ABANDONED SYSTEMS (Modernized Facilities Only)

- A. Existing systems shall remain operational until all Vendor-installed systems are in place.
- B. Existing drop cables serving TOs at locations where pathway is to be reused shall be removed from their existing raceways and taped to the wall adjacent to the existing raceway in order to maintain connectivity. Use painters tape in order to ensure no residue shall be left or damage shall be done to existing wall finishes.
- C. Following system cutover by WCSD/IT, The Vendor shall remove all abandoned systems related to the project's scope of work.
- D. Abandoned systems include all racks, cabinets, optical fiber cabling, horizontal cabling, coaxial cabling, surface-mount raceway, and associated hardware which was in place prior to the initiation of the current Project and used as a component of the existing data communications system. Exceptions include: Category 6 Labs which were installed prior the current project. Verify systems to be removed with the Project Manager prior to removal.

**NOTE:** DO NOT REMOVE EXISTING POS, SECURITY, FIRE ALARM, OR VOICE CABLING UNLESS EXPLICITLY INDICATED IN THE PROJECT DOCUMENTS.

#### 5.16 WORK INCLUDED

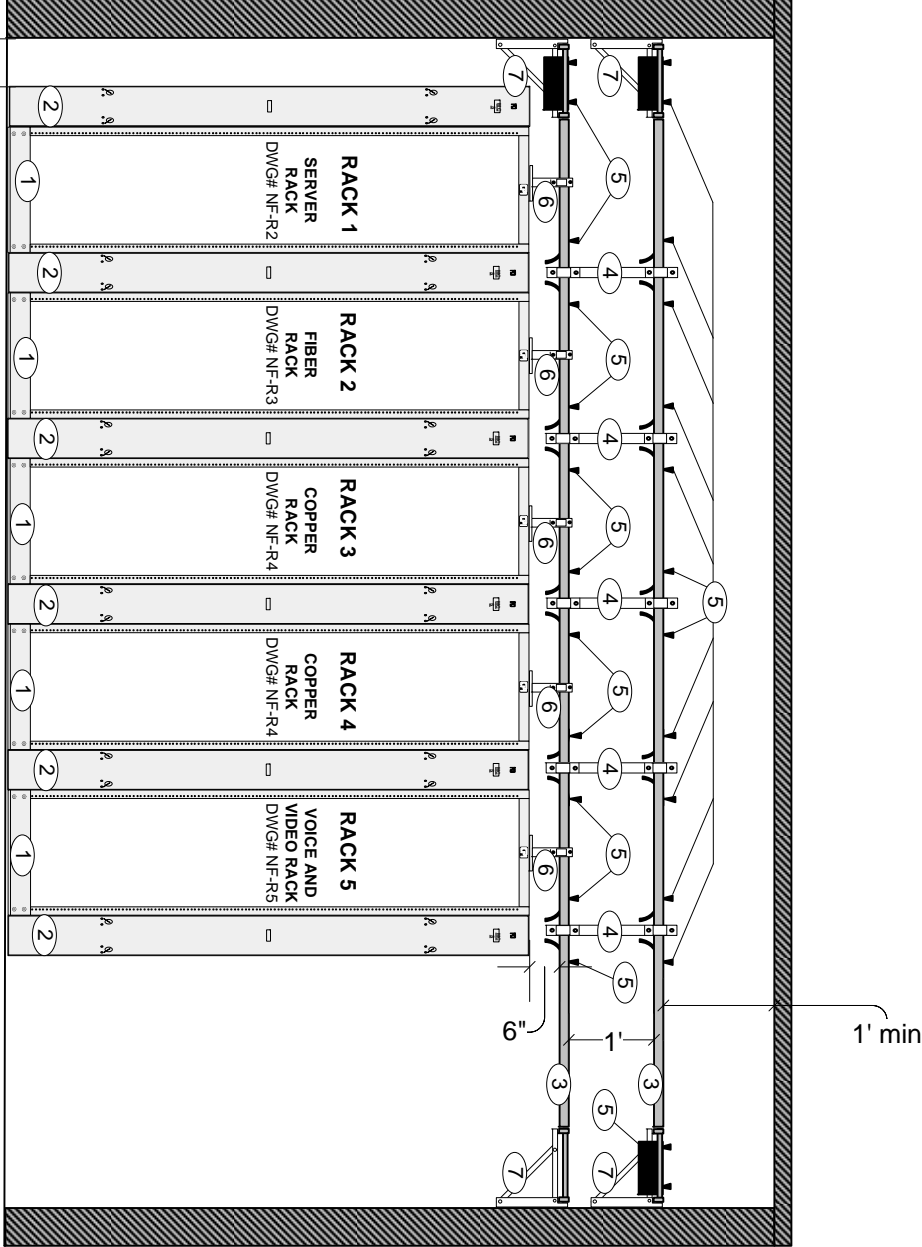
- A. The Vendor shall provide and install all components of the SCS as per the specifications made within the Project Documents in order to achieve the objectives stated in the System Description above.

#### 5.17 PROJECT DRAWINGS FOR NEW AND MODERNIZED FACILITIES

- A. Refer to inserted drawings contained in the following pages.

- B. Dimensions of ER/TR spaces and associated door positions shall vary at New Facilities, Modernized Facilities, and Building Additions. Refer to additional specifications provided elsewhere in the Project Documents (scope of work, description of work, blueprints) for exact positioning of racks, ladder-rack, sleeves, etc.
- C. The following drawings form a portion of a larger project specification and in no way are intended to represent the entirety of the project requirements.

THIS DRAWING INDICATES THE PREFERRED LAYOUT FOR AN ER. ALTERNATIVE LAYOUTS ARE INDICATED IN LATER DRAWINGS, AND SHALL BE USED ONLY WHEN REQUIRED BY SPACE CONSTRAINTS (TYPICALLY IN MODERNIZED FACILITIES ONLY).



ORIENTATION OF RACKS OFF THE LEFT WALL HERE IS DIAGRAMMATIC. RACKS MAY BE INSTALLED OFF THE RIGHT WALL, BUT THE RACK ORDER MUST REVERSE (RACK ONE IS ALWAYS OFF A WALL).

**ER Design Notes:**

- 1) Rack fronts face the same direction, and are to be more visible from the doorway than the rear of the racks
- 2) Path to rear of racks must be easily accessible from the door
- 3) Server Rack must be adjacent to wall

MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
①	QuadRack Server Frame	CPI	15053-703	
②	CCS Combination Cabling Section, 7'	CPI	30163-703	
③	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
④	Cable Runway Standoff Kit, Black	CPI	31470-712	
⑤	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	
⑥	Cable Runway Elevation Kit, Rack, Black	CPI	10506-706	
	3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718	
⑦	Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718	

**NOTES**

1. The Contractor will install all components as shown.
2. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
3. Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

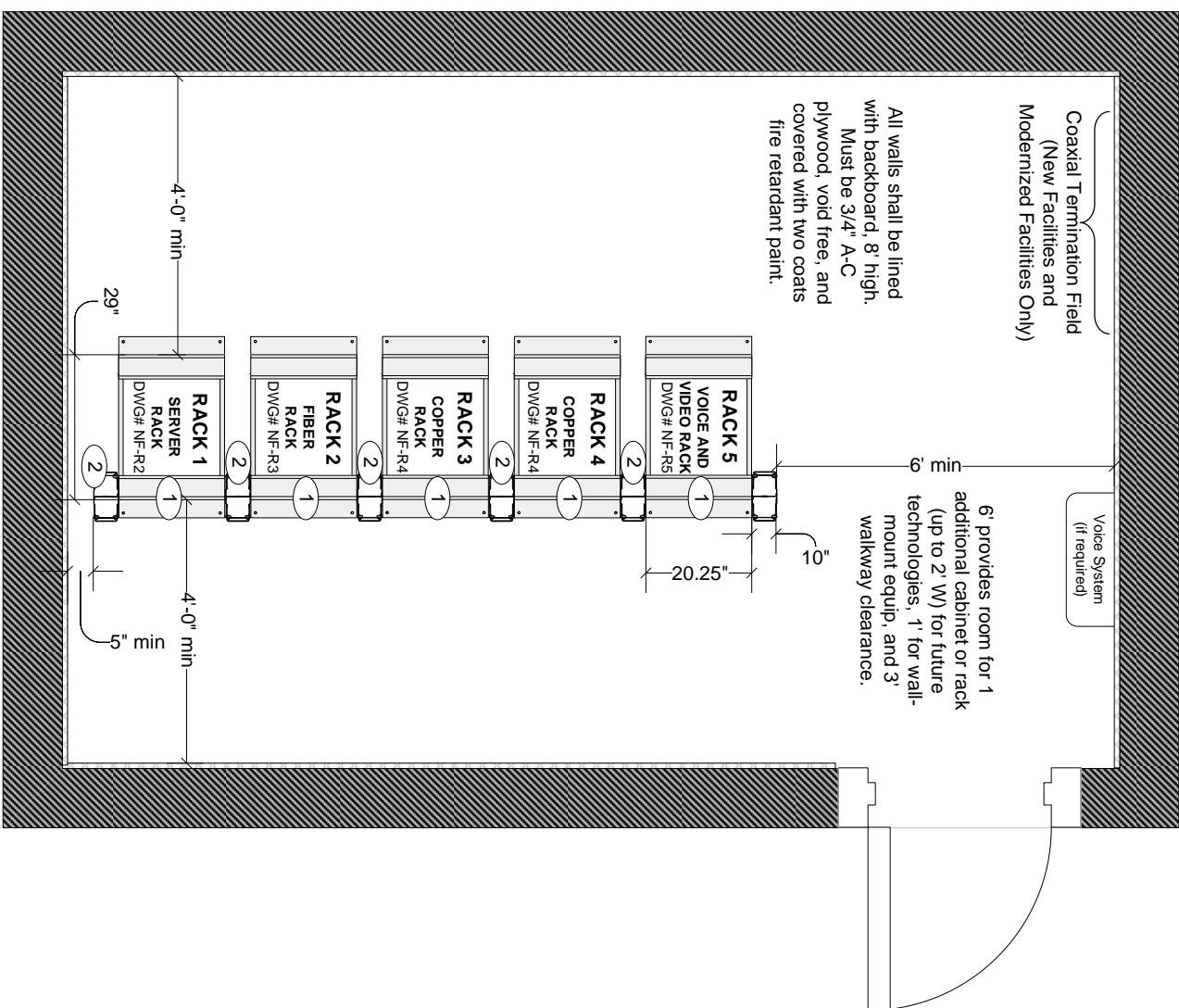


Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
ER		ER Layout (Rack Fronts)	
SCALE	NTS	JLC	DWG# NF-S1

Min ER Dimensions: 18' L X 10' W



ER Design Notes:

- 1) Rack fronts face the same direction, and are to be more visible from the doorway than the rear of the racks
- 2) Path to rear of racks must be easily accessible from the door
- 3) Server Rack must be adjacent to wall


MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	QuadraRack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7'	CPI	30163-703	

NOTES

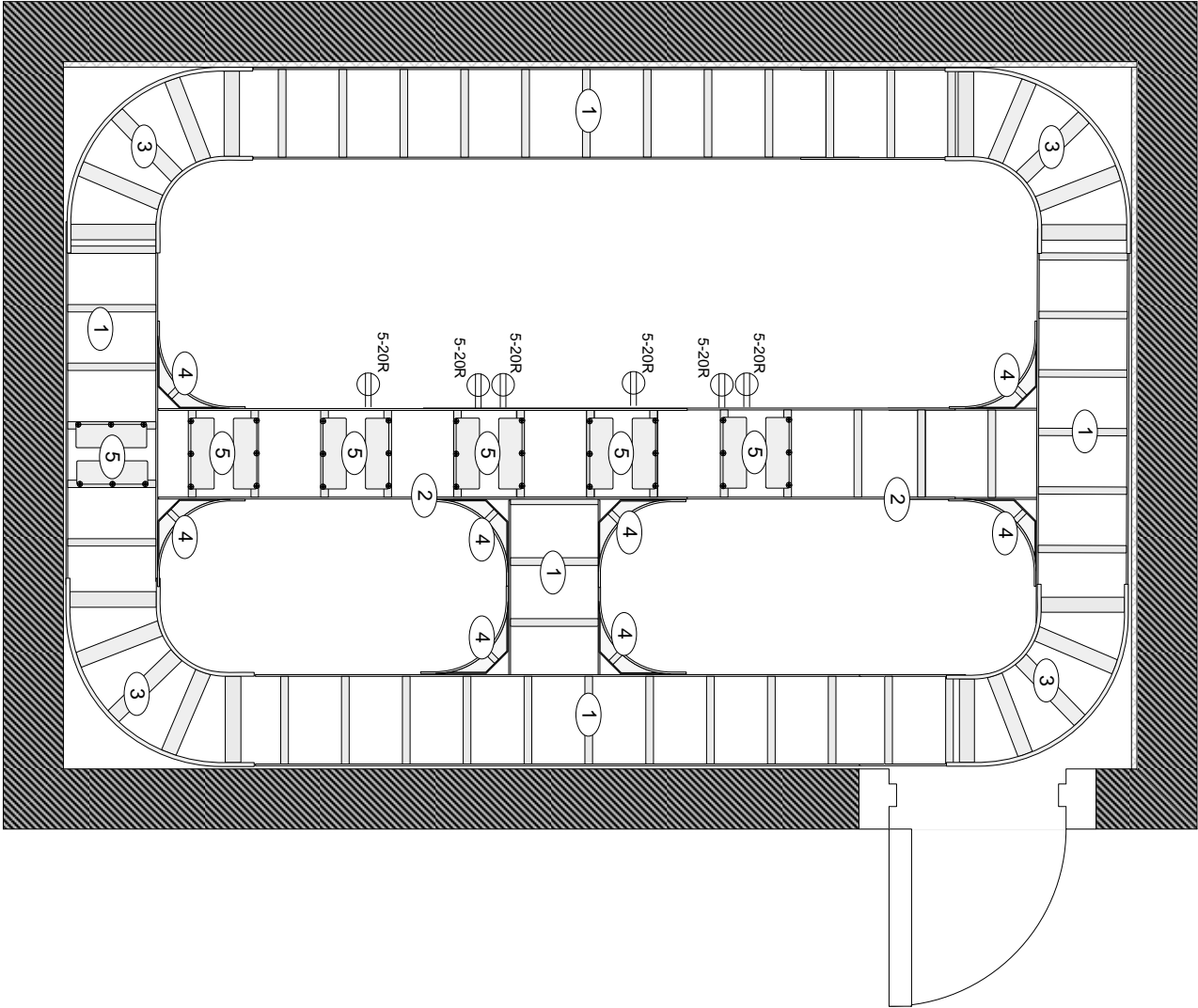
1. The Contractor will install all components as shown.
2. Additional Equipment (PA System, Floor-Mount UPS, etc.) are not factored into this design. Additional space is required should additional equipment be installed in the ER.
3. Consult with WCSD/IT for alternate configurations.
4. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
5. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

THIS DRAWING INDICATES THE PREFERRED LAYOUT FOR AN ER. ALTERNATIVE LAYOUTS ARE INDICATED IN LATER DRAWINGS, AND SHALL BE USED ONLY WHEN REQUIRED BY SPACE CONSTRAINTS (TYPICALLY IN MODERNIZED FACILITIES ONLY).

ORIENTATION OF RACKS OFF THE LEFT WALL HERE IS DIAGRAMMATIC. RACKS MAY BE INSTALLED OFF THE RIGHT WALL, BUT THE RACK ORDER MUST REVERSE (RACK ONE IS ALWAYS OFF A WALL).

		Washoe County School District Information Technology	
LOCATION <b>ER</b>		DWG TITLE <b>ER Layout (Overview)</b>	
SCALE NTS		JLC	DWG# NF-S2

THIS LADDER RACK CONFIGURATION MATCHES WITH THE RACK CONFIGURATION  
DEPICTED IN DWG NF-S2.



MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
①	Universal Cable Runway, 18" W, Black	CPI	10250-718	
②	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
③	Cable Runway E-Bend, 18" W, Black	CPI	10822-718	
④	Cable Runway Corner Bracket, 15" W, Black	CPI	11959-715	
⑤	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	

NOTES

1. The Contractor will install all components as shown, including power.
2. Power outlets will be mounted to the rear of the ladder rack, with receptacles facing the rear wall (away from rack fronts).
3. Use the following components as per manufacturer instructions to build a complete system:

Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701	
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701	
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718	
3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718	
Cable Runway Elevation Kit, Rack, Black	CPI	10506-706	
Cable Runway Ground Strap	CPI	40164-001	

4. Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
5. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

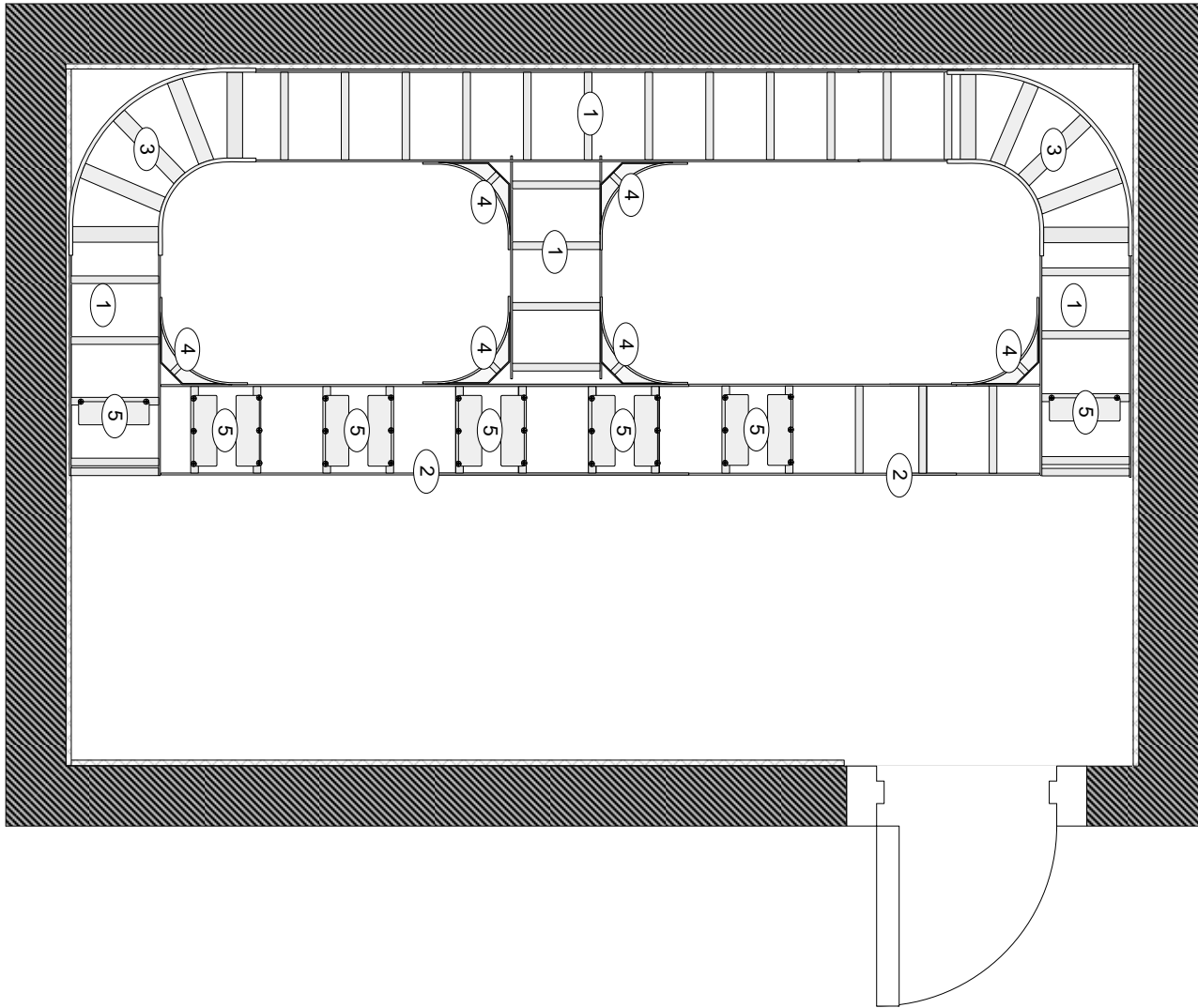


Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
ER	ER	JLC	DWG#
SCALE	NTS	NTS	NF-S3

THIS LADDER RACK CONFIGURATION MATCHES WITH THE RACK CONFIGURATION DEPICTED IN DWG NF-S2. UPPER LADDER RACK TO BE INSTALLED ON CABLE ENTRY SIDE OF ROOM.




MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	Universal Cable Runway, 18" W, Black	CPI	10250-718	
2	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
3	Cable Runway E-Bend, 18" W, Black	CPI	10822-718	
4	Cable Runway Corner Bracket, 15" W, Black	CPI	11959-715	
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	

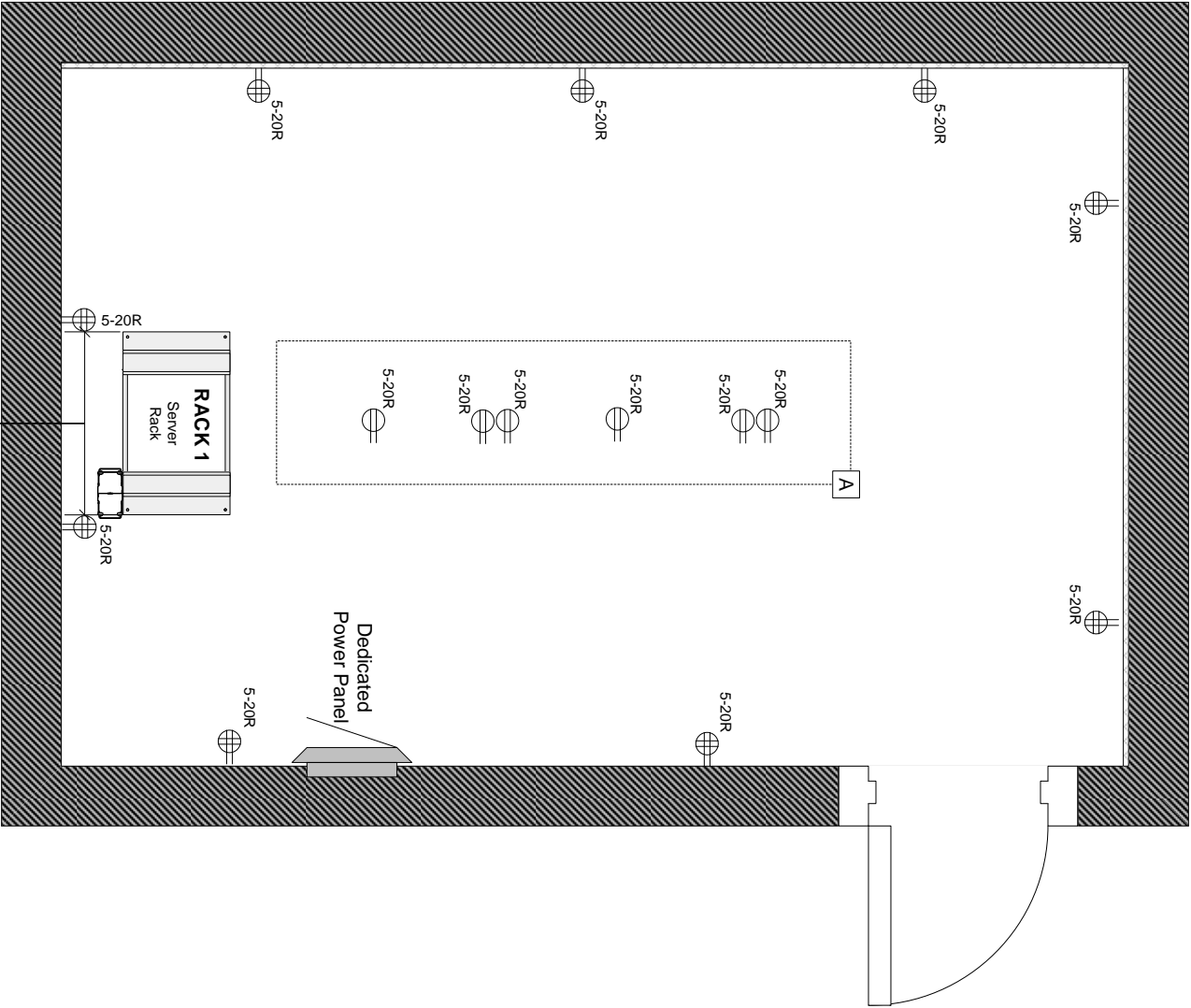
#### NOTES

- The Contractor will install all components as shown.
- Use the following components as per manufacturer instructions to build a complete system:

Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718
End Closing Kit, Cable Runway, 18" W, Black	CPI	11700-718
Cable Runway Standoff Kit, Black	CPI	31470-712
Wall Angle Support Kit, Cable Runway	CPI	11421-718
Cable Runway Ground Strap	CPI	40164-001

- Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

		Washoe County School District Information Technology	
PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES			
LOCATION	ER	DWG TITLE	ER Layout (Upper Ladder Rack)
SCALE	NTS	JLC	DWG# NF-S4





Install outlets directly in front of and behind leading edges of end rack.

**ER Design Notes:**

- 1) Walls shall be lined every six feet with quad 5-20R outlets.
- 2) Server Rack shall have an L6-30R outlet available immediately at its rear.
- 3) All racks installed against the wall shall have quad 5-20R outlets available both in front and at the rear.

**NOTES**

-  Duplex power outlet (5-20R).
-  Quad power outlet (5-20R).

**A** Outlets not directly off walls are attached to Lower Ladder Rack (see Project Drawing NF-S3). Each outlet not directly off a wall shall be fed from a dedicated circuit off the local power panel.

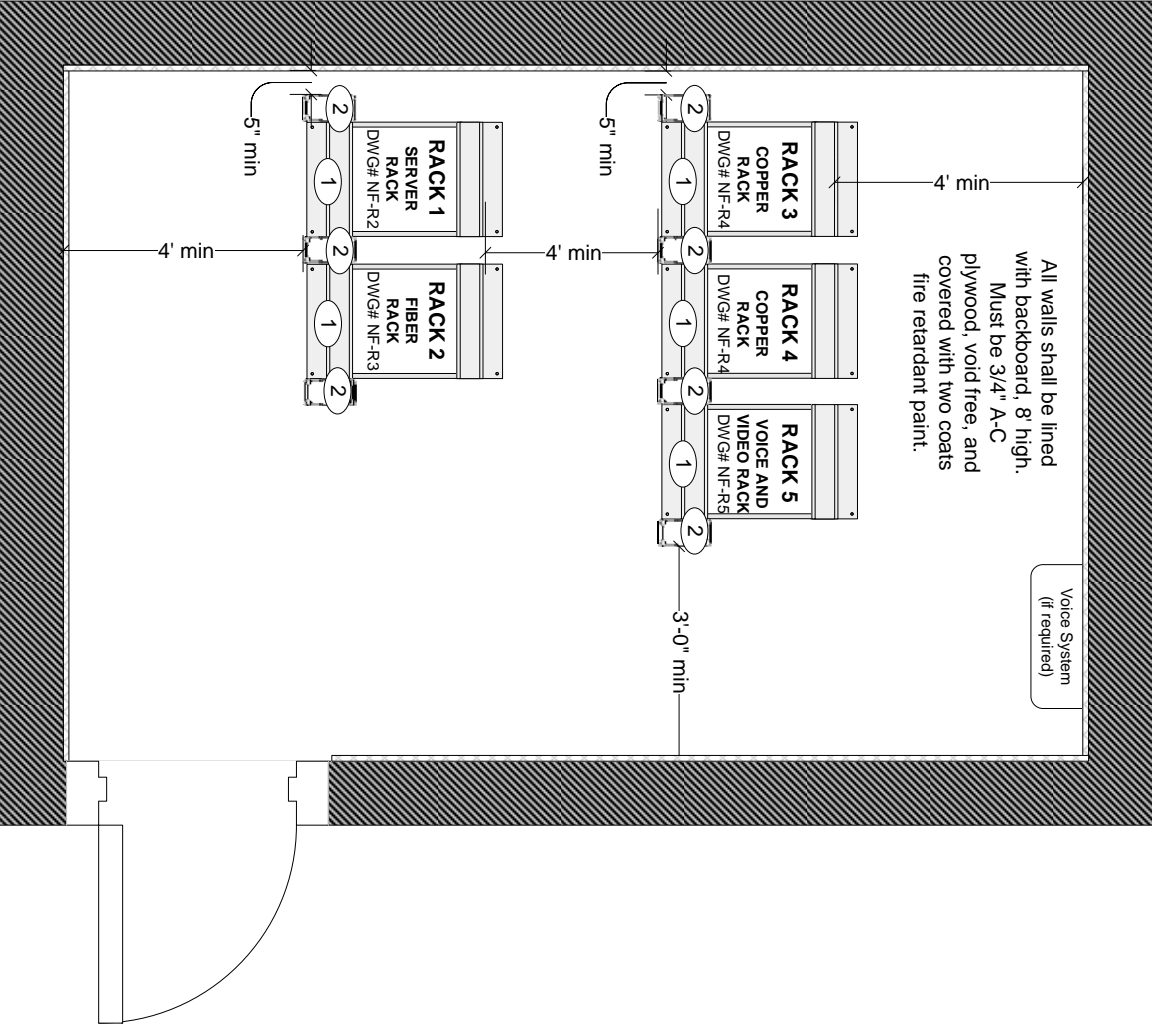
1. Each outlet installed on the wall at the rear of each end rack (L6-30R, and 5-20R) shall be fed from a dedicated circuit off the local power panel.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION	DWG TITLE		
ER	ER Layout (Power)		
SCALE	NTS	JLC	DWG# NF-S5



- ER Design Notes:**
- 1) Rack fronts face the same direction, and are to be more visible from the doorway than the rear of the racks
  - 2) Path to rear of racks must be easily accessible from the door
  - 3) Server Rack must be adjacent to wall

MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	QuadraRack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7'	CPI	30163-703	

NOTES

**NOTES**

- 1. The Contractor will install all components as shown.
- 2. Additional Equipment (P/A System, Floor-Mount UPS, etc.) are not factored into this design. Additional space is required should additional equipment be installed in the ER.
- 3. Consult with WCSD/IT for alternate configurations.
- 4. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
- 5. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

THIS DRAWING INDICATES AN ALTERNATIVE LAYOUTS TO THAT DEPICTED IN NF-S1 AND NF-S2. THIS LAYOUT SHALL BE USED ONLY WHEN REQUIRED BY SPACE CONSTRAINTS (TYPICALLY IN MODERNIZED FACILITIES ONLY). THIS LAYOUT SHALL BE PREFERRED OVER THAT DEPICTED IN NF-S2-A2.

ORIENTATION OF RACKS OFF THE LEFT WALL HERE IS DIAGRAMMATIC. RACKS MAY BE INSTALLED OFF THE RIGHT WALL, BUT THE RACK ORDER MUST REVERSE (RACKS ONE AND THREE SHALL BE OFF A WALL).

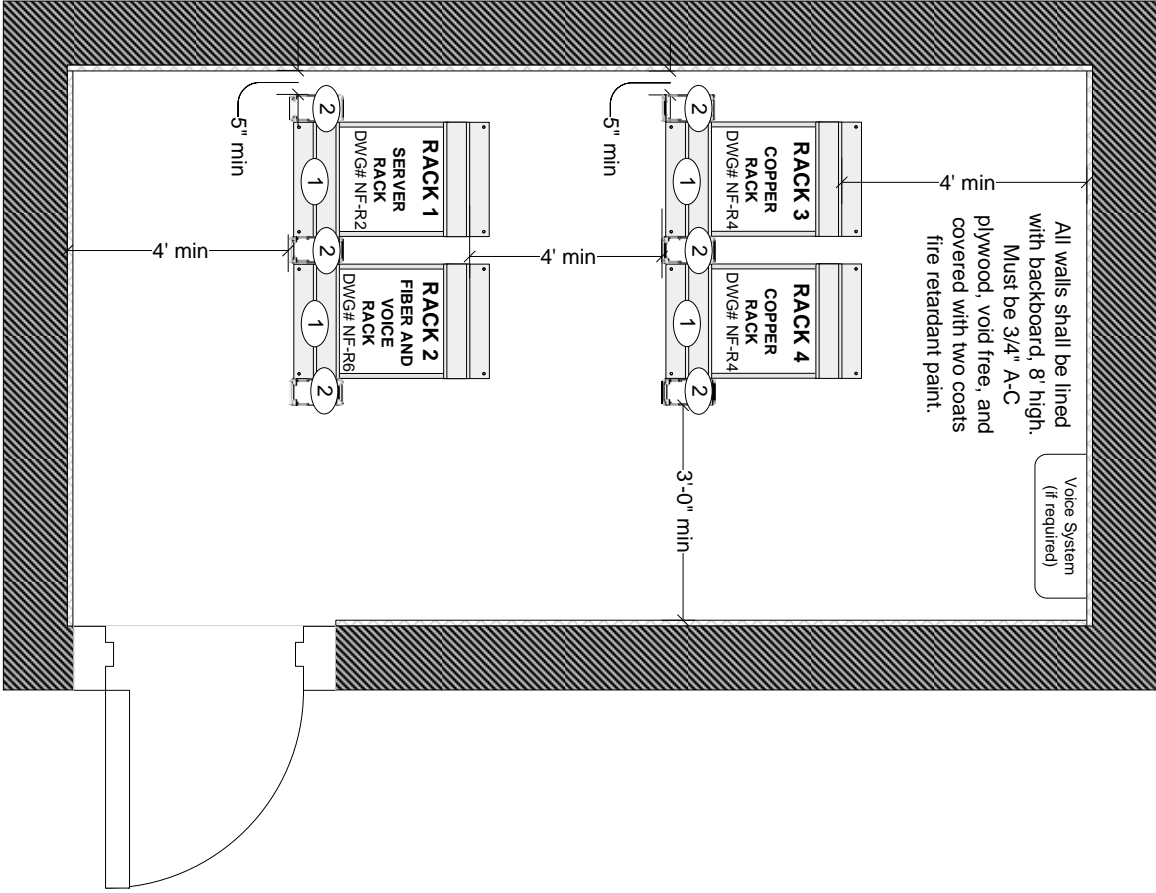


Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
ER	NTS	JLC	DWG# NF-S2-A1
SCALE		NTS	

THIS CONFIGURATION SHALL ONLY BE USED IN A FACILITY WITH A MAXIMUM OF ONE (1) FIBER MANAGER SHELF TO BE INSTALLED (REFER TO DWG NF-R6).



- ER Design Notes:**
- 1) Rack fronts face the same direction, and are to be more visible from the doorway than the rear of the racks
  - 2) Path to rear of racks must be easily accessible from the door
  - 3) Server Rack must be adjacent to wall


MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
①	QuadraRack Server Frame	CPI	15053-703	
②	CCS Combination Cabling Section, 7'	CPI	30163-703	
NOTES				

**NOTES**

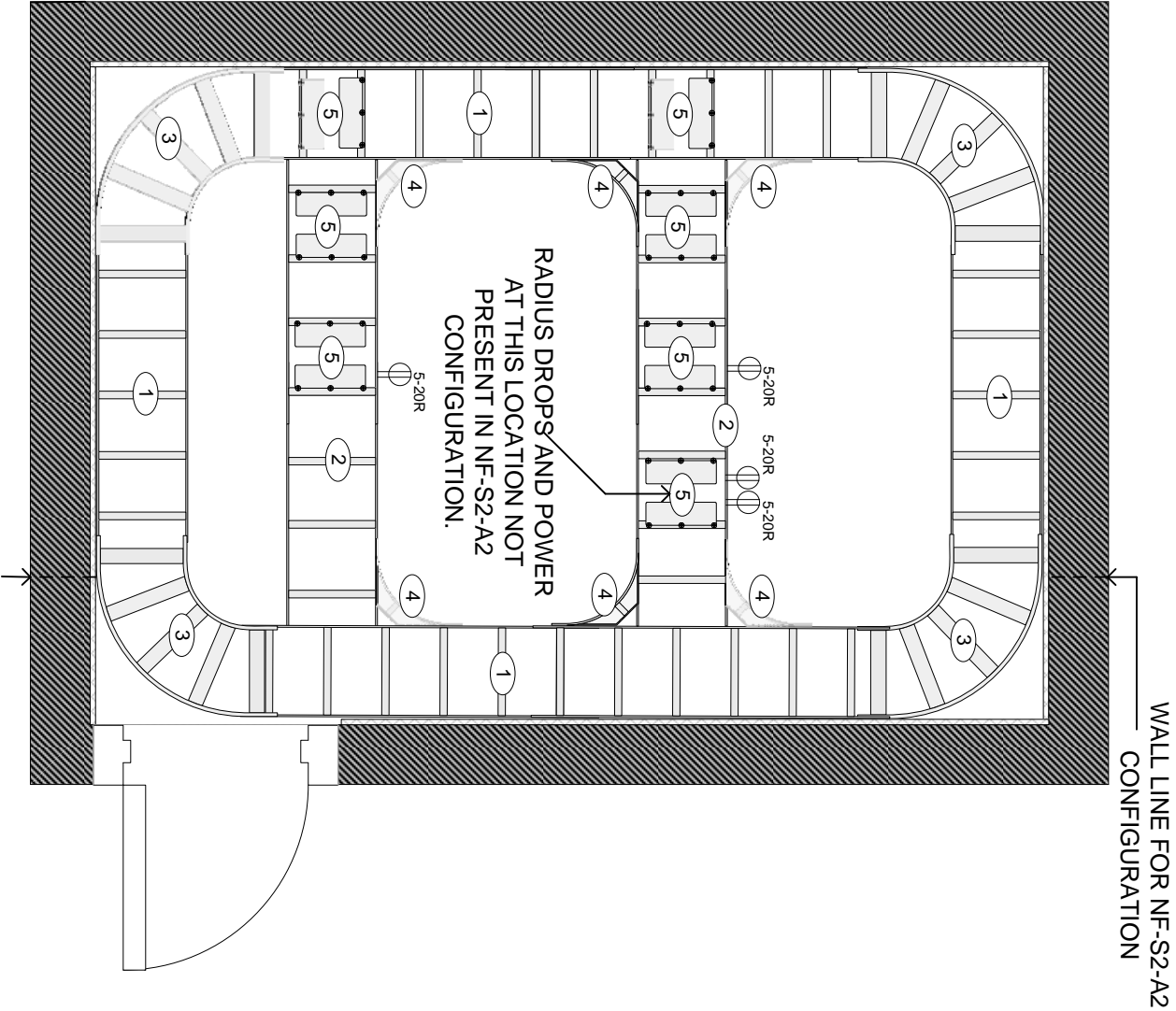
1. The Contractor will install all components as shown.
2. Additional Equipment (P/A System, Floor-Mount UPS, etc.) are not factored into this design. Additional space is required should additional equipment be installed in the ER.
3. Consult with WCSD/IT for alternate configurations.
4. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
5. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

THIS DRAWING INDICATES AN ALTERNATIVE LAYOUTS TO THAT DEPICTED IN NF-S1 AND NF-S2. THIS LAYOUT SHALL BE USED ONLY WHEN REQUIRED BY SPACE CONSTRAINTS (TYPICALLY IN MODERNIZED FACILITIES ONLY).

ORIENTATION OF RACKS OFF THE LEFT WALL HERE IS DIAGRAMMATIC. RACKS MAY BE INSTALLED OFF THE RIGHT WALL, BUT THE RACK ORDER MUST REVERSE (RACKS ONE AND THREE SHALL BE OFF A WALL).

		Washoe County School District Information Technology	
LOCATION <b>ER</b>		DWG TITLE <b>ER Layout (Overview) Alt 2</b>	
SCALE NTS		JLC	DWG# NF-S2-A2

THIS LADDER RACK CONFIGURATION MATCHES WITH THE RACK CONFIGURATION  
DEPICTED IN DWGS NF-S2-A1 AND NF-S2-A2.



MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	Universal Cable Runway, 18" W, Black	CPI	10250-718	
2	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
3	Cable Runway E-Bend, 18" W, Black	CPI	10822-718	
4	Cable Runway Corner Bracket, 15" W, Black	CPI	11959-715	
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	

NOTES

- The Contractor will install all components as shown, including power.
- Power outlets will be mounted to the rear of the ladder rack, with receptacles facing the rear wall (away from rack fronts).
- Use the following components as per manufacturer instructions to build a complete system:

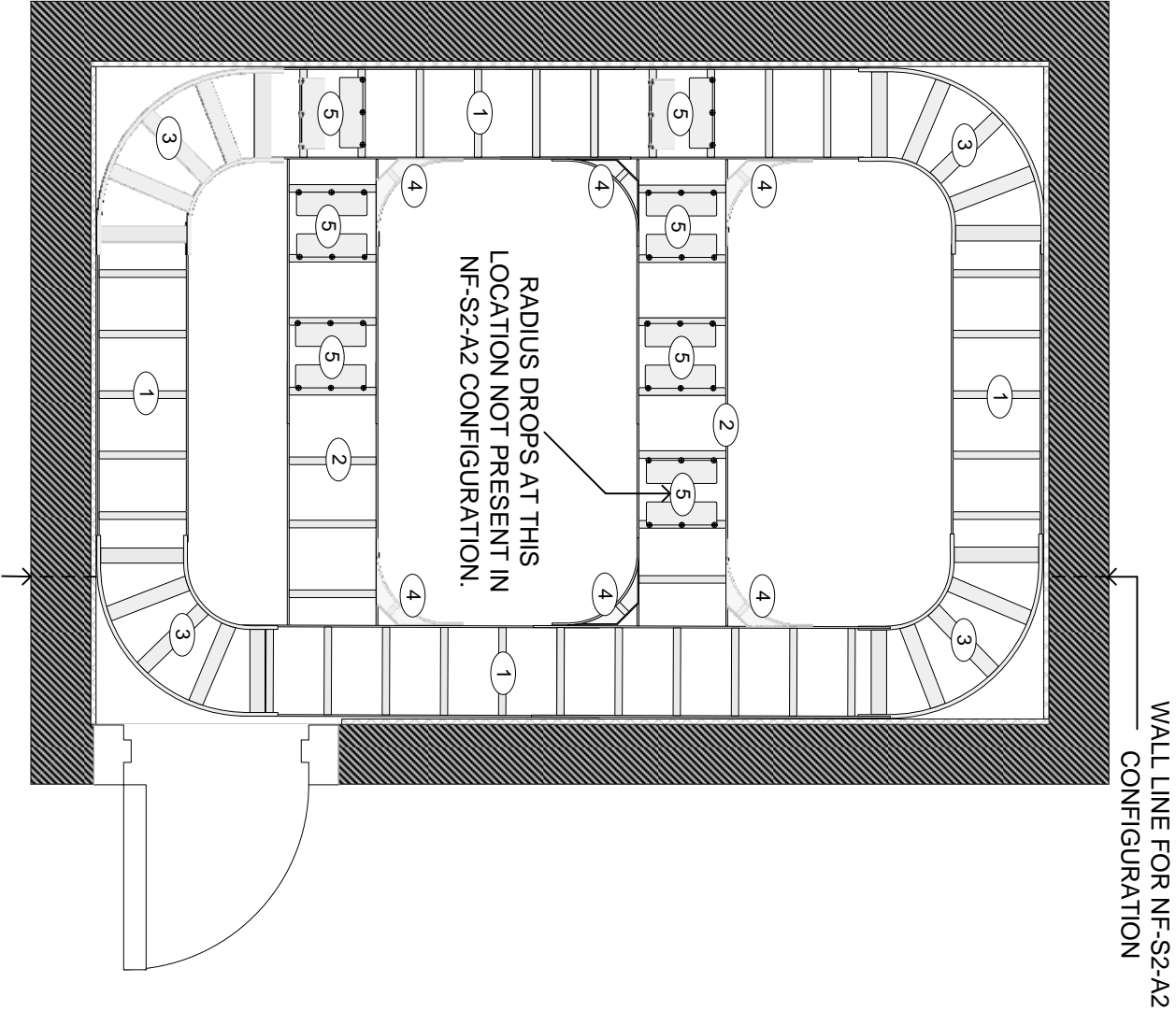
Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718
3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718
Cable Runway Elevation Kit, Rack, Black	CPI	10506-706
Cable Runway Ground Strap	CPI	40164-001
- Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology  
PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
ER		ER Layout (Lower Ladder Rack) Alt 1	
SCALE	NTS	JLC	DWG# NF-S3-A1

THIS LADDER RACK CONFIGURATION MATCHES WITH THE RACK CONFIGURATION  
DEPICTED IN DWGS NF-S2-A1 AND NF-S2-A2.



MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	Universal Cable Runway, 18" W, Black	CPI	10250-718	
2	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
3	Cable Runway E-Bend, 18" W, Black	CPI	10822-718	
4	Cable Runway Corner Bracket, 15" W, Black	CPI	11959-715	
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	

**NOTES**

- The Contractor will install all components as shown, including power.
- Power outlets will be mounted to the rear of the ladder rack, with receptacles pointing up.
- Use the following components as per manufacturer instructions to build a complete system:
 

Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718
3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718
Cable Runway Elevation Kit, Rack, Black	CPI	10506-706
Cable Runway Ground Strap	CPI	40164-001
- Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.





Washoe County School District  
Information Technology

**PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES**

LOCATION		DWG TITLE	
<b>ER</b>		<b>ER Layout (Upper Ladder Rack) Alt 1</b>	
SCALE	NTS	JLC	DWG# NF-S4-A1

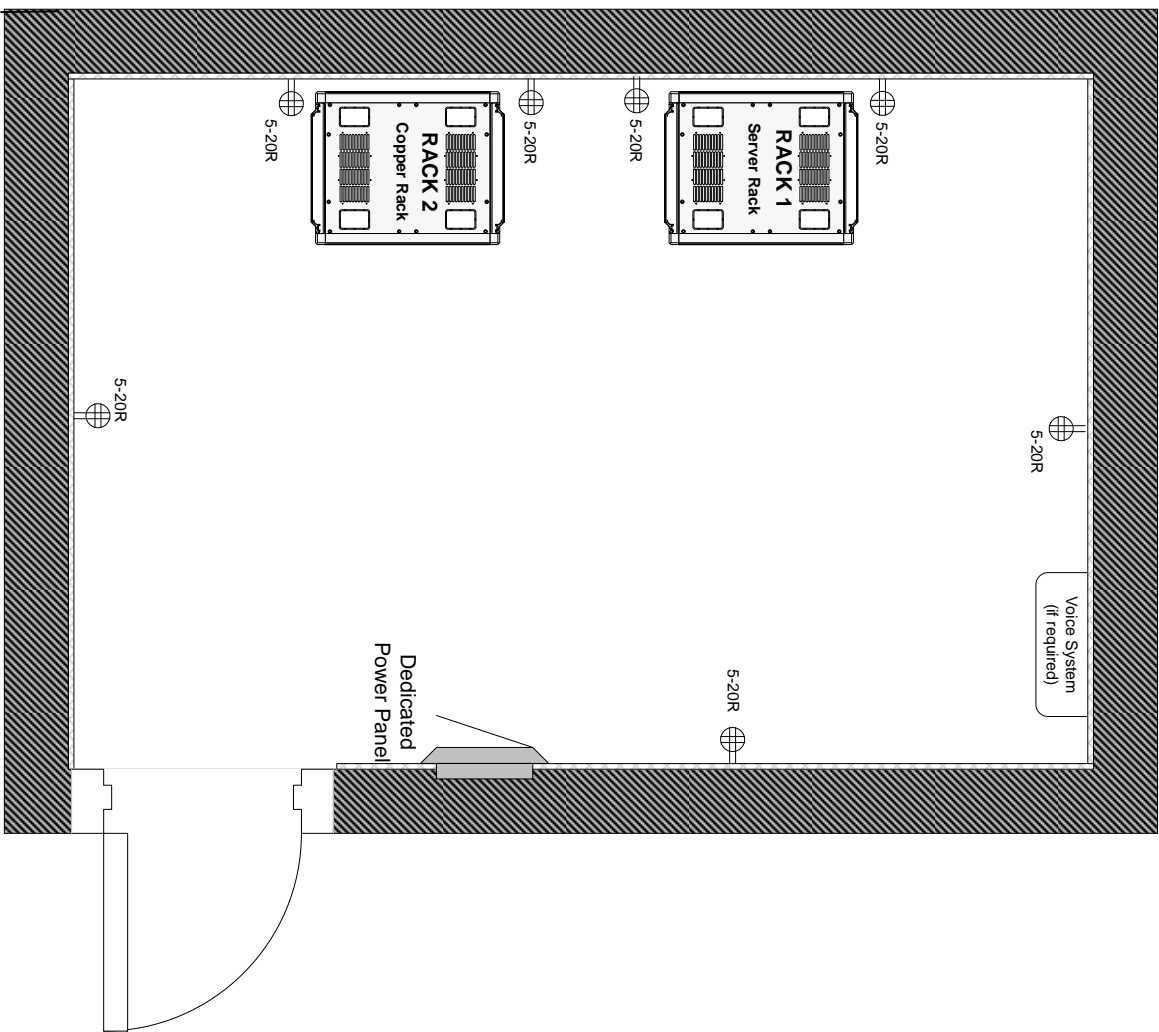
# NOTES

-  Duplex power outlet (5-20R).
-  Quad power outlet (5-20R).

**A**

Outlets not directly off walls are attached to Lower Ladder Rack (see Project Drawing NF-S3). Each outlet not directly off a wall shall be fed from a dedicated circuit off the local power panel.

1. Each outlet installed on the wall at the rear of each end rack (L6-30R, and 5-20R) shall be fed from a dedicated circuit off the local power panel.



## TR Design Notes:

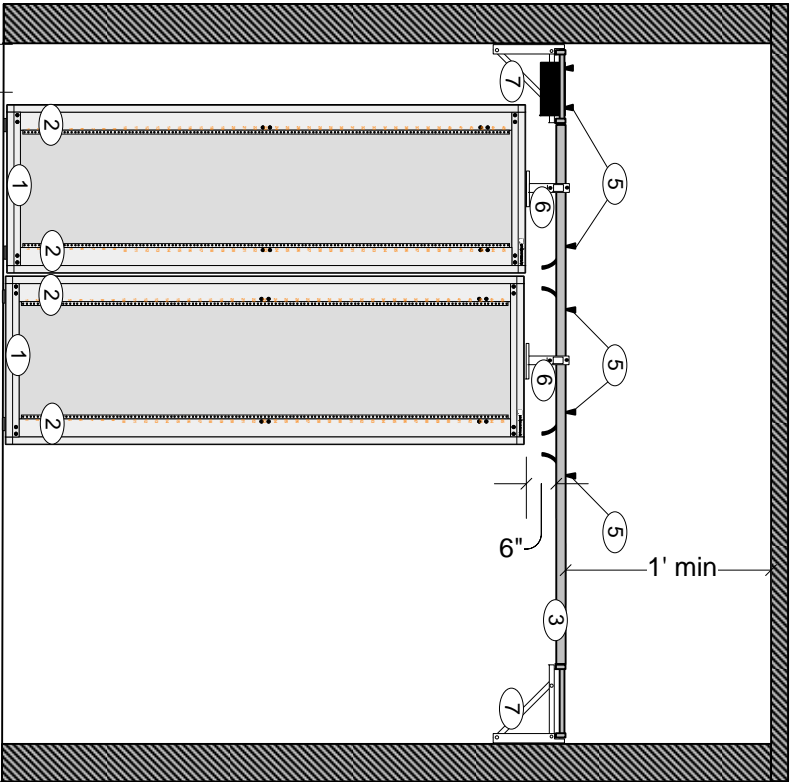
- 1) Walls shall be lined every six feet with quad 5-20R outlets.
- 2) Server Rack shall have an L6-30R outlet available immediately at its rear.
- 3) All racks installed against the wall shall have quad 5-20R outlets available both in front and at the rear.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES


LOCATION		DWG TITLE	
ER		ER Layout (Power) Alt 1	
SCALE	NTS	JLC	DWG# NF-S5-A1



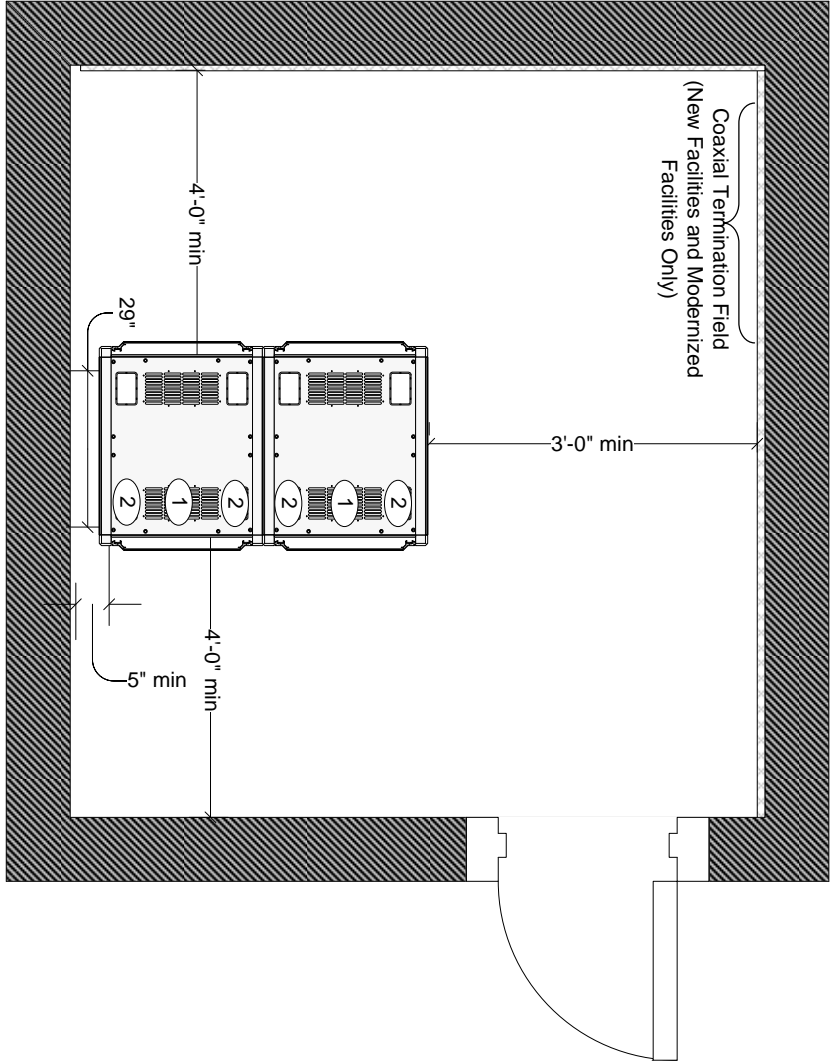
MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	CPI Megaframe Cabinet	CPI	M1033-741	
2	Vertical Cabling Ring Manager for Megaframe	CPI	12465-707	
3	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
4	Not Used			
5	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	
6	Cable Runway Elevation Kit, Rack, Black	CPI	10506-706	
	3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718	
7	Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718	

**NOTES**

1. The Contractor will install all components as shown.
2. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
3. Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

		Washoe County School District Information Technology	
PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES			
LOCATION	TR	DWG TITLE Alternate TR Layout (Rack Fronts)	
SCALE	NTS	JLC	DWG# NF-S6

**Min TR Dimensions:**  
**8' L X 10' W**




**TR Design Notes:**

- 1) Cabinet fronts face the same direction, and are to be more visible from the doorway than the rear of the cabinets.
- 2) Path to rear of cabinets must be easily accessible from the door

MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	CPI Megafame Cabinet	CPI	M1033-741	
2	Vertical Cabling Ring Manager for Megafame	CPI	12465-707	
NOTES				

1. The Contractor will install all components as shown.
2. Should annotated vertical or horizontal clearances not be possible due to physical constraints of the designated space, the Contractor shall immediately contact WCSD/IT for alternative specifications. Please note that deviations for specific locations may be annotated elsewhere in the Project Documents.
3. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

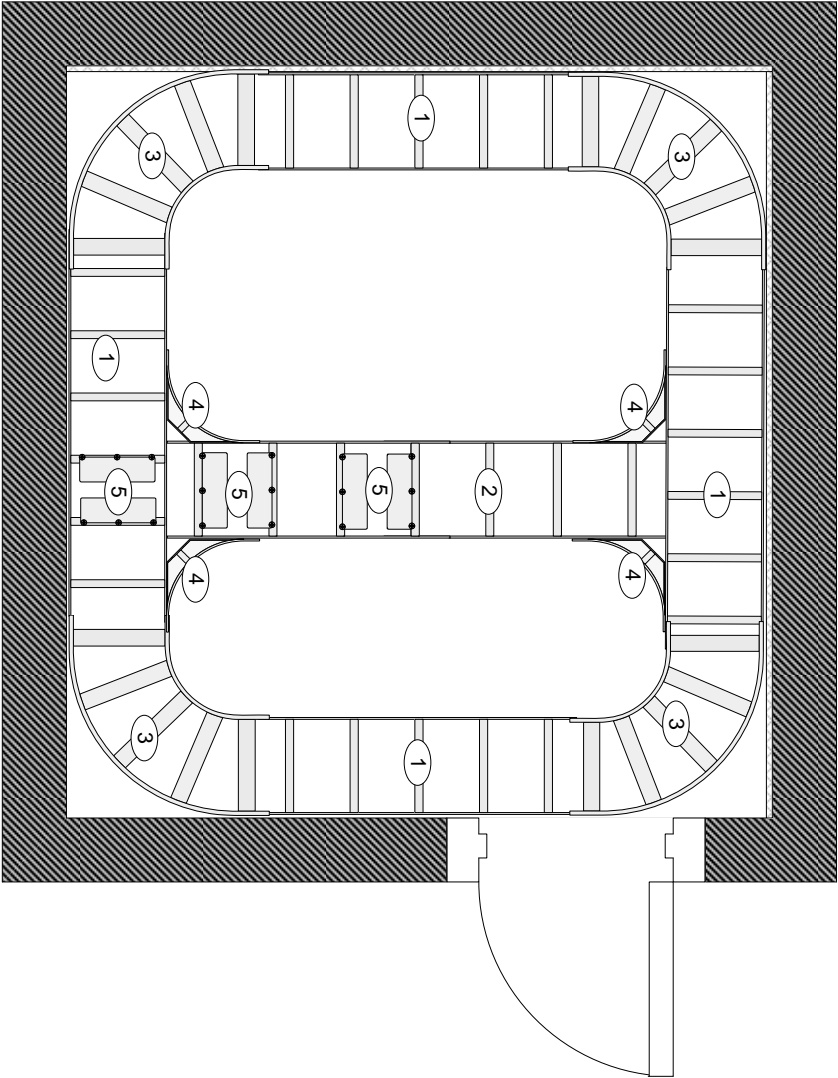
		Washoe County School District Information Technology	
LOCATION <b>TR</b>		DWG TITLE <b>Alternate TR Layout (Overview)</b>	
SCALE	NTS	JLC	DWG# NF-S7


MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
①	Universal Cable Runway, 18" W, Black	CPI	10250-718	
②	Alternate Space Cable Runway, 18" W, Black	CPI	31472-718	
③	Cable Runway E-Bend, 18" W, Black	CPI	10822-718	
④	Cable Runway Corner Bracket, 15" W, Black	CPI	11959-715	
⑤	Runway Radius Drop, Cross Member, 18" W, Black	CPI	12100-718	

NOTES

1. The Contractor will install all components as shown, including power.
2. Power outlets will be mounted to the rear of the ladder rack, with receptacles pointing up.
3. Use the following components as per manufacturer instructions to build a complete system:

Butt-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11301-701	34
Junction-Splice Kit 1 1/2" x 3/8" Stringer, Black	CPI	11302-701	35
Triangular Support Bracket, Steel, 18" W, Black	CPI	11746-718	36
3" Channel Rack-to-Runway Mounting Plate, 18" W, Black	CPI	10595-718	37
Cable Runway Elevation Kit, Rack, Black	CPI	10506-706	38
Cable Runway Ground Strap	CPI	40164-001	135
4. Triangular Support Brackets shall be installed every 48" for proper support of cable runway.
5. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.





Washoe County School District

Information Technology

PROJECT DRAWINGS FOR

NEW & MODERNIZED FACILITIES

LOCATION

TR

DWG TITLE

Standard TR Layout (Ladder Rack)

SCAL

E

NTS

JLC

DWG#

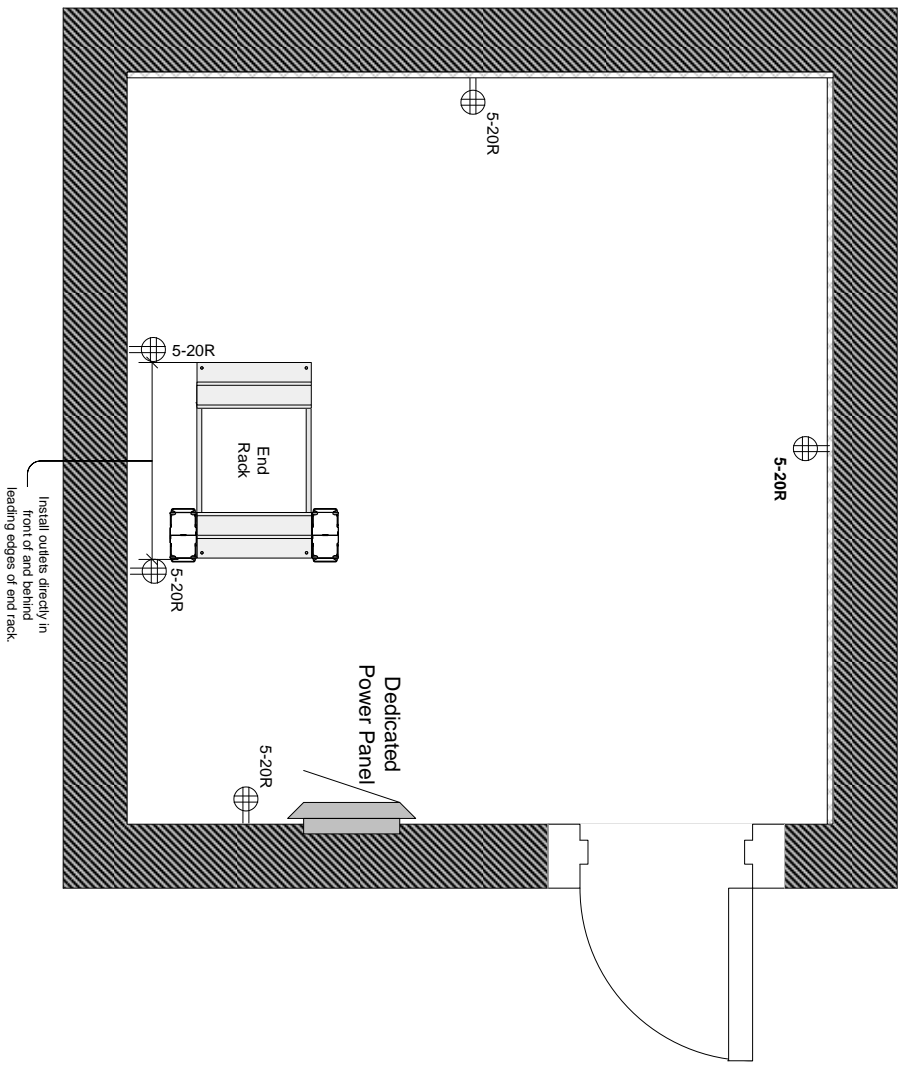
NF-S8

**NOTES**

⊕ Duplex power outlet (5-20R).

⊕ Quad power outlet (5-20R).

1. Each outlet installed on the wall at the rear of the end rack(s) shall be fed from a dedicated circuit off the local power panel.



**ER Design Notes:**

- 1) Walls shall be lined every six feet with quad 5-20R outlets.
- 3) The End Rack shall have quad 5-20R outlets available both in front and at the rear.

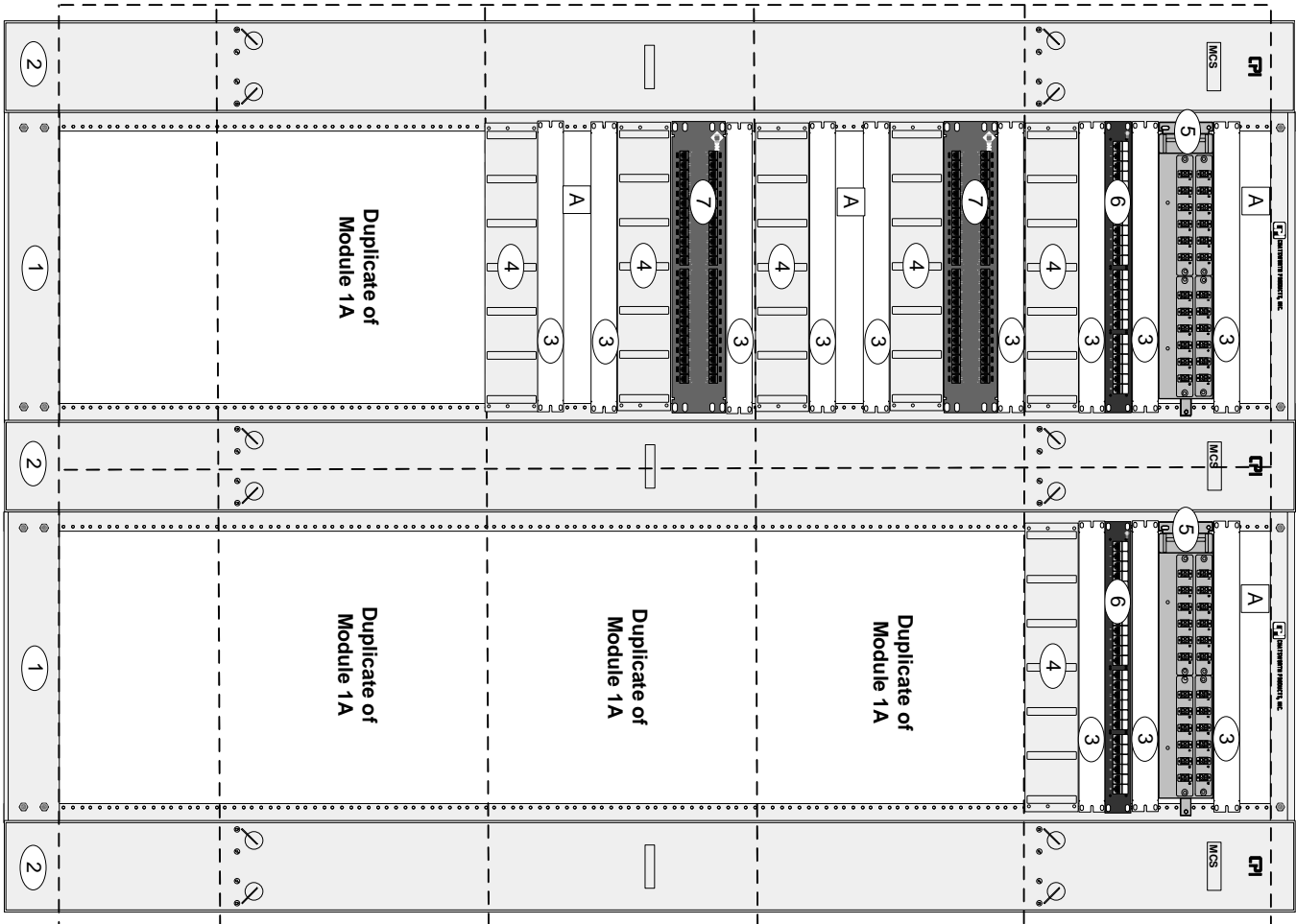


Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION	DWG TITLE		
TR	Standard TR Layout (Power)		
SCALE	NTS	JLC	DWG# NIF-S9

# TR (typical)



Backbone Module 2

Access Module 2

Access Module 2A

Access Module 2B

UPS Module 2

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	QuadraRack Server Frame	CPI	15063-703
2	CCS Combination Cabling Section, 7'	CPI	30163-703
3	Filler Panel, 1U, 19" W, Black	CPI	30024-701
4	Large Horizontal Ring Panel, Black	CPI	11564-719
5	Slip-on Cover	CPI	11764-719
6	FiberExpress ECX Panel, 2U, Black	BELDEN/CDT	ECX-02U
7	6 LC Duplex ECX Adapter Strip, MM	BELDEN/CDT	FF4X12LD
8	6 LC Duplex ECX Adapter Strip, SM	BELDEN/CDT	FFSXI2LD
9	Blank ECX Adapter Strip	BELDEN/CDT	FFZX00BB
10	PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258
11	Cable Tie Bar	BELDEN/CDT	AX101173
12	10GX RevConnect Patch Panel, 48-port	BELDEN/CDT	RYAAPF2U48BK

## NOTES

- Leave 1U space at **A**.
- Install (4) 6 LC Duplex ECX Adapter strips for mounting 12 & 6 strand Multimode and 12 & 6 strand singlmode cable terminations.
- Access Modules 1-2B shall be Cat6A RevConnect preloaded panels. One additional Access Module will be installed for future cables. For instance, if 88 Cat6A cables are to be installed, Access Modules 1A (48 cables), 1B (40 cables), and 2 (0 cables) will be installed.
- Terminate 25-pair Cat5e served from MC on ports 1-6 of **6** (one orphan pair (violet/slate) in 25-pair cable will not be terminated).
- The Contractor shall install all rack mount equipment using 12/24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 12/24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.

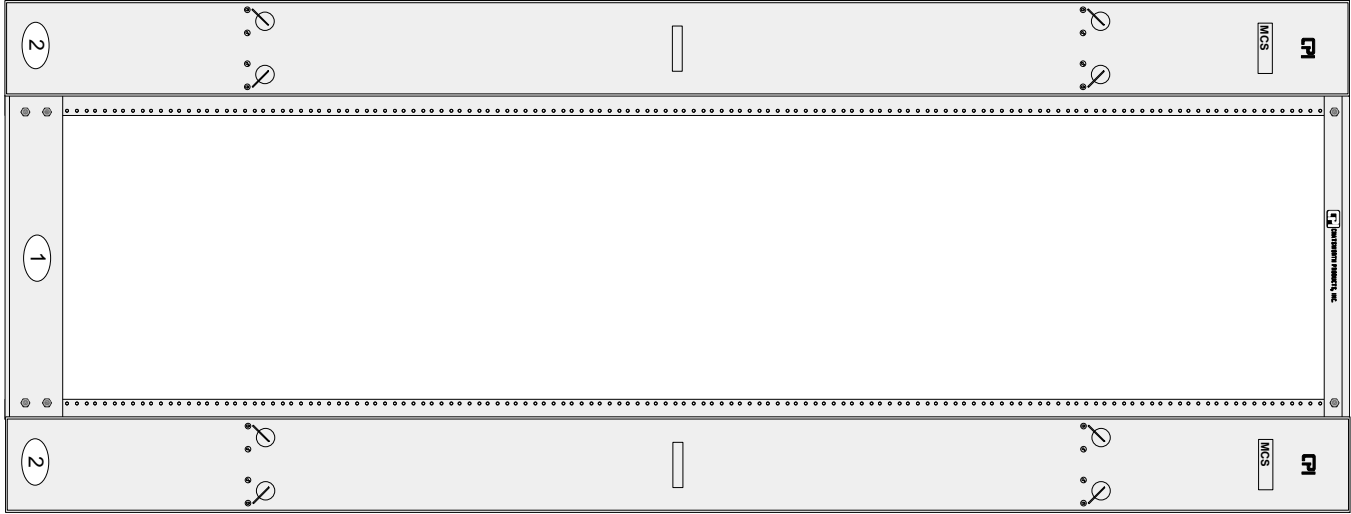


Washoe County School District  
Information Technology

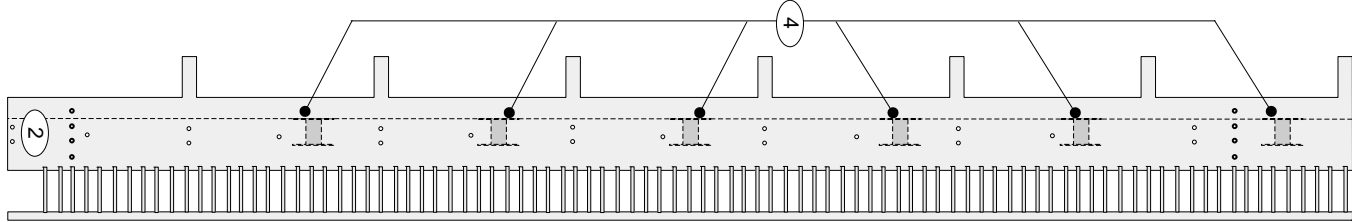
PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
TR		Standard TR Racks	
SCALE	NTS	JLC	DWG# NF-R1

ER SERVER RACK




SIDE VIEW, CCS COMBINATION CABLING SECTION



MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	QuadRack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7'	CPI	30163-703	
3	Large Horizontal Ring Panel, Black	CPI	11564-719	
4	Slip-on Cover	CPI	11764-719	
4	2" Diameter Fiber Mgmt Spools	CPI	12766-702	

NOTES

- Contractor will provide and install all items shown in drawing, unless otherwise indicated.
- The Contractor shall install all rack mount equipment using 12/24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 12/24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.
- Install a total of 12 Fiber Management Spools within the CCS Combination Cabling Sections (six Spools in each Section). Spools attach to the 2.5" pass-through holes in the CCS Combination Cabling Section. Use the top six pass-through holes, leaving the bottom one empty.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION  
**ER**

DWG TITLE  
**ER Server Rack**

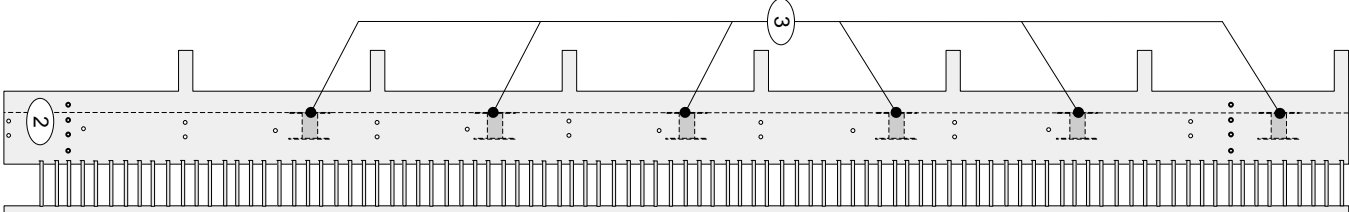
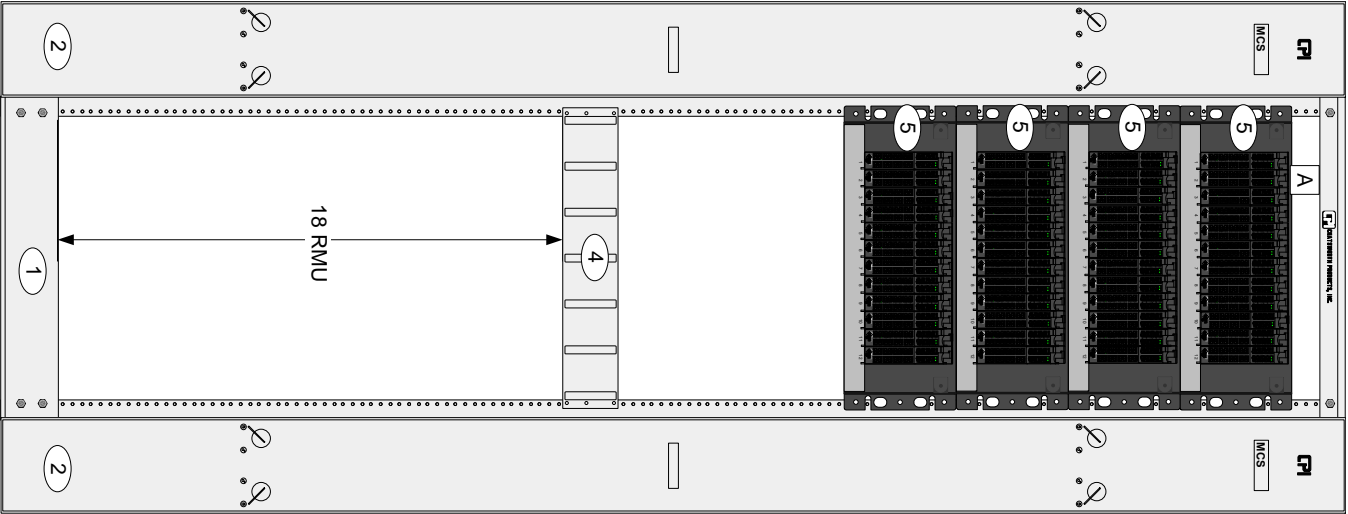
SCALE  
**NTS**

JLC

DWG#

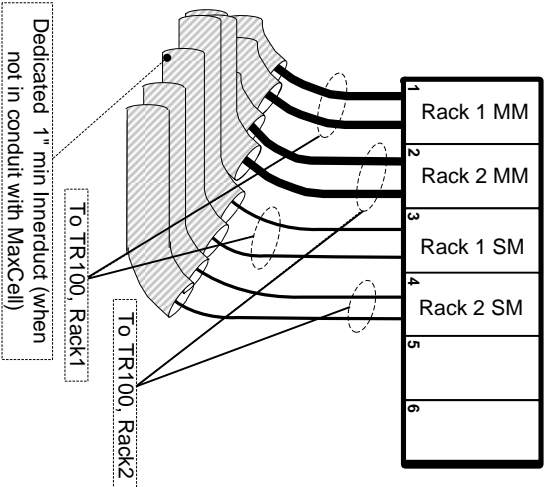
NF-R2

ER FIBER RACK



SIDE VIEW, CCS COMBINATION CABLING SECTION

Installation Detail:  
FiberExpress Cable  
Manager Shelf



Install cables to modules as indicated. All modules will be installed contiguously in alphanumeric order by destination TR and Rack, as indicated above.

6-strand cables feeding TEs will be mounted in 24F Modules (four cables per module). Group all Modules serving TEs together to be installed at the end of all TR Modules.

MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N	Ref
1	Quadrarack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7'	CPI	30163-703	
3	2" Diameter Fiber Mgmt Spools	CPI	12766-702	
4	Large Horizontal Ring Panel, Black	CPI	11564-719	
	Slip-on Cover	CPI	11764-719	
5	FiberExpress ECX Cable Manager Shelf	BEIDEN/CDT	ECX-04U	
	FiberExpress Manager Connector ECX Modules, 24F, LC Duplex, MM	BEIDEN/CDT	FF4X12LD	
	FiberExpress Manager Connector ECX Modules, 24F, LC Duplex, SM	BEIDEN/CDT	FFSX12LD	

NOTES

1. Leave 1U at A.
2. Contractor will provide and install all items shown in drawing, unless otherwise indicated.
3. Install a total of 12 Fiber Management Spools within the CCS Combination Cabling Sections (six Spools in each Section). Spools attach to the 2.5" pass-through holes in the CCS Combination Cabling Section. Use the top six pass-through holes, leaving the bottom one empty.
4. Install total number of FiberExpress Manager Shelves 5 required to accommodate total quantity of installed fiber.
5. The Contractor shall install all rack mount equipment using 12/24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 12/24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.
6. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

ER

DWG TITLE

ER Fiber Rack

SCALE

NTS

JLC

DWG#

NF-R3

## ER COPPER RACKS

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	QuadraRack Server Frame	CPI	15053-703
2	CCS Combination Cabling Section, 7'	CPI	30163-703
3	Filler Panel, 1U, 19" W, Black	CPI	30024-701
4	Large Horizontal Ring Panel, Black	CPI	11564-719
5	Slip-on Cover	CPI	11764-719
6	10GX RevConnect Patch Panel, 48-port	BEIDEN/CDT	RVAPPF2U48BK
7	Lockbox, 4U	Middle-Atlantic Products, Inc	LBX-4

### NOTES

- Leave 1U at A.
- Contractor will provide and install all items shown in drawing, unless otherwise indicated.
- Access Modules 1-2B shall be Cat6A RevConnect preloaded panels. Contractor to install all (6) modules.
- All UTP cabling terminated on 5 will be terminated and dressed as per manufacturer instructions
- For every installed 10GX patch panel, the Vendor will provide:
 

(4) Duplex Patch Cord, FX4000, 50u, LC - LC, 5 m	BEIDEN/CDT	FP4LDLD005MR2XA
--	------------	-----------------
- For every installed 10GX patch panel in breezeway design ERs, the Vendor will provide:
 

(4) Duplex Patch Cord, FX4000, 50u, LC - LC, 10 m	BEIDEN/CDT	FP4LDLD010MR2XA
---	------------	-----------------
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

ER

SCALE

DWG TITLE

ER Copper Racks

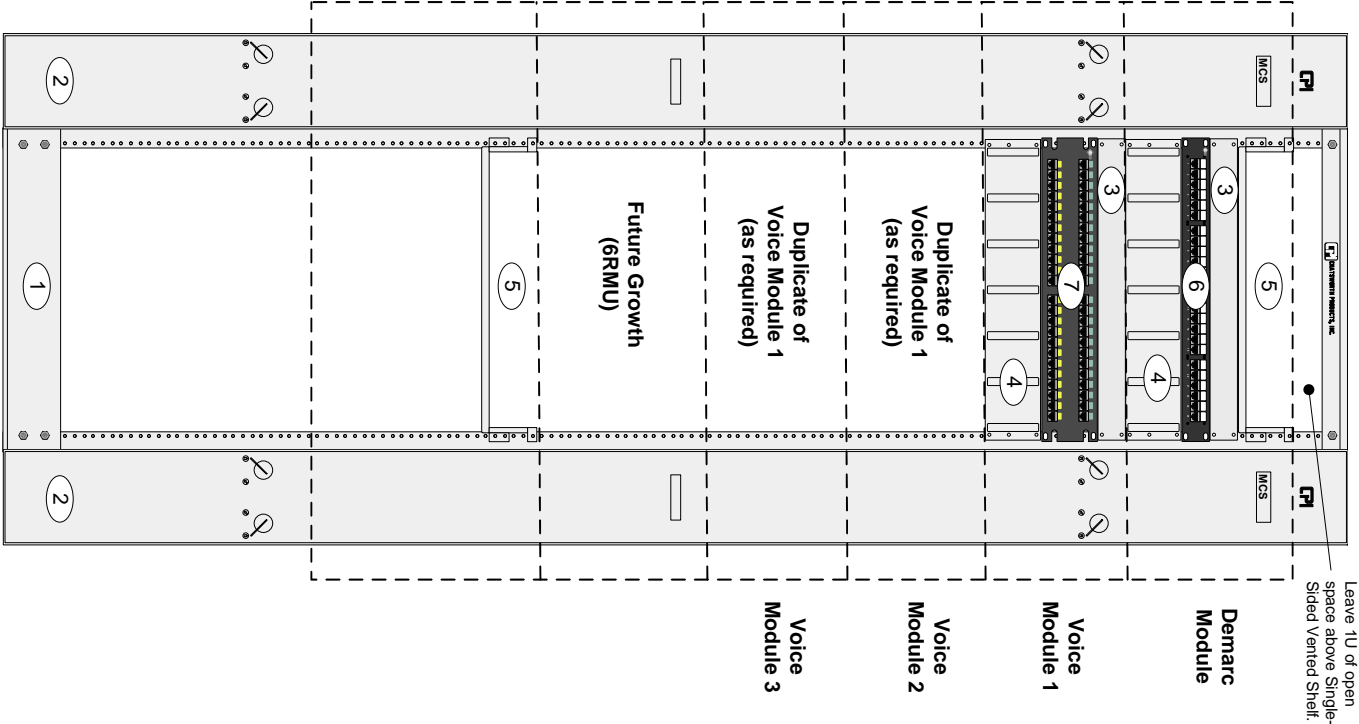
NTS

JLC

DWG#

NF-R4

ER VOICE & VIDEO RACK




Leave 1U of open space above Single-Sided Vented Shelf.

MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	QuadraRack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7'	CPI	30163-703	
3	Filler Panel, 1U, 19" W, Black	CPI	30024-701	
4	Large Horizontal Ring Panel, Black	CPI	11564-719	
5	Slip-on Cover	CPI	11764-719	
6	Single-Sided Vented Shelf, 19" W, Black	CPI	40117-719	
7	PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258	
8	PSSE HD-110 Patch Panel, 48-Port	BELDEN/CDT	AX103259	

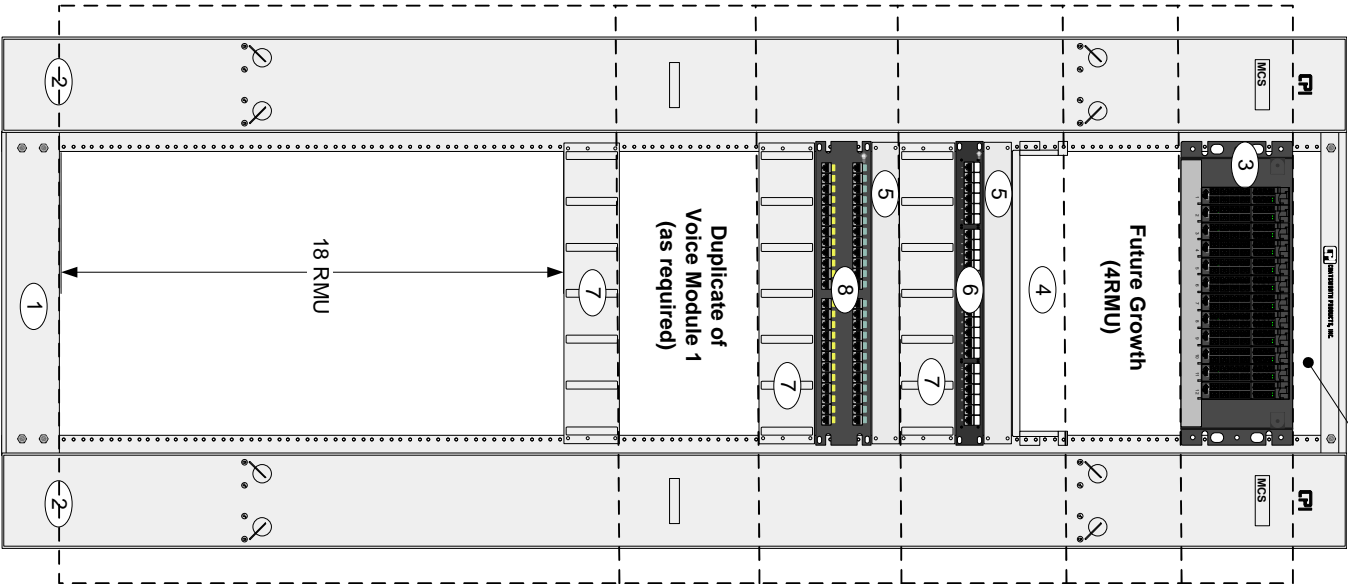
NOTES

1. (7) will be used to terminate 25-pair cabling feeding all HCs. Each 25-pair will terminate on six ports of each panel (7) (one orphan pair (violet/slate) in each 25-pair cable will not be terminated). Each panel (7) will support up to eight 25-pair cables.
2. Contractor will install a BELDEN/CDT 50-pair cable from a Contractor provided 110 block at the EF backboard (colocated with the Demarc) to a Contractor provided 110-block at the ER for analog connections. The Contractor shall additionally install a 50-pair cable from the ER 110-block to (6) Four orphan pairs (violet/slate) will not be terminated at (6).
3. The Contractor shall install all rack mount equipment using 12/24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 12/24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.
4. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

		Washoe County School District Information Technology	
LOCATION <b>ER</b>		DWG TITLE <b>ER Voice and Video Rack</b>	
SCALE NTS		JLC	DWG# NF-R5

ER FIBER AND VOICE RACK

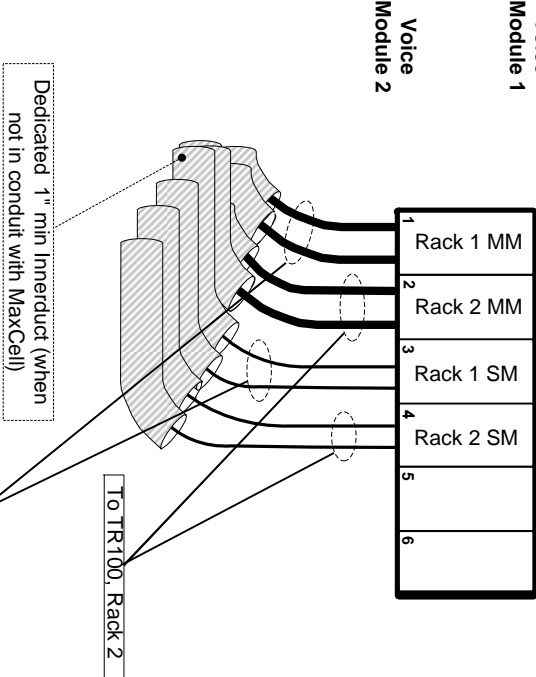
Leave 1U of open space at top of rack.



THIS CONFIGURATION CONSISTS OF ONLY ONE (1) FIBER MANAGER SHELF TO BE INSTALLED AT INITIAL BUILD OUT AND CORRESPONDS TO THE RACK LAYOUT DEPICTED IN DRAWING NF-S2-A2 ONLY.

WHEN USING THIS CONFIGURATION, DO NOT USE THE CONFIGURATIONS DEPICTED IN NF-R3 AND NF-R5.

Installation Detail:  
FiberExpress Cable  
Manager Shelf



Install cables to modules as indicated. All modules will be installed contiguously in alphanumeric order by destination TR and Rack, as indicated above.

6-strand cables feeding TEs will be mounted in 24F ECX Modules (four cables per module). Group all ECX Modules serving TEs together to be installed at the end of all TR Modules.

MATERIAL SPECIFICATIONS				
#	Description	Mfr	P/N	Ref
1	QuadraraRack Server Frame	CPI	15053-703	
2	CCS Combination Cabling Section, 7	CPI	30163-703	
3	FiberExpress ECX Cable Manager Shelf	BELDEN/CDT	ECX-04U	
	FiberExpress Manager Connector	BELDEN/CDT	FF4X12LD	
	ECX Modules, 24F, LC Duplex, 1MM	BELDEN/CDT	FFS4X12LD	
	FiberExpress Manager Connector	BELDEN/CDT	FFS4X12LD	
	ECX Modules, 24F, LC Duplex, SM	BELDEN/CDT	FFS4X12LD	
4	Single-Sided Vented Shelf, 19" W, Black	CPI	40117-719	
5	Filler Panel, 1U, 19" W, Black	CPI	30024-701	
6	PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258	
7	Large Horizontal Ring Panel, Black	CPI	11564-719	
	Slip-on Cover	CPI	11764-719	
8	PSSE HD-110 Patch Panel, 48-Port	BELDEN/CDT	AX103259	

NOTES

- Contractor will provide and install all items shown in drawing, unless otherwise indicated.
- 8 will be used to terminate 25-pair cabling feeding all HCs. Each 25-pair will terminate on six ports of each panel 8 (one orphan pair (violet/slate) in each 25-pair cable will not be terminated). Each panel 8 will support up to eight 25-pair cables.
- Contractor will install a BELDEN/CDT 50-pair cable from 6 to a Contractor provided 110-block at the SBC demarc for analog connections. Four orphan pairs (violet/slate) will not be terminated at 6.
- Install total number of FiberExpress Manager Shelves 3 required to accommodate total quantity of installed fiber.
- The Contractor shall install all rack mount equipment using 12/24 screws and cage nuts. The Contractor shall also supply a total of 50 spare 12/24 screws and cage nuts per installed Server Frame rack. The spares shall be provided in a sealed bag labeled "Spare HW" and shall be taped to the top of each installed server frame using painters tape.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

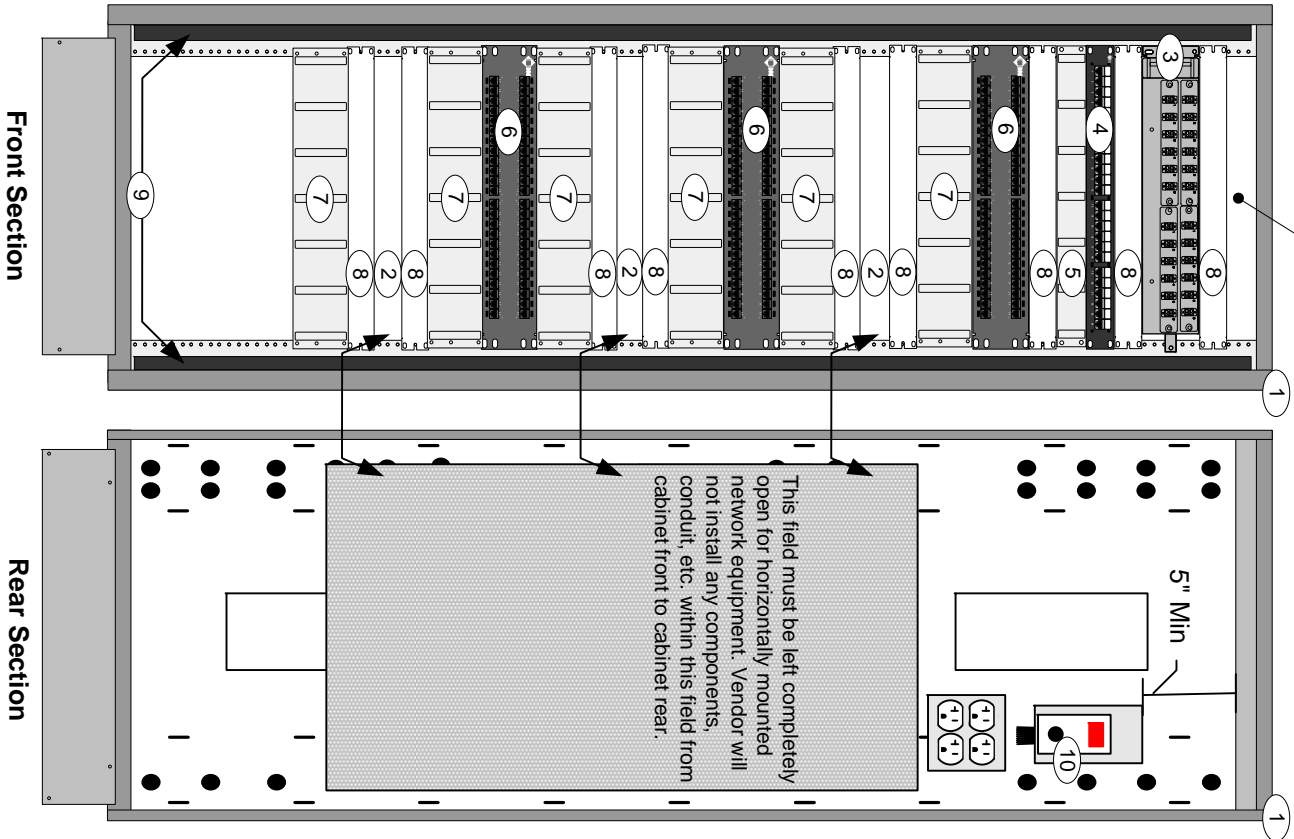
11/14/18

LOCATION		DWG TITLE	
ER	NTS	JLC	DWG#
ER	NTS	JLC	DWG#
ER	NTS	JLC	DWG#

WCSD-SCS-014

Page 96

Leave 1U of open space at top of rack.



**DESIGN NOTE:**  
This cabinet configuration is designed to serve up to two adjacent computer labs or a small building requiring less than 144 horizontal cables.

#### ELECTRICAL NOTES

1. The Contractor will install one quad power outlet fed from a dedicated circuit as shown. The left two outlets shall be clearly labeled "T-stat" using a Brady P/N X-29-422.
2. The Contractor shall install the Line Thermostat and electrical outlet on the non-hinged side of the cabinet. The Line Thermostat shall be wired so as to apply power to the left two outlets of the Contractor-installed quad power outlet when the temp. within the TE exceeds 90 deg. F. This shall apply power to the fan at 90 deg. F.
3. All Contractor-installed power within the Enclosure will be installed within metallic flex conduit, and will be routed along the walls of the Enclosure (left, right, top, or bottom), and secured to the rear section of the Enclosure. Contact WCSD/IT for sample electrical installation pictures.

#### MATERIAL SPECIFICATIONS

#	Description	Mfr	P/N
1	Cube-IT PLUS Cabinet, 72" H, 30" D, Metal Door	CPI	13493-772
2	Cube-IT Fan Kit	CPI	12804-701
3	FiberExpress ECX Panel, 2U, Black	BELDEN/CDT	ECX-02U
6 LC Duplex ECX Adapter Strip, MM	BELDEN/CDT	FF4X12LD	
6 LC Duplex ECX Adapter Strip, SM	BELDEN/CDT	FFSXI2LD	
Blank ECX Adapter Strip	BELDEN/CDT	FFZX00BB	
PSSE HD-110 Patch Panel, 24-Port	BELDEN/CDT	AX103258	
4	Rack Cabling Manager, 1U, Black	CPI	11752-719
5	10GX RevConnect Patch Panel, 48-port	BELDEN/CDT	RVAPPF2U48BK
6	Large Horizontal Ring Panel, Black	CPI	11564-719
7	Slip-on Cover	CPI	11764-719
8	Filler Panel, 1U, 19"W, Black	CPI	30024-701
9	Cube-IT Vertical Cable Manager, 72" H	CPI	13485-772
10	Line Thermostat	DAYTON	4LZ94

#### NOTES

1. Install (4) 6 LC Duplex ECX Adapter strips for mounting 12 & 6 strand Multimode and 12 & 6 strand singlmode cable terminations.
2. All UTP cabling will be terminated and dressed as per manufacturer instructions.
3. Terminate 25-pair Cat5e served from MC on ports 1-6 of PSSE patch panel (one orphan pair (violet/slate) in 25-pair cable will not be terminated).
4. The Cube-IT cabinet shall typically be installed to hinges on the left-hand side. It shall be placed in a location which permits full opening of both the front door and front section without obstruction. Verify final placement with WCSD/IT prior to installation.
5. TE doors will be properly labeled as indicated in General Labeling Requirements in section 1 of this document.
6. Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

N/A

DWG TITLE

Wall-Mount TE

SCALE

NTS

JLC

DWG#

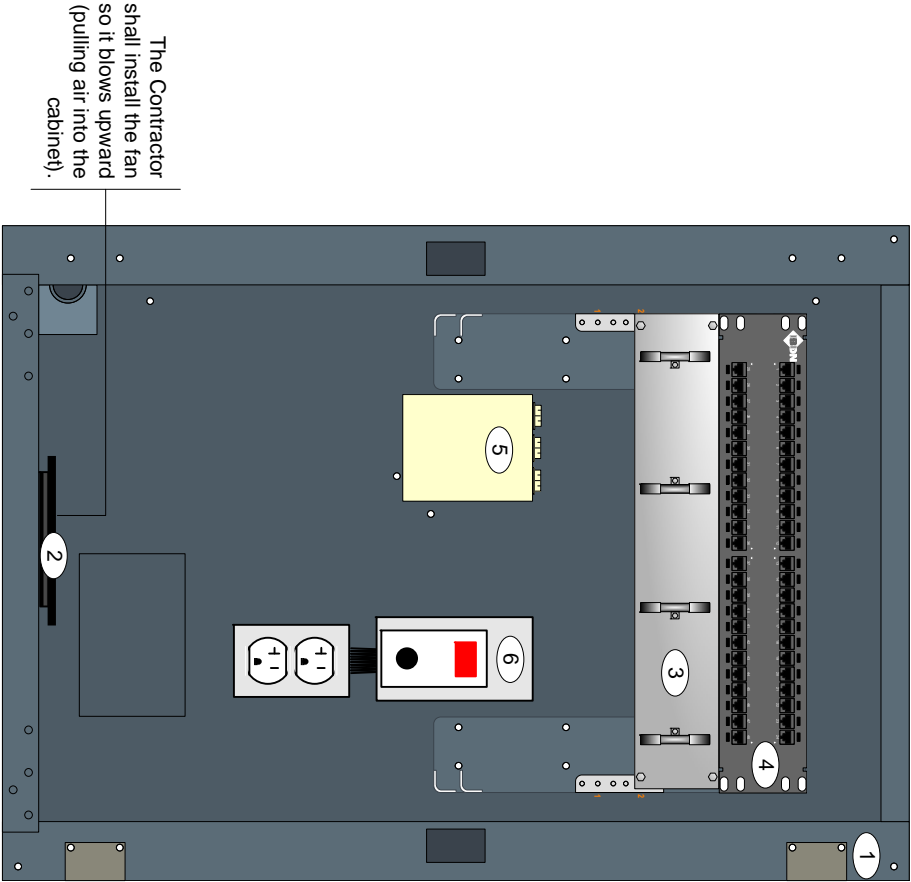
NF-R7

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Vertical On-Wall Enclosure	CPI	13050-223
2	Fan Kit	CPI	13051-001
3	Organizer Ring Panel	BELDEN/CDT	AO403977
4	Cat6A RevConnect Patch Panel, 48-Port	BELDEN/CDT	RVAPPF2U48BK
5	Multimedia Outlet Box, White	BELDEN/CDT	AO643207
	LC Duplex Adapter, MM	BELDEN/CDT	AX102211
	LC Duplex Adapter, SM	BELDEN/CDT	AX102215
6	Line Thermostat	DAYTON	4LZ94
7	Not Used		

NOTES

- The Contractor will install one duplex, single-gang power outlet fed from a dedicated circuit as shown. The top outlet shall be clearly labeled "T-stat" using a Brady P/N X-29-422.
- The Contractor shall install the Line Thermostat directly above the single-gang power outlet as shown. The Line Thermostat shall be installed so as to apply power to the top outlet of the Contractor-installed duplex power outlet when the temperature within the TE exceeds 90 degrees F. This shall apply power to the fan at 90 deg. F.
- All Contractor-installed power within the Enclosure will be installed within metallic flex conduit, and will be routed along the walls of the enclosure (left, right, top, or bottom), and secured to the rear of the enclosure.
- Installed systems shall be grounded as per ANSI/TIA/EIA-607-A.

The Contractor shall install the Line Thermostat and electrical outlet on the non-hinged side of the cabinet. The Line Thermostat shall be wired so as to apply power to the left two outlets of the Contractor-installed quad power outlet when the temp. within the TE exceeds 90 deg. F. This shall apply power to the fan at 90 deg. F.




Installation Note:

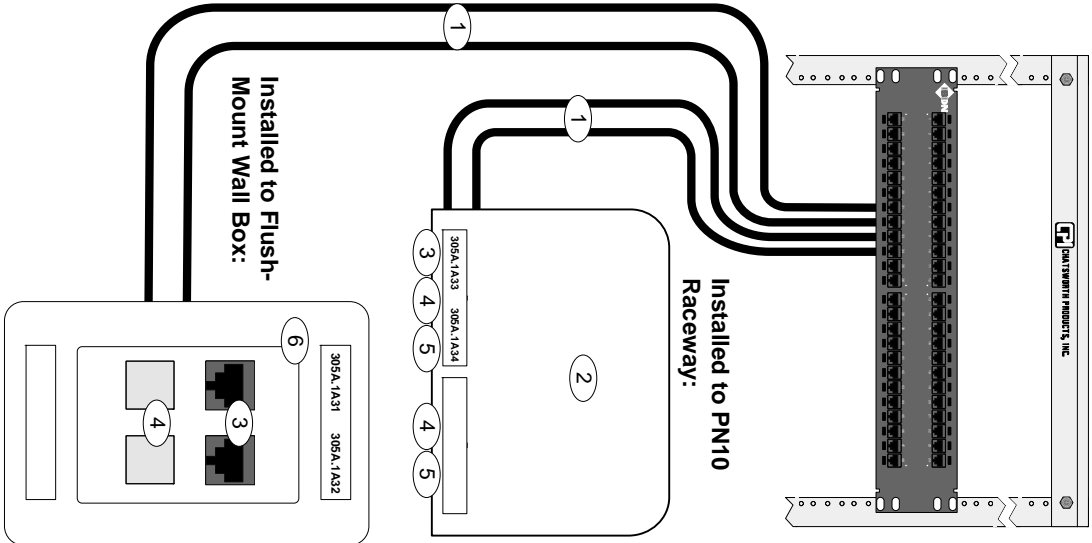
Install lowest leading edge of cabinet at or below 27 in above the finished floor (ADA Section 4.4.1).

ADDITIONAL NOTES

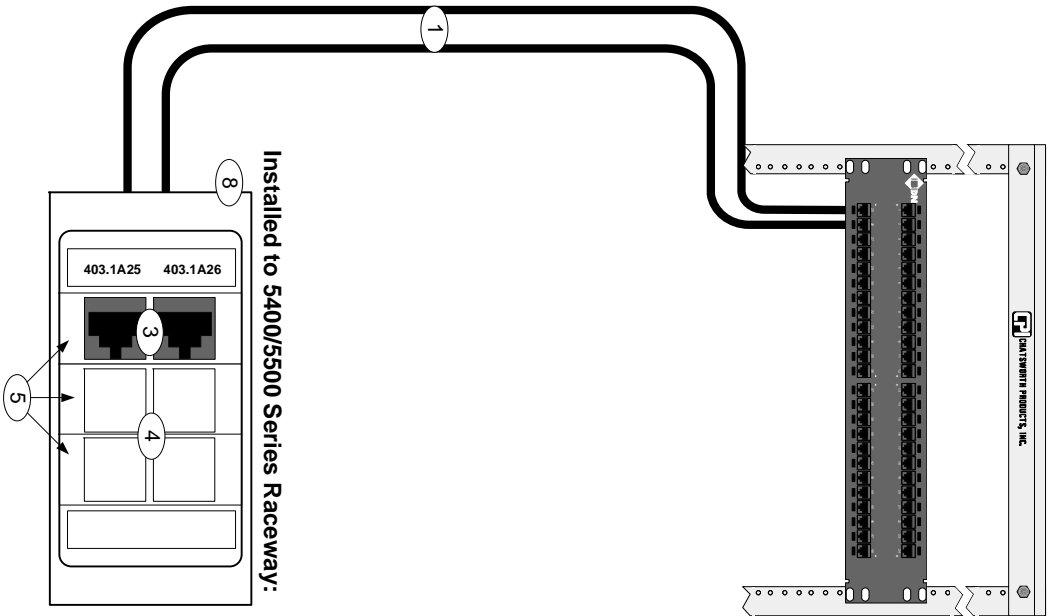
- TE doors will be properly numbered with the room number in which the TE is installed preceded by the letters "TE" and followed by ".1". A space will separate the Letters "TE" from the room number. Therefore, a TE installed in room A6 or room 224 will be labeled "TE A6.1" or "TE 224.1" respectively. Engraved acrylic label plates [A] shall be mounted with the top edge of the label two inches below the top of the door. The label plate will be centered horizontally on the door, and will be 3" H x 4" W; have a black or dark-grey foreground with white lettering.

		Washoe County School District Information Technology	
LOCATION N/A		PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES	
SCALE NTS		DWG TITLE COMPUTER LAB TE	
JLC		NF-R8	

TR 305A



TR 403



ADDITIONAL NOTES

1. If installing into an existing multi-channel raceway system and none of the above options will suffice, install a Beiden/CDT 4-port Key/Cable Adapter (PN AX104124). Installed faceplate must be produced by the same manufacturer as the existing raceway system, and must include labeling windows. Contact the Project Manager if circumstances do not permit any options listed on this page.

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	Cat6A UTP IBDN 10GXS13, CMP, Yellow	BELDEN/CDT	10GXS13 0041000
	Cat6A UTP IBDN 10GXS12, CMR, Yellow	BELDEN/CDT	10GXS12 0041000
2	Large Data Box, White	Wiremold	PDB2CMMWH
3	Cat6A RevConnect Module, Yellow	BELDEN/CDT	RVAMJUKVLS1
4	KeyConnect Blank Insert, White	BELDEN/CDT	AX102262
5	Dual Flushmount Module	Wiremold	CM2-U2KEYA-WH
6	SG4P Interface Plate (White)	BELDEN/CDT	AX102249
7	Twin Cover Device Bracket, White	Wiremold	40N2F31WH
8	End Plate, White	Wiremold	CM-EPLAWH
9	Not Used		

NOTES

1. For every installed Category 6A cable, The Vendor will provide:

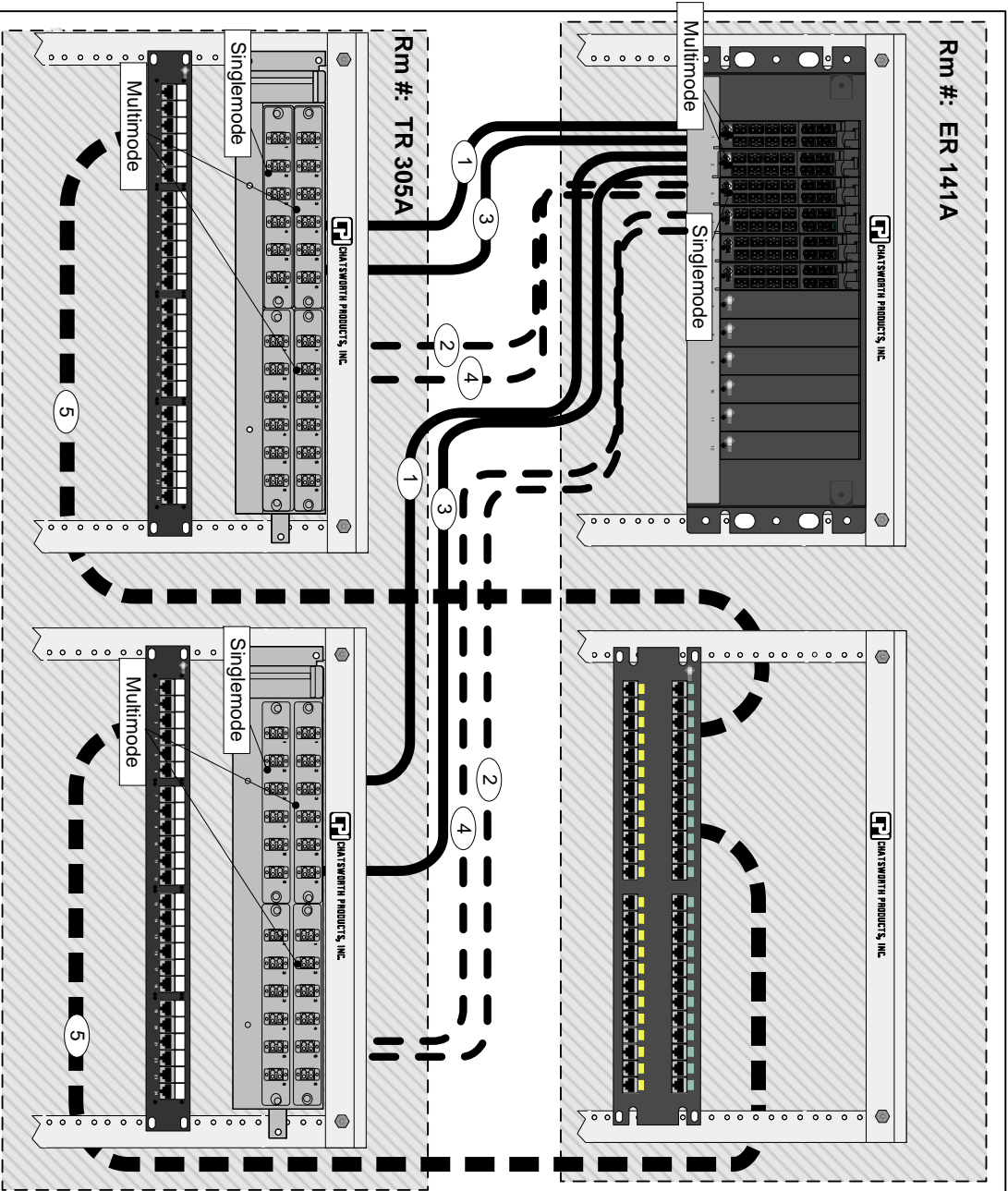
(1) 10GX Modular Cord, 4', Yellow	BELDEN/CDT	CA21104004
(1) 10GX Modular Cord, 15', Yellow	BELDEN/CDT	CA21104015
2. Ten feet of cable slack shall be stored at the ER/TR and three feet of cable slack will be provided at the TE and TO for each installed cable in an extended loop or figure-eight configuration. Five inches of cable slack will be stored behind each TO, if possible without compromising minimum bend radius.
3. All horizontal cables will be installed in cable bundles upon entry into every TR. Cable bundles will not exceed 30 cables per bundle, and will be loosely bound with velcro straps. Cables in a bundle should be uncombined until entry into each rack's vertical cable management, where the cables are to be combed and dressed together until terminated on each patch panel.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION		DWG TITLE	
N/A		Horizontal Cabling	
SCALE	NTS	JLC	DWG# NF-C1



### ADDITIONAL NOTES

1. Ten feet of cable slack shall be stored in the ladder rack at the ER/TR in an extended loop or figure-eight configuration for every installed cable. Additional cable slack will be installed within the vertical management in a "drip loop" configuration.
2. Contractor will install plenum-rated cabling and plenum-rated innerduct if cabling is routed through a plenum-rated space. In all other instances The Contractor will install riser-rated cabling and riser-rated innerduct.
3. OSP optical fiber cabling at Modernized Facilities shall be BELDEN/CDT Tight Buffered Indoor/Outdoor Riser Series cabling. Strand count and core diameters shall match with those in this drawing.

MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	FX4000 50u 12F Distribution Riser	BELDEN/CDT	F14D012R9
	FX4000 50u 12F Distribution Plenum	BELDEN/CDT	F14D012P9
2	Singlemode 12F Distribution Riser	BELDEN/CDT	F1SD012R9
	Singlemode 12F Distribution Plenum	BELDEN/CDT	F1SD012P9
3	FX4000 50u 6F Distribution Riser	BELDEN/CDT	F14D006R9
	FX4000 50u 6F Distribution Plenum	BELDEN/CDT	F14D006P9
4	Singlemode 6F Distribution Riser	BELDEN/CDT	F1SD006R9
	Singlemode 6F Distribution Plenum	BELDEN/CDT	F1SD006P9
5	IBDN Plus Cat5E, Riser, 25-Pair, Gray	BELDEN/CDT	IBDN25R 0081000
	IBDN Plus Cat5E, Plenum, 25-Pair	BELDEN/CDT	IBDN25P 0081000

### NOTES

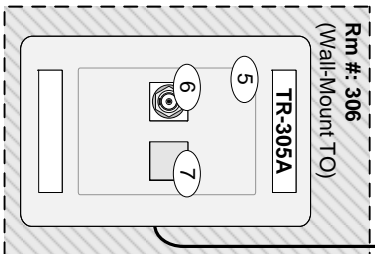
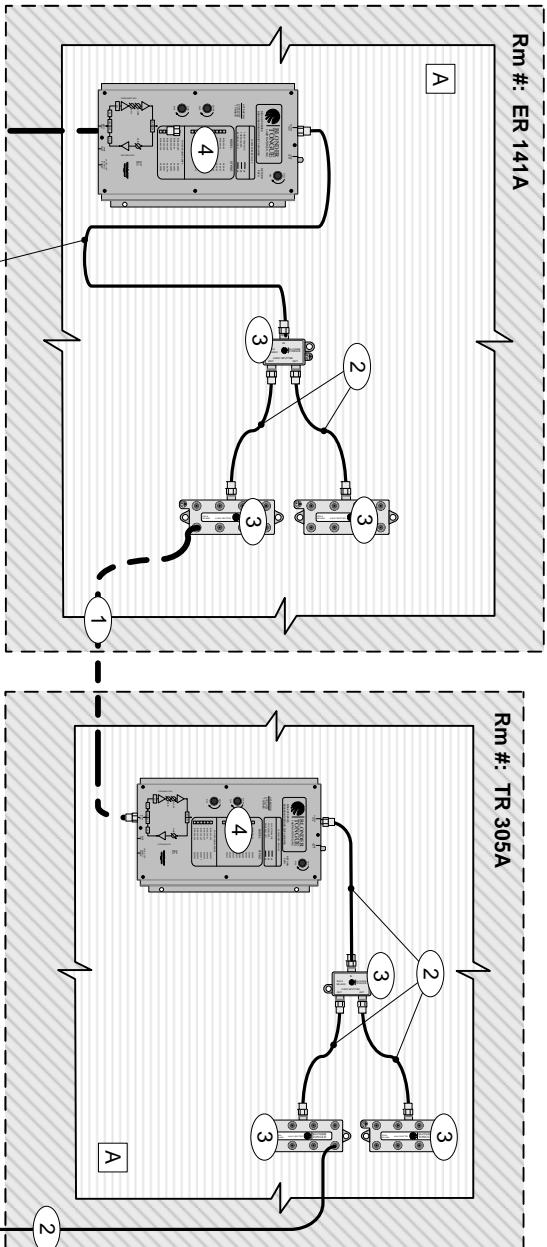
1. All Contractor-installed multi-mode fiber will be terminated with:  
Fusion-Splice LC 50u MM Connector BELDEN/CDT FTALC900F-S01
2. All Contractor-installed single-mode fibers will be terminated with:  
Fusion-Splice LC SM Connector BELDEN/CDT FTSLC900F-S01
3. For every Contractor-installed 12 strand multi-mode fiber optic cable The Vendor will provide:  
(6) Hybrid Patch Cord, FX4000, 50u, LC duplex-LC duplex, 3 m BELDEN/CDT FP4LDLDD003 MR2XA  
(2) Hybrid Patch Cord, FX4000, 50u, LC duplex-LC duplex, 5 m BELDEN/CDT FP4LDLDD005 MR2XA
4. For every Contractor-installed, 25-pair cable The Vendor will provide:  
(4) Gigaflex PSSE Mod Cord, 7', Blue BELDEN/CDT CS01106007
5. Each 25-pr copper cable will terminate on six ports of each patch panel at MC and HC. One orphan-pair (violet/state) will be left un-terminated.
6. At MC and all HCs, terminate cables to modules or ports in alpha-numeric order by PATCH PANEL MODULE LABEL or PORT LABEL from left to right, top to bottom (across all panels within a rack) as shown. Refer to drawing NF-42 for definitions of the above.



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION	DWG TITLE		
N/A	Backbone Cabling		
SCALE	NTS	JLC	DWG# NF-C2




MATERIAL SPECIFICATIONS			
#	Description	Mfr	P/N
1	RG11 Quad Shield, Plenum	BELDEN/CDT	1153A
	RG11 Quad Shield, PVC	BELDEN/CDT	1617A
2	RG6 Quad Shield, Plenum	BELDEN/CDT	1189AP
	RG6 Quad Shield, PVC	BELDEN/CDT	1189A
3	2-Way Video Splitter	Blonder T.	CRS-2 4032
	3-Way Video Splitter	Blonder T.	CRS-3 4033
	4-Way Video Splitter	Blonder T.	CRS-3 4034
	8-Way Video Splitter	Blonder T.	CRS-8 4038
4	BIDA-750-30 Video Amplifier, Wall Mount	Blonder T.	5400-73
5	SG2P Interface Plate (White)	BELDEN/CDT	AX102655
6	KeyConnect Video F Coaxial Module, White	BELDEN/CDT	AX102904
7	KeyConnect Blank Insert, White	BELDEN/CDT	AX102262

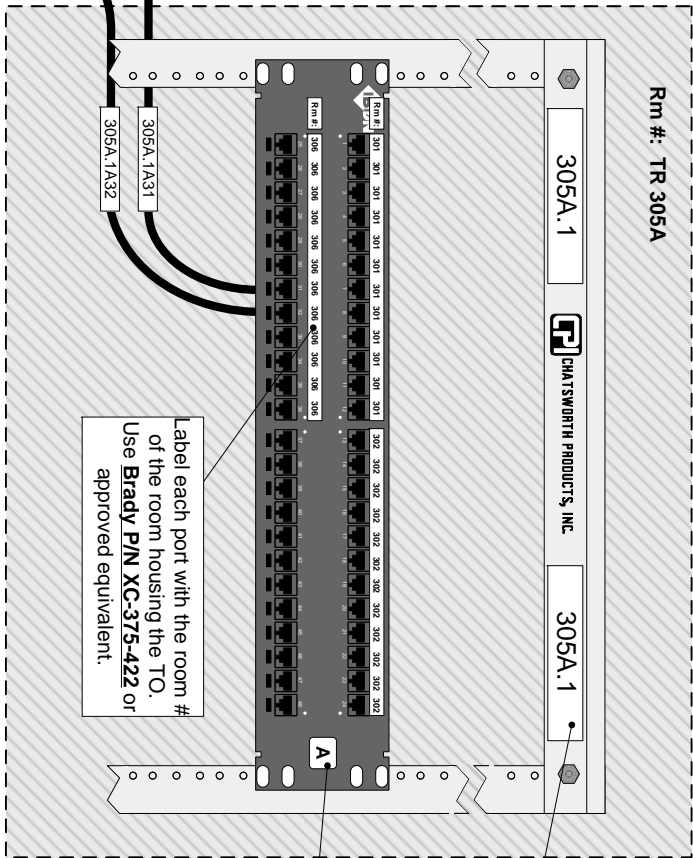
#### NOTES

- Item 5 may be replaced by a 4-port or 6-port Interface Plate, or even by a MediaFlex Faceplate Kit in order to accommodate RCA or S-VHS KeyConnect Modules. Refer to Project Documents and Blueprints for consolidated CATV, RCA, and S-VHS at the TO.
- Coaxial cabling WILL NOT be installed in the same conduit as UTP or Optical Fiber cabling.
- Contractor will install plenum rated cabling if cabling is routed through a plenum-rated space. In all other instances The Contractor will install riser-rated cabling.
- Contractor will provide and install all items shown in drawing, unless otherwise indicated.
- Coaxial cabling terminations and splitters will be backboard mounted in each ER/TR. A minimum of two walls will be covered with rigidly fixed 3/4 in A-C plywood [A], preferably void free, 8 ft high, capable of supporting attached equipment. Plywood should be either fire-rated or covered with two coats of fire retardant paint.

To EF (Entrance Facility)

**Note:** All specifications made within this drawing apply to New Facilities, Building Addition and Modernized Facility projects only.

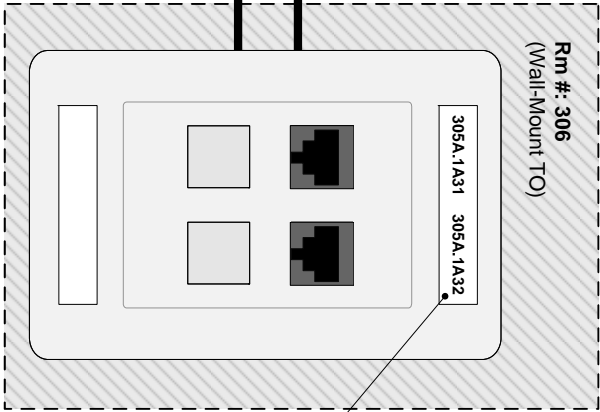
		Washoe County School District Information Technology	
LOCATION N/A		DWG TITLE PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES	
SCALE NTS		JLC Coaxial Cabling	
NTS		DWG# NF-C3	



Racks will be labeled with Space ID and Rack ID as shown. Use **Brady P/N XC-1000-483** or approved equivalent.

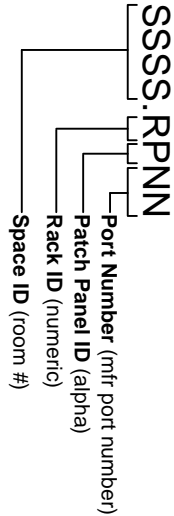
Label with Panel ID as shown. Use **Brady P/N X-7-422** or approved equivalent.

Label each cable according to the Horizontal Cable Labeling Scheme below. Use **Brady P/N XSL-32-427** or approved equivalent.



Label each port according to the Horizontal Cable Labeling Scheme below. Label must be machine-printed and inserted in faceplate label window. If no window exists, label with **Brady P/N X-29-422** (or approved equivalent).

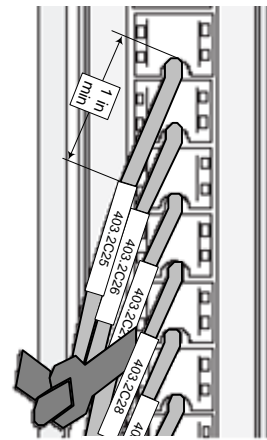
## Horizontal Cable Labeling Scheme



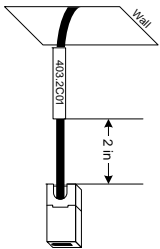
### HORIZONTAL LABELING SCHEME CONCEPT:

All CABLE LABELS point upstream. All patch panel PORT LABELS and TO LABELS point to the termination at the opposite end of the cable. Therefore, CABLE LABELS and TO LABELS both indicate the ports on which they are terminated at the serving TR, while patch panel PORT LABELS indicate the room in which the TO is located.

At TR, cable labels will be affixed to cable a minimum of 1 inch from termination (on patch panel), and placed in such a way as to be clearly visible:



At TO, cable labels will be affixed to cable 2 inches from termination (on jack):



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

N/A

DWG TITLE

Horizontal Labeling

SCALE

NTS

JLC

DWG#

NF-L1

Label each Connector Module with its Slot ID as shown. Use **Brady P/N X-7-422** or approved equivalent.

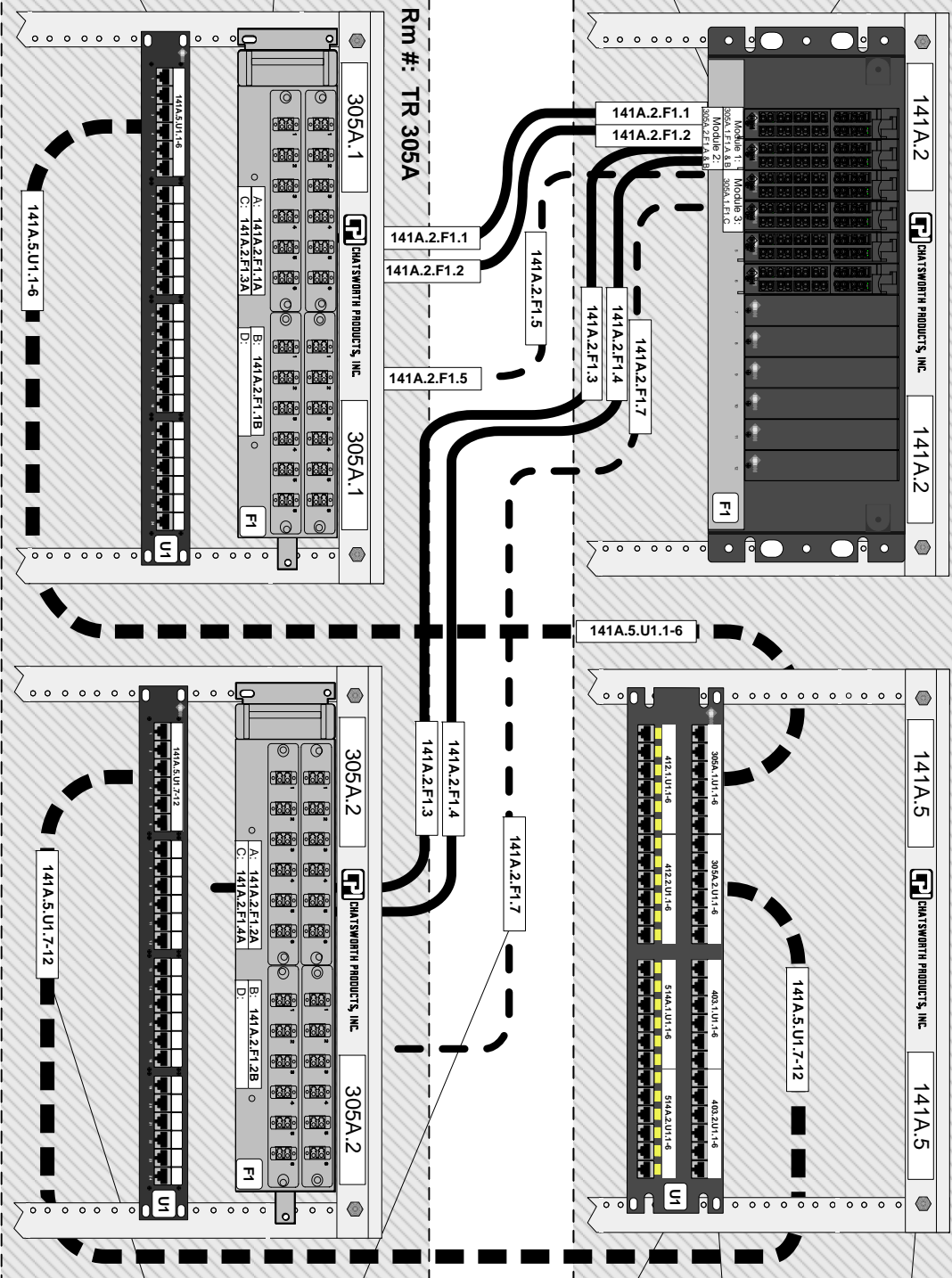
FiberExpress Manager chassis will be labeled as shown directly on plexiglass front cover so labels will be visible when cover is closed. Place labels below each set of two Connector Modules.

Each label will be representative of one Connector Module and will indicate the exact location and position of the cable's far end according to the Backbone Cable Labeling Scheme. Use **Brady P/N XC-500-422** or approved equivalent.

A label will be affixed to the FiberExpress chassis for each Optical Fiber Adapter Strip as shown using the Backbone Cable Labeling Scheme. Use **Brady P/N XC-500-422** or approved equivalent.

Each six ports terminating one 25-pr cable will be labeled as shown using the Backbone Cable Labeling Scheme. Use **Brady P/N XC-375-422** or approved equivalent.

Rm #: ER 141A



Racks will be labeled with Space ID and Rack ID as shown. Use **Brady P/N XC-1000-483** or approved equivalent.

Each six ports terminating one 25-pr cable will be labeled as shown using the Backbone Cable Labeling Scheme. Use **Brady P/N XC-375-422** or approved equivalent.

Label all fiber and copper patch panels with Panel ID as shown. Use **Brady P/N X-7-422** or approved equivalent.

Label 25-pr copper and optical fiber cables as shown according to the Backbone Cable Labeling Scheme below. Cables must be clearly visible at rear of rack. Use **Brady P/N XSL-116-422** or approved equivalent.

## Backbone Cable Labeling Scheme

SSSS.R.MP.N-N



## BACKBONE LABELING SCHEME CONCEPT:

ALL CABLE LABELS point upstream. All patch panel PORT LABELS or FIBER MODULES point to the termination at the opposite end of the cable. Therefore, CABLE LABELS and TR (HC) PORT/MODULE LABELS both indicate the ports on which they are terminated at the ER (MC), while ER (MC) PORT LABELS indicate the ports on which they are terminated at the TR (HC).



Washoe County School District  
Information Technology

PROJECT DRAWINGS FOR  
NEW & MODERNIZED FACILITIES

LOCATION

N/A

DWG TITLE

Backbone Labeling

SCALE

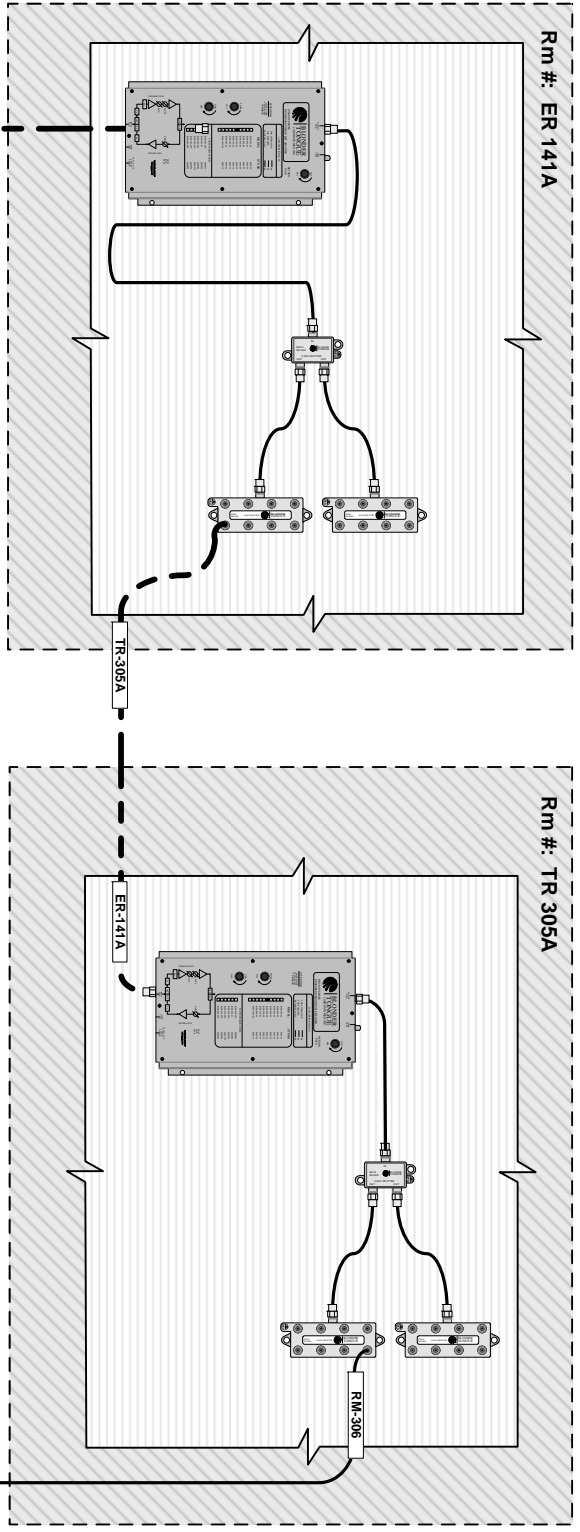
NTS

JLC

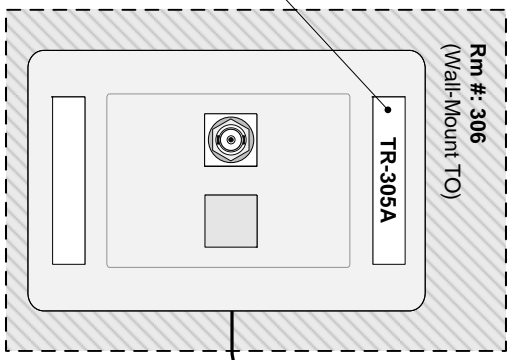
DWG#

NF-L2

**Note:** All specifications made within this drawing apply to New Facilities, Building Addition and Modernized Facilities projects only.



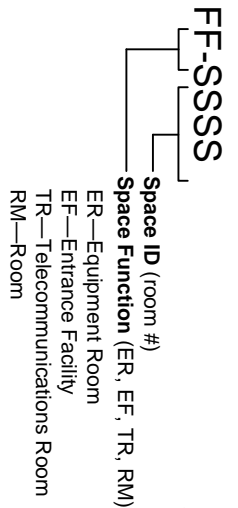
Label each TO according to the Coaxial Cable Labeling Scheme below. Label must be machine-printed and inserted in faceplate label window. If no window exists, label with **Brady P/N X-29-422** (or approved equivalent).



Label all installed coaxial cables as shown according to the Coaxial Cable Labeling Scheme below. Cables must be clearly visible each termination. Use **Brady P/N XSL-116-422** or approved equivalent.

To EF (Entrance Facility)  
EF-102

### Backbone Cable Labeling Scheme



### COAXIAL LABELING SCHEME CONCEPT:

All downstream CABLE LABELS point upstream. All upstream CABLE LABELS point downstream. All TO LABELS point upstream. Therefore, all CABLE LABELS indicate the room in which the opposite end of the cable is terminated, and all TO LABELS indicate the serving TR.

		Washoe County School District Information Technology	
LOCATION	N/A	PROJECT DRAWINGS FOR NEW & MODERNIZED FACILITIES	
SCALE	NTS	JLC	DWG# NF-L3