Institute of Technology & Advanced Learning

MASTER GUIDELINES FOR COMMUNICATIONS INFRASTRUCTURE

VERSION 5.0

AUGUST 26, 2013

Prepared in association with:

Fibrelight Design Solutions Inc.
for
Information Technology Group

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REVISIONS:

1.0 April 02, 2008

    1.1 Initial Draft Creation IT Master Guideline

2.0 February 15, 2010

    2.1 Revisions to IT
        2.1.1   Additions of Classroom Types
        2.1.2   Additions of Detail Sketches
        2.1.3   Addition of Paging Systems Section

3.0 February 11, 2011

    3.1 Revisions to IT

4.0 March 31, 2012

    4.1 Reformat of Entire Document
    4.2 Revisions to IT
        4.2.1   Removal of Division 27 Samples
        4.2.2   Updates to Classroom Types
        4.2.3   New Detail Sketches
        4.2.4   Updates to Paging Systems
        4.2.5   Fibre Upgrades
    4.3 Addition of Audio Visual IT Requirements Section
    4.4 Addition of Security IT Requirements Section

    May 15, 2012
    4.5 Revision of Audio Visual IT Requirements Section
    4.6 Revision to Paging Requirements Section

October 15, 2012
4.7 Revisions to IT
        4.7.1   Revisions to Plug Types
        4.7.2   Additions to Plug Types
        4.7.3   Revisions to Breakout/Study Rooms
        4.7.4   Revisions to Meeting Rooms
        4.7.5   Revisions to Classrooms

November 28, 2012
4.8 Revisions to IT
        4.8.1   Redefining Plug Types
        4.8.2   Revisions to Meeting Rooms

5.0 August 25, 2013

5.0 Revision to IT
        5.0.1   Update of all Codes, Standards, & Acronyms
        5.0.2   Revisions to Administrative Staff & Titles
        5.0.3   Addition of Copper Patch Cords
        5.0.4   Addition of Fibre Patch Cords
        5.0.5   Revision to 20A Plug Configuration
        5.06   Update for Inclusion of all Revised Detail Sketches

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1.0 FOREWORD:

The sole purpose of this document is to guide Telecommunication Consultants in their design requirements when producing Tender Drawings and Specifications for contractors bidding various projects and expansions that Sheridan Institute of Technology and Advanced Learning may be undertaking.

Its main focus will be the IT infrastructure, components, installation recommendations, testing procedures and parameters. With telecommunications cabling being utilized in so many other disciplines, we are expanding version 5.0 of the Master Guidelines for Communications Infrastructure to include cabling for Paging, Audio Visual (A/V), and Security components.

All detail drawings or images that pertain to only one section of the master outline will be listed and included at the end of that section.

Manufacturer cut sheet samples will be provided at the end of the document in appendix 14.3

2.0 ACKNOWLEDGEMENTS:

Information & Communication Technologies expresses its appreciation to the following participants and contributors in the development of this document:

3.0 DEFINITIONS:

ANSI   American National Standards Institute
ASTM   American Society for Testing Materials
BICSI   Building Industry Consulting Services International
CEC   Canadian Electrical Code
CLECs   Competitive Local Exchange Carriers
CRTC   Canadian Radio & Television Telecommunications Commission
CUL   Canadian Underwriters Laboratories, Inc.
ICEA   Insulated Cable Engineer's Association
ICT   Information Communication Technology (IT)
IDF-1   Intermediate Distribution Frame Type 1 – Communications Closet
IDF-2   Intermediate Distribution Frame Type 2 – Co-Locate Closet
IEEE   Institute of Electrical and Electronics Engineers
MCC   Main Cross Connect
MCR   Main Computer Room
MDF   Main Distribution Frame
NEC   National Electric Code
NEMA   National Electrical Manufacturer's Association
NFPA   National Fire Protection Agency
POP   Point of Presence
SIREN   Sheridan Incident Reporting & Emergency Notification
SITAL   Sheridan Institute of Technology and Advanced Learning
TIA   Telecommunications Industry Association

4.0   APPLICABLE STANDARDS:

Unless specifically indicated otherwise in this document, all telecommunications infrastructure shall be design in accordance with the following standards including all appropriate addendums and revisions:

ANSI/TIA-455   Test Procedures for Fibre Optics, Cables and Transistors

ANSI/TIA-568-C.0-2008   Generic Commercial Building Telecommunications Cabling
                                    Standard

ANSI/TIA-568-C.1-2009   Commercial Building Telecommunications Cabling Standard

ANSI/TIA-568-C.2-2009   Balanced Twisted Pair Telecommunications Cabling and
                                    Components Standard

ANSI/TIA-568-C.3-2008   Optical Fibre Cabling Components Standard

ANSI/TIA-568-C.4-2011   Broadband Coaxial Cabling and Components Standard

ANSI/TIA-569-C-2012   Telecommunications Pathways and Spaces Cabling Standard

ANSI/TIA-598-D   Optical Fibre Colour Coding (Draft)

ANSI/TIA-604-3   FOCIS 3 Fibre Optic Connector Intermateability Standard

ANSI/TIA-604-5-D   Fiber Optic Connector Intermateability Standard, Type MPO

ANSI/TIA-604-10-B   FOCIS 10B Fiber Optic Connector Intermateability Standard
                                    Type LC

ANSI/TIA-606-B   Administrative Standard for Commercial Telecommunications
                                    Infrastructure

ANSI/TIA-607-B-2011   Generic Telecommunications Bonding and Grounding
                                    (Earthing) for Customer Premises

ANSI/TIA-758-B-2012   Customer Owned Outside Plant Telecommunications
                                    Infrastructure Standard

ANSI/TIA-862-A-2011   Building Automation Systems Cabling Standard

ANSI/TIA-942-2005   Telecommunications Infrastructure Standard for Data Centres

ANSI/TIA-1005-2009   Telecommunications Infrastructure Standard for Industrial
                                    Premises

ANSI/TIA-1152-2009	Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
ANSI/BICSI-002-2011	Data Centre Design and Implementation Best Practices
ANSI/ICEA S-83-596	Fibre Optic Premises Distribution Cable
ANSI/ICEA S-83-640	Fibre Optic Outside Plant Communications Cable
ANSI/IEEE-110-1992	Powering and Grounding Sensitive Electronic Equipment.
ANSI/NECA/BICSI 568-2006	Standard for Installing Commercial Building Telecommunications Cabling
ANSI/NECA/BICSI-568	Standard for Installing Commercial Building Telecommunications Cabling
ANSI/NFPA 70	National Electrical Code.
ANSI/NFPA 70-1987	Standard for Paging Punch Block and Cable Sizing Requirements
ANSI Z136.2	American Standards for the Safe Operation of Fiber Optic Communications Systems Utilizing Laser Diode and LED Sources
BICSI	Network Design Reference Manual, 7th Edition
BICSI	Network Systems and Commissioning (NSC) Reference, 1st Edition
BICSI AVDRM	AV Design Reference Manual, 1st Edition
BICSI DCDI	Data Center Design and Implementation Best Practices
BICSI ESS	Electronic Safety and Security Design Reference Manual, 2nd Edition
BICSI ITSI	Information Transport Systems Installation Methods Manual, 6th Edition
BICSI OPDRM	Outside Plant Design Reference Manual, 5th Edition
BICSI WDRM	Wireless Design Reference Manual, 3rd Edition
BICSI TCIM	Telecommunications Cabling Installation Manual

BICSI TDMM	Telecommunications Distribution Methods Manual, 12th Edition
CISCA	Recommended Test Procedures for Access Floors
CSA C22.1	Canadian Electric Code Part 1 Ontario Hydro Electric Safety Code
CSA C22.2 No. 182.4-M90	Plugs, Receptacles, and Connectors for Communications Systems
CSA C22.2 No. 214-94	Communications Cables
CSA C22.2 No. 232-M	Fibre Optic Cables
ICEA S 104 696	Insulated Cable Engineers Association
IEEE Std. 446	Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
IEEE Std. 1100	Recommended Practice for Powering and Grounding Electronic Equipment
NECA/BICSI 607-2011	Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
NFPA-75	Protection of Electronic Computer Data Processing Equipment.
NFPA-297	Guide on Principles and Practices for Communication Systems.
NRC-CNRC	National Building Code of Canada
(RUS) 7 CFR 1755.900	Rural Utilities Service
TIA TSB-155-A-2006	Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10BASE-T
TIA TSB-162-2006	Telecommunications Cabling Guidelines for Wireless Access Points
TIA TSB-184-2009	Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling
TIA TSB-185-2009	Environmental Classification (MICE) Tutorial
TIA TSB-190-2011	Guidelines on Shared Pathways and Shared Sheaths

5.0   TELECOMMUNICATIONS DESIGN GUIDELINES

5.1   DESIGN DELIVERABLES

5.1.1   Programming;

With specific input from Information Communication Technologies, generate outlet schedule based on functional use summary of the needs/program statement.
- Provide preliminary area requirements for entrance facility and telecommunication rooms.
- Identify extent of site work necessary to bring services to building.
- Provide $/sq.ft. budgetary number.
- Where wireless networks are to be the primary connection to the network, either a Sheridan IT person or an independent consultant with demonstrated expertise in wireless systems shall be commissioned to provide access point layout, equipment selection and input on other construction methods that may affect wireless transmissions.

5.1.2   Schematic Design:

Concept Sketches showing preliminary telecommunications rooms and sizes and zone plan showing areas served by rooms.
- Preliminary backbone riser diagrams showing interrelationships
- Concept sketch showing major pathways for backbone and horizontal cabling

5.1.3   Design Development:

Preliminary drawings identifying device layouts for typical spaces
- Preliminary drawing showing main cable tray layouts
- Preliminary drawing showing communication backbone riser.
- Preliminary drawing showing communication grounding riser.

5.1.4   Construction Documents:

Identify all device locations on scaled plan drawings
- Identify outlet configurations by unique symbol and/or schedule
- Identify all intended pathways and raceways for horizontal and backbone cable.
- Provide enlarged telecommunications room plans indicating placement of racks, cable runway, wall-mounted systems, and ground bus locations.
- Provide rack elevations indicating all patch panel placement, cable management, structural supports, ground connections and space allocated for owner provided network electronics and any owner supplied UPS/power conditioners.

- Provide backboard elevations indicating space allocated for wall fields, equipment, etc.
- Indicate location and provide details for all grounding apparatus.
- Provide CSI format specifications for cable, connectors, cable management hardware, etc.

5.1.5   Construction:

Review shop drawings for cable, connectors, and hardware for:
- Administration compliance with project specifications and Sheridan Institute of Technology & Advanced Learning requirements
- Make periodic construction visits to observe the installation for conformance to project specifications and proper installation practices.
- Perform final punch list including follow-up to verify punch list items have been completed.

5.1.6   Prequalified Manufacturer/Vendor:

Sheridan Institute of Technology & Advanced Learning has mandated that only Belden/CDT shall be an acceptable manufacturer. Any other bid submissions or alternates for   cost savings shall not be viewed and any such submissions shall disqualify the bidder. Any bidding Contractor must be a CSV in good standing with Belden/CDT. A copy of certification is required with every bid submission.

5.1.7   Prequalified Contractors:

Sheridan Institute of Technology & Advanced Learning has mandated that only the following Contractors shall be invited to the bid. Any alternates or sub-contract work is not   acceptable. The list is closed at:

- Activo Inc.
  40 Vogell Road, Unit 70
  Richmond Hill, ON   L4B 3N8
  Tel: 905-787-0750
  Fax: 905-787-8025

- CaTech Systems Limited
  201 Whitehall Drive, Unit 4
  Markham, ON   L3R 9Y3
  Tel: 905-944-0000
  Fax: 905-944-4844

- Marcomm Integrated Business Solutions
  163 Buttermill Avenue, Unit 3
  Concord, ON   L4K 3X8
  Tel: 905-695-1700
  Fax: 905-695-1701

5.2   FINAL DOCUMENTATION DELIVERABLES:

5.2.1   Testing and Documentation:

Testing Criteria:
- Comply minimally with EIA/TIA testing requirements
- Provide certification from manufacturer.
- Testing shall demonstrate compliance with manufacturer's stated performance.

Documentation:
- Provide warranty certificate upon completion.
- Provide hard copy of summary test results.
- Provide bound hardcopy of test results (<u>ONLY</u> for fewer than 25 drops).
- Provide electronic copy of both summary and test results (for all jobs)

As-builts:
- The Cabling Contractor is required to provide as-built drawing(s) of the cable installation. It shall include all horizontal cabling required to service the space as defined on the drawings.

- The as-built drawing(s) shall include all additional cables (i.e. change notices) installed during the project.

- The as-built drawings shall reflect all termination locations, labeling, elevation detail of final rack layout for horizontal cabling (digital photos are acceptable), elevation details of backboards (digital photos are acceptable), and all cabletray and support structure routing.

- Upon completion of the installation the Cabling Contractor shall provide eight (8) copies of the as-built drawing(s) to the Client. As-built drawings must be forwarded to Client's office **within 5 business days** of the completion of the project. An additional copy of the as-built drawing is to be posted on the wall in the main distribution rooms

- All changes to drawings shall be engineer drafted standards.

5.2.2   Package Requirements:

Communications Contractor must provide 5 burned CD's with the following information:

- UTP Test Results in Microsoft Excel format or in a format that is easily interpreted by any text reader (i.e. '.txt' extension). DO NOT submit paper test results for projects greater than 25 drops. Testing requirements are outlined further in this document.

- Fibre Test results in Microsoft Excel format or in a format that is easily interpreted by any text reader (i.e. '.txt' extension). DO NOT submit paper test results for projects greater than 25 drops. Testing requirements are outlined further in this document.

- Digital pictures in '.jpg' or '.gif' format. Pictures shall include all relevant information such as top/bottom picture of all racks and cabinets (both front and rear), backboard elevations of all main backboards, all secondary backboards and all riser backboards that are utilized, as well as consolidation points (if applicable).

- Enough room shall be left on the CD for Client to burn as-built drawings onto them.

5.2.3   Warranty and Certification Requirements

- The manufacturer is required to provide minimum 20-year parts and labour Warranty for the entire Structured Cabling Platform, including both UTP copper and fibre. Response time for Warranty items is to be 24 hours. The Cabling Contractor may be required to repair deficient cabling system components outside regular working hours. Bidders are to include a statement of Warranty terms and conditions with their response.

- The Warranty for the Performance Cabling must be such that the cable meets or exceeds the requirements of EIA/TIA-568-A and EIA/TIA-568-A-5 'Transmission Performance Specifications for 100 Ohm 4-pair Category Cabling' including all Standards stated in this Contract.

- If a Warranty issue arises for the cabling the Warrantor must make arrangements to undertake the repair or replacement of Warranty issues within 24 hours of notification. This may require the repair/replace of cabling components outside regular working hours. Bidders are to include a statement of Warranty terms and conditions with their response.

- The Cabling Contractor shall forward the Structured Cabling Platform certification request form(s) to the proper authority and ensure that a Plaque or Certificate is issued to the Project Manager along with the Structured Cabling Platform user manual. The successful bidder will provide a certification number within two weeks of award of this project. Please note that the Plaque/Certificate must have the Project Managers Client name on the Plaque/Certificate.

- The Cabling Contractor will provide letter(s) of Certification within two weeks of substantial completion of the project to the Communications Consultant. This document will include the following: verification of the performance of the installed system, identification of the installation by location and project number and a copy of the Warranty.

- Upon award of contract, the Cabling Contractor shall forward copies of the Structured Cabling Platform certification request for Certification form complete with certification number(s) for the project to Communications Consultants office within 7 days of the award of contract. Provide a copy of the form with Specification submission.

- Upon request and at no additional cost to the Project Manager the Cabling Contractor must provide a manufacturer's technical representative to conduct an on-site visit to ensure complete technical compliance.

- The Cabling Contractor must ensure that a Warranty plaque and letter of certification is issued to the Project Managers Client along with a user manual for the Warranty. The letter must be issued within 2 weeks of substantial completion of the project. This document will include the following: verification of the performance of the installed system, identification of the installation by location and project number and a copy of the Warranty to the Communications Consultant.

- The Cabling Contractor must supply a sample (at the time of bidding) of the Warranty including all related terms and conditions. This sample will be the standard to which the Warranty will be held. No changes will be accepted unless it is deemed to benefit the Project Managers Client. Any proposed changes to the Warranty must be submitted in writing to the Project Manager/their representative for review. The changes will then be accepted or declined by the Project Authority at their discretion. This is to remain valid for the entire Warranty period.

6.0   SYSTEM AND PERFORMANCE:

6.1   Data System:

Designed to support 1Gbps Ethernet to the desktop over UTP copper cable.
- Intra-building backbone shall support 10Gbps Ethernet
- Inter-building backbone shall support DWDM (Dense Wave Division Multiplexing)

6.2   Voice System:

Specific design to be coordinated with Sheridan Institute of Technology & Advanced Learning Information Communication Technologies. Typically Sheridan College uses VoIP and all cable pulls terminate in the same patch panels.

6.3   Wireless Networks:

Specific design to be coordinated with Sheridan Institute of Technology & Advanced Learning Information Communication Technologies.

6.4   Paging Networks:

Specific design to be coordinated with Sheridan Institute of Technology & Advanced Learning Information Communication Technologies.

6.5   Audio Visual Networks:

Specific design to be coordinated with Sheridan Institute of Technology & Advanced Learning Audio Visual Department.

6.6   Security Networks:

Specific design to be coordinated with Sheridan Institute of Technology & Advanced Learning Security Department.

7.0   SITE AND SERVICE CONSIDERATIONS

7.1   CABLE PATHWAYS

7.1.1   Entrance Cable Pathways:

It is strongly recommended that diverse entrances including multiple conduits from multiple carriers are established at Sheridan Institute of Technology and Advanced Learning Campus Locations. For existing buildings with existing carrier entrance facilities it is strongly recommended that a diverse carrier method be established to eliminate single point of failure.

For buildings with existing carrier entrance facilities where Sheridan Institute of Technology and Advanced Learning is not the sole building tenant, it is strongly recommended that diverse conduit pathways be established between the existing entrance facility and Sheridan Institute of Technology and Advanced Learning main communications room.

Typically, provide minimum of two (2) banks of three (3) 4" (100mm) conduits from nearest telecommunications manhole, tunnel, etc. into service entrance facility. The quantity /size of conduits can vary depending on project requirements. These can be defined on a project-to-project basis. It is also encouraged that the service provider be pressed to extend the demarcation directly to the Sheridan Institute of Technology and Advanced Learning's main communications room.

- Provide three 1 ¼" inner ducts in one of the service entrance conduits.
- Coordinate with Information Communication Technologies for further definition of design requirements.
- Minimum of 1 240V dedicated circuit.
- Minimum of 1 120V dedicated circuit.

REFERENCE FIGURE 01 – INCOMING CONDUIT BANK

7.1.2   Inter-Building Cable Pathways:

It is strongly recommended that two diverse cable pathways between Sheridan Institute of Technology and Advanced Learning occupied buildings be established. These pathways should be physically separated from each other as much as it is practical to prevent a single disaster from affecting both pathways.

Where the intra-building cable pathways enter each building a Sheridan Institute of Technology and Advanced Learning controlled building entrance room is required, as electrical protection devices need to be installed as close to the point of entry as possible. A telecommunications grounding busbar should be located within this room.

Sizes and quantities of intra-building conduit depend on the individual requirements of each project.

REFERENCE FIGURE 02 – CAMPUS ENVIRONMENT

7.1.3   Intra-Building Cable Pathways:

These pathways typically consist of conduit, sleeves and cable tray or ladder rack.

- Between Sheridan Institute of Technology and Advanced Learning Main Communications Room (MCR) and the Intermediate Distribution Frame (IDF) a.k.a. Communications Closet or Co-Locate Closet. There must be two (2) diverse cable pathways established. Typically these would be conduit paths. Quantity of conduits varies according to project requirements.
- Between two communications closets on the same floor there should be a cable pathway installed.
- Within a communications closet or main communications room that does not have raised floor, an overhead raceway is required. This raceway is typically ladder rack or cable tray.
- Sleeves or slots should be installed from the wall mounted telecommunications outlet boxes to above the access ceiling. Typically a 1-gang outlet box with a single faceplate is required for the wall mounted telecommunication outlet; with a minimum of one (1") conduit stub-up. When utilizing Deco adapters, locations with more than 3 outlets at a single location must go to a 2-two gang outlet box with a dual faceplate and the minimum conduit size shall increase to 1-1/4". If utilizing Belden/CDT cover plates, utilize 4-port cover over single gang box.
- In the offices, flexible conduit is required from the modular furniture feed point (either wall or floor) to the modular furniture. This pathway can be either flexible conduit, spiral wrap, split loom tubing, or loom tubing. It must be cut to length and cover the entire length of the exposed cable. It must be secured at both ends as not to expose cable when furniture is bumped or moved. The communications contractor typically installs this.
- In offices for case goods (non modular furniture), a typical 1-gang outlet can be utilized.
- Where case goods are utilized, and communications outlet is located behind furniture, communications contractor must label with a small, removable, coloured sticky dot on the ceiling directly above the location of the outlet.
- All empty conduits must have a pull string (or rope) installed with a minimum breaking tension of 200 lbs.
- All conduits must be reamed at both ends to avoid any sharp edges that may cut or damage cable being installed. Any conduit not de-burred must be reported immediately to the acting GC. Failure to do so will place onus on the communications contractor for any damaged cable.
- All conduits must be grounded as per local codes.

- Conduits may not be routed adjacent to hot water or steam lines or through areas where flammable materials are installed.
- Bends in the conduit are undesirable and must be kept to a minimum. The minimum inside bend radius permitted is six (6) times the inside diameter of the conduit for conduits smaller than two (2") inches. And ten (10) times the inside diameter of conduits larger than two (2") inches.
- Pull boxes must be installed when there are more than two (2) 90º bends in the conduit run, there is a reverse in the conduit run, or the run exceeds one hundred (100') feet.
- Conduits must be aligned on opposite ends of the pull box. Adjacent side (90º) stub ins on pull boxes are not permitted.
- Pull boxes must be in a strait section of conduit run and are not permitted to be used in lieu of a turn, bend, or corner.
- Pull boxes for communications should not be used for any other type of cabling (i.e. security, paging, sound masking).
- Pull boxes outside of Sheridan Institute of Technology and Advanced Learning spaces are undesireable and should be avoided.
- The preference for Sheridan Institute of Technology and Advanced Learning is to have all wiring closets stacked vertically for ease of cable pulls between floors. This is a recommendation and not a requirement.

7.1.4   Intra Building Pathway Requirements:

Backbone:

- Provide minimum of four (4) 4" sleeves through floors in stacked rooms. Cap any unused conduits. All populated conduits shall be fire stopped according to local codes.
- Where rooms are not stacked, provide minimum (4) 4" conduits continuous between rooms, or as required. Cap any unused conduits. All populated conduits shall be fire stopped according to local codes.
- Connect Communications Closets on same floor with a minimum of two (2) 4" conduits.
- Conduit between rooms shall have no more than (2) 90 degree bends without pull box. Pull boxes shall be sized per the amount of conduits.
- Sleeves shall consist of GRS conduit with bushings and stub above the floor a minimum of 4".
- Horizontal backbone routing shall only be through secure cabletray or 4" conduit. No substitutions shall be allowed.

REFERENCE FIGURE 03 – INTERFLOOR CORE REQUIREMENTS

7.1.4a Breakout Room Pathways Requirements:

Four (4) Person Breakout Room:

- Provide two (2) 1¼" conduits, one (1) from each 2-gang back box at wall locations on the two short walls of the room to the centre of the table location.
- At the wall, the conduit shall be bushed, reamed and left with a grommetted bushing as not to damage any future cabling being installed.
- At the table, the conduit shall be stubbed up a minimum of 12" from the slab. This conduit shall be bushed and reamed only not to leave sharp edges but otherwise left unfinished as it will be cut on site to accommodate specific requirements.
- Routing of conduit can be in slab or in conduit if located in ceiling space below.
- All penetrations must be fire-stopped according to code.

Six (6) Person Meeting Room:

- Provide two (2) 2" conduits, one (1) from each 2-gang back box at wall locations on the two short walls of the room to the centre of the table location.
- At the wall, the conduits shall be bushed, reamed and left with a grommetted bushing as not to damage any future cabling being installed.
- At the table, the conduits shall be stubbed up a minimum of 12" from the slab. These conduits shall be bushed and reamed only not to leave sharp edges but otherwise left unfinished as it will be cut on site to accommodate specific requirements.
- Routing of conduits can be in slab or in conduit if located in ceiling space below.
- All penetrations must be fire-stopped according to code.

Eight (8) Person Meeting Room:

- Provide two (2) 2" conduits, one (1) from each 2-gang back box at wall locations on the two short walls of the room to the centre of the table location.
- At the wall, the conduits shall be bushed, reamed and left with a grommetted bushing as not to damage any future cabling being installed.
- At the table, the conduits shall be stubbed up a minimum of 12" from the slab. These conduits shall be bushed and reamed only not to leave sharp edges but otherwise left unfinished as it will be cut on site to accommodate specific requirements.
- Routing of conduits can be in slab or in conduit if located in ceiling space below.
- All penetrations must be fire-stopped according to code.

Ten to Twelve (10-12) Person Meeting Room:

- Provide two (2) 2" conduits, one (1) from each 2-gang back box at wall locations on the two short walls of the room to the centre of the table location.
- At the wall, the conduits shall be bushed, reamed and left with a grommetted bushing as not to damage any future cabling being installed.
- At the table, the conduits shall be stubbed up a minimum of 12" from the slab. These conduits shall be bushed and reamed only not to leave sharp edges but otherwise left unfinished as it will be cut on site to accommodate specific requirements.
- Routing of conduits can be in slab or in conduit if located in ceiling space below.
- All penetrations must be fire-stopped according to code.

Fourteen Plus (14+) Person Meeting Room:

- Provide two (2) 2" conduits, one (1) from each 2-gang back box at wall locations on the two long walls and the wall where the television shall reside to the centre of the table location.
- At the wall, the conduits shall be bushed, reamed and left with a grommetted bushing as not to damage any future cabling being installed.
- At the table, the conduits shall be stubbed up a minimum of 12" from the slab. These conduits shall be bushed and reamed only not to leave sharp edges but otherwise left unfinished as it will be cut on site to accommodate specific requirements.
- Routing of conduits can be in slab or in conduit if located in ceiling space below.
- All penetrations must be fire-stopped according to code.

7.1.5   Minimum Fill Capacities:

- The following tables are to be referenced for all cable maximum fill ratios for communications cables routed through EMT conduit. If not referenced in tender specification, ownership of overfill recommendations and costs associated to remedy shall fall on the consultant and/or contractor.
- Please note that the conduit fill ratios do not apply to RMC, Inner duct, or Corlon style pathways. Consultant must reference internal diameter of these pathways and use the conduit fill formula listed below.
- Conduits under one (1") are not allowed without written expression from Sheridan Institute of Technology and Advanced Learning IT Department.
- Keep in mind when designing and utilizing fill charts below that recommended fill ratios will vary depending on the number of cables. This easy fill table should always be referenced once number of cables are determined for a conduit run or drop location:

Number of Conductors	1	2	>2
Percentage Fill	53%	31%	40%

If you cannot find the corresponding table, please utilize the conduit fill formula:

Aconduit x (1 – 1 x 0.4) / Acable, where A = pi * d2 / 4

For 4-pair copper cabling please utilize the following tables:

4-pair Category 5E (typical cable O.D. 0.22")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	7	12	16	22	36	50	-

4-pair Category 6 (typical cable O.D. 0.24")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	6	10	15	20	30	40	-

4-pair Category 6A (typical cable O.D. 0.29")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	3	6	7	14	17	20	-

For multi pair Category 5 copper backbone cables please utilize the following tables:

25-pair Category 5 - (typical cable O.D. 0.39")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	1	2	3	6	8	12	24

50-pair Category 5 - (typical cable O.D. 0.58")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	-	1	1	3	3	6	12

100-pair Category 5 - (typical cable O.D. 0.78")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	-	-	1	2	3	6	7

For Fibre Optic Cables please utilize the following tables:

12 Strand Fibre Optic Cable (typical cable O.D. 0.25")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	5	9	14	18	27	36	-

24 Strand Fibre Optic Cable (typical cable O.D. 0.48")

Trade Size	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Inside φ	.824"	1.049"	1.380"	1.610"	2.067"	2.469"	3.068"	4.026"
Maximum	-	2	5	7	9	16	20	-

7.1.6   Horizontal, Accessible Ceiling Spaces:

- Provide cable trays for bundles of cable exceeding 24 cables.
- Provide J-Hooks for cable bundles of 24 and below.
- Route main cable runs through accessible corridor spaces and drop off into each room from the main runs.
- Do not route main cable trays or cable bundles through classrooms or offices.
- Maintain 18" minimum between cable tray fluorescent lighting.

7.1.7   Manholes & Handholes:

Provide additional manholes and/or hand holes to minimize cable pulls to 400', and two 90 degree bends.
- Where required, provide 4'w x 8'l x 4'd manholes
- Where required, provide 24"w x 42"d x 36"l "Quazite" hand holes. (locate hand holes in green space only)

7.1.8   Communications Cable Tray:
- It is mandatory that any new build or retrofit for cabletray be coordinated with all electrical and mechanical drawings and signed off for clear and unrestricted access for ease of use once installed. Minimum clearances around cabletray must be maintained as well. (i.e. two (2') at the sides and one (1') above where possible).

- All cable trays shall be WBT PW (Pewter Powder Coated Finish) or BL (Black Powder Coated Finish) Series; or Sheridan Institute of Technology and Advanced Learning approved equivalent. WBT tray is made from documented recycled steel; it offers over 400% increase in cable support and 68% reduction in cabling pressure/strain over traditional round wire trays. It is a continuous, rigid, T-welded steel wire mesh cable management system with the following requirements:

  REFERENCE FIGURE 04 – WBT MONOMESH TRAY

- Mesh system permits continuous ventilation of cables and maximum dissipation of heat.
- Wire mesh welded at all intersections.
- Wire Diameter: 0.197-inch (5mm) minimum on all mesh sections.
- All mesh sections must have at least one (1) bottom longitudinal wire along entire length.

UL Classification and CUL Listed:

- 2" deep straight sections in 6, 8, 12, 16, 18, 20 and 24 inch widths
- 4" deep straight sections in 6, 8, 12, 16, 18, 20 and 24 inch widths
- 6" deep straight sections in 8, 12, 16, 18, 20, 22, and 24 inch widths
- 8" deep straight sections in 8, 12, 16, 18, and 20" inch widths

Notes: Sheridan Institute of Technology and Advanced Learning preferences 2 and 4 inch depths and 8, 12, and 18 inch widths.
Specify pewter Powder Coated Finish or Black Powder Coated Finish. Stainless Steel (304L and 316S) is also available but Stainless steel wire is used primarily in corrosive environments and food processing facilities.
Stainless steel does not require additional surface treatment. Consult WBT representative for assistance in selecting finish for specific applications (if required).

Nominal Dimensions:
- Mesh: 2 x 4 inches (50 x 100 mm).
- Straight Section Length: 118 inches (3,000 mm).
- Non-Standard widths and depths are available upon request.

Notes: Refer to drawings for size requirements at various locations. Other sizes are only for reference and must be pre-approved for installation due to interference issues. They must also be installed in multiples to add up to the minimum width required on drawings.

Fittings:
- Field fabricated, (in accordance with manufacturer's instructions), from straight sections.

Hardware:
- Hardware, including splice connectors and support components available from manufacturer.

Accessories:
- Covers: Solid covers, pre-galvanized steel, width to match tray.

Grounding:
- Grounding Clip is available for continuous ground of cable management system. [aluminum]
- Grounding of the Cabletray shall be the responsibility of the Communications Contractor.

Installation:
- Communications Contractor shall supply and install all required cable tray for horizontal distribution as outlined on drawings.
- All Cable trays and fittings shall conform to ANSI NFPA 70, Article 318-Cable Trays.
- Supply and install all sections of tray including required coupling/joining hardware, support and attachment hardware, and dropouts (waterfalls) where required.
- The radii on all fittings shall match tray width.
- The inside of the cable tray must be free of burrs, sharp edges, or projections, which can damage the cable insulation.
- Supply and install all required rods for support of cabletray structure. Cabletray shall be supported on trapeze clips and a support must be placed within 2 feet (600mm) on each side of any connection to a fitting.
- All metallic cable trays must be grounded. Clearly mark any tray that is used as an equipment grounding conductor, as specified in ANSI/NFPA 70, Section 318-3 (c).
- Communications Contractor must follow routing laid out on the Communications drawings for all cable tray in the computer room and on the floors.
- All cabletrays must be installed above bulkheads where possible.

7.1.9 Communications Cable Support - All Other Locations
- For bundles of up to 16 cables utilise Erico Part Number CAT12, UPC Number 33178 J-hook assemblies. All cabling shall be separated into separate bundles on each side of the rod. There shall be a maximum of 2 hooks per rod. These are to be supplied and installed by Communications Contractor.
- For bundles between 16 and 24 cables utilise Erico Part Number CAT21, UPC Number 30015 J-hook assemblies. All cabling shall be separated into separate bundles on each side of the rod. There shall be a maximum of 2 hooks per rod. These are to be supplied and installed by Communications Contractor.

- ▪ All J-hooks shall be supported by Erico Cablecat UPC Number 30245, CATHBA Angled Hanger Bracket. These are to be supplied and installed by Communications Contractor.
- ▪ All horizontal cabling designated as floor monuments shall be routed through underslab conduits (supplied and installed by Div.16) and through the floor into floor boxes and furniture feed points (supplied and installed by Div.16).

REFERENCE FIGURE 05 – ERICO J-HOOK DETAIL

7.1.10 Grounding:
- ▪ Well-designed grounding systems reduce the risk of damage to telecommunications equipment from stray voltages. The communications grounding system shall be used for the communications ONLY. Bonding and grounding conductors shall be C.U.L listed for the purposes intended. All bonding conductors shall be insulated copper with green insulation.
- ▪ The minimum inside bend radius of a grounding conductor shall be eight (8) times the diameter of that conductor. Bonding conductors should not be placed in ferrous metal conduit.
- ▪ Telecommunications grounding for each room type shall be defined in that section.

REFERENCE FIGURE 06 – COPPER GROUNDING BUSBAR

7.1.11 Telecommunications Main Grounding Busbar:
- ▪ The telecommunications main grounding busbar (TMGB) is the dedicated extension of the building grounding system for telecommunications. It serves as the master ground bar or central point for the telecommunications grounding system. The TMGB shall be mounted in the main Sheridan Institute of Technology and Advanced Learning communications room of a building. The TMGB shall be connected to the building's service equipment power ground for the building with an insulated stranded cable at least 3/0 AWG in size. This conductor should be continuous in length (no splices) and as straight as possible. Each building shall have a telecommunications main grounding busbar.
- ▪ All telecommunications grounding busbars (one in each communications closet or co-location space) will connect to the telecommunications main grounding busbar via the telecommunications bonding busbar (TBB).
- ▪ This busbar must be sized to handle a minimum of thirty (30) connections and be 6mm thick and 100mm high. It shall be pre-drilled with standard NEMA spacing.
- ▪ The TMGB must be installed on two (2") inch insulating spacers.
- ▪ All connections to the TMGB must be made using 2 hole lugs and silver epoxy. Connecting hardware must be at least 6mm copper or copper alloy and tin plated bolts and nuts.
- ▪ Do not route bonding backbone within 18" of electrical feeders.

7.1.12 Telecommunications Bonding Backbone:
- The telecommunications bonding backbone (TBB) connects the telecommunications main grounding busbar with each of the telecommunication grounding busbars. There will be one telecommunication grounding busbar in each telecommunication closet.
- The telecommunication bonding backbone shall be insulated stranded copper, 3/0 AWG in size.
- Splices should be kept to a minimum and where necessary should be located in accessible telecommunications spaces.
- Provide a 3/0 AWG insulated copper bonding backbone from the main ground bus in the service entrance facility (MDF) to the intermediate rooms (IDF) with 6 AWG jumper to TGB's.

7.1.13 Telecommunications Grounding Busbar:
- One (1) telecommunications grounding busbar will be located in each telecommunications closet. See the communications closet section for more information.
- Bond all equipment, racks, cabinets, etc to ground busbar in each telecommunications room with 6 AWG insulated ground conductor.
- Minimum performance shall be 2ohms.

7.2   TELECOMMUNICATIONS ROOM FUNCTIONS:

7.2.1   Main Distribution Frame (MDF)
AKA: Main Cross Connect

Main Cross Connect will provide telecommunications services to a building or campus environment. It is a distribution frame on one part of which terminate the permanent outside lines entering the central office building and on another part of which terminate the subscriber line multiple cabling, trunk multiple cabling, etc.
- Provide minimum of one (10' x 12') MDF telecommunications room per building.
- This room is the connection point to all other building in a campus environment.

- This room is where all entrance protectors are located.
- The room is typically lined with plywood.
- This room is located on the exterior wall of the building closest to the Main Computer room facility in the campus environment.
- A grounding system must be provided as outlined in the grounding section.

7.2.2   Main Computer Room (MCR)

The Main Computer Room is the Central Location for all computer services in a campus environment and all other buildings in a campus environment shall connect to this room through their own MCC location.

Room sizes for MDF's, MCR's and IDF's listed in this document are for reference only. All consultants and contractors must adhere to architectural drawings for each project.

The Main Computer Room at larger facilities must be a minimum of 12' x 20' in size.

REFERENCE FIGURE 07 – 12' x 20' COMPUTER ROOM LAYOUT

The Main Computer Room at smaller facilities must be a minimum of 7' x 12' in size.

REFERENCE FIGURE 08 – 7' x 12' COMPUTER ROOM LAYOUT

The Main Computer Room a remote sites must be a minimum of 7' x 8' in size.

REFERENCE FIGURE 09 – 7' x 8' COMPUTER ROOM LAYOUT

7.2.2.1 Main Computer Room General:
- The Main Communication Room must be a maximum of 500' (horizontal and vertical run combined) from the furthest Communications Closet that the Room serves.
- In campus environments these Main Rooms serving the building may be further but distances must be defined to ensure fiber lengths are accurate.
- The Main Communications Room may not be located on the exterior of the building.
- The Main Communications Room may not have windows.
- Equipment racks within the room must have at least four (4') feet clearance in front and from a wall mounted cable termination field and three (3') feet on the rear and clearance from any other wall or obstruction.
- Entrance doors to the closet should swing inward still maximizing the usable space within the room.
- Entrance doors shall have direct access to hallways (i.e. never through a classroom, office or other building services utility rooms.

- Entrance doors shall not have any windows.
- Door and a half width shall be a minimum of 54" wide and 84" high. This shall comprise of two doors, one a full width 36" door and the other a ½ width 18" width door.
- There shall be no door sill in the entrance doorway.
- Doors should be fitted with automatic closers and have either card access or keypad access only.
- The closet shall not be adjacent to any washrooms, janitor's closets, or kitchen spaces. Generally, no plumbing piping, fixtures, or HVAC equipment that could produce leaks or where water may permeate into the room should be located within the confines of the communications closets.

- The closet shall not be directly below or adjacently below any of the rooms defined above.
- No water pipes except for sprinklers shall pass through the ceiling space of the communications closet.
- The Main Communications Room size will vary from campus to campus and sizes shall be defined by Sheridan Institute of Technology and Advanced Learning IT department. The minimum size for this room shall be twelve (12') feet by twenty (20') feet.
- Main Computer Room should be centrally located within the physical area that they serve.
- The Main Computer Room may be stacked with Communication closets wherever possible.
- Adjust room sizes accordingly for additional systems (video, security, access control, etc.)
- Main Computer Room shall feed all fibre and copper backbone to Communications Closets or Co-Locate Closets.

7.2.2.2 Main Computer Room Ceilings:
- Main Computer Room does not require, nor is it recommended that they have finished ceilings. Closets without finished ceilings must have fireproofing encapsulated to reduce dust in the room.
- The minimum clear ceiling height in the Main Computer Room is 9'-6" clear from the finished floor The only suspended fixture permitted below the 9'-6" clear is the communications cable tray, should it be required. Heights and clearances for this are defined in this document.
- Sprinkler heads within the Main Computer Room should be provided with protective cages to prevent accidental operation.

REFERENCE FIGURE 10 – TYPICAL SPRINKLER CAGES

7.2.2.3 Main Computer Room Floors:
- Main Computer Room requires the installation of anti-static Vinyl Composite Tile (VCT).
- Floors should be level, free of high/low spots that would interfere with floor mounting bolts for equipment such as racks or cabinets.

7.2.2.4 Main Computer Room Walls
- Walls should be 'slab-to-slab' partitions to satisfy one (1) hour fire rating or as local code requires in achieving that one (1) hour fire rating.
- Each wall of the closet (facing accessible ceiling areas) shall have either sleeves or a framed slot installed above the general ceiling height to allow cable to enter the closet overhead, while making the installation of the fire stop materials possible once cabling is installed.

- One wall of the Main Computer Room will have a telecommunications plywood backboard. This shall be in sheets of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved to backbone cabling, sound masking, or paging. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16: centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.
- On another, either adjacent or opposite wall there shall be a requirement for a security backboard. This shall be one (1) sheet of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved for security cabling and/or building environmental controls as required. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16" centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.
- Drywall walls within the room are to be pained a light color to enhance room lighting.

7.2.2.5 Main Computer Room Heating, Cooling and Ventilation:
- The Main Computer Room will require 24/7 climate control.
- The air conditioning unit will maintain a positive pressure in the room with a minimum of one air change per hour.
- The air conditioning units shall be located outside the communications closet where possible and the air conditioned air shall be ducted into the closet.
- Room temperature shall be maintained at 18ºC to 24ºC.
- Air conditioning unit should be backed up by the emergency power generator where available but should not be on the UPS system.
- If air conditioning is inside room, all condensate pipes must be routed to a drain located outside the room.

7.2.2.6 Main Computer Room Power:
- Each Main Computer Room shall have a UPS supplied by Sheridan Institute of Technology and Advance Learning. All rack circuits and plugs shall be on building EPS (Emergency Power System) or Generator. The UPS panel will support equipment only and not lighting circuits or air conditioning equipment, as those should be on a panel backed up by the generator.
- Air Conditioning within any IT space should be backed up on building EPS or Generator.
- All electrical panels within the Main Computer Room should support power within the Main Computer Room only. There should be no panels mounted in the Main Computer Room that support any equipment/lighting outside of the closet.
- All active equipment in the Main Computer Room must be connected to building EPS (generator power) if it is available.

- There should only be one (1) utility electrical receptacle on each wall that does not have plywood on it or a door on it. These receptacles are not on the UPS panel and do not require generator back up.
- The Main Computer Room shall contain freestanding racks or cabinets that will require UPS power for LAN switches. If raised floor is installed in the facility, they can be under the raised floor. Type and quantity shall be defined for each project.
- UPS receptacles in the Main Computer Room should be identified as such to distinguish them from other receptacles.
- All receptacles reserved for power on the racks shall be mounted at the bottom, back of the rack at the right hand side (not on vertical cable management).

Power shall be located at the bottom of the racks on the right hand side as not to impede the mounting of equipment. It shall not impede the cable management.

REFERENCE FIGURE 11 – C.R. RACK CROSS SECTION

7.2.2.7 Main Computer Room Lighting:
- Lighting intensity within the Main Computer Room should be a minimum of 50 foot candles measured at three (3') feet above the finished floor. Additional lighting should be provided over the wall field termination plywood. Low ratio frequency emission fluorescent lighting should be used.
- Lighting should be powered from a separate power source than the critical network equipment. Lighting should be on back up generator power but not on UPS.
- Lighting should be located a minimum 12" from the front and rear of the rack as not to obstruct cabletrays and access to cabletrays. Lighting should be mounted a minimal 12" above the highest point on the cabletray.

7.2.2.8 Main Computer Room Grounding and Bonding:
- All Main Computer Room shall have a telecommunications grounding busbar (TGB). The TGB shall be 6mm thick and 5ohm high and sufficient width to accommodate fifteen (16) lugs. The TGB shall connect to the telecommunications bonding backbone (TBB) with a minimum 3/0 AWG copper cable. See grounding section of this document for more information on the telecommunication bonding backbone.
-
- All racks and cabinets including metal cable termination frames within the Main Computer Room shall have their frames individually (NOT serially) connected to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor.

- All conduit, ladder rack or cabletray in the Main Computer Room shall be bonded to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor. The conduit and ladder rack or cabletray may be serially connected to the TGB. Grounding strips should be used to connect separate sections of ladder rack or cabletray to ensure continuity.
- Metallic cable sheathe should be connected to the telecommunication grounding busbar using 14 AWG insulated copper conductors.
- Typically, the telecommunication grounding busbar will be mounted at the lower right corner of the plywood cable termination wall field. The bar should be mounted on insulated stand-offs as defined in the grounding section.

7.2.2.9 Main Computer Room Rack Requirements

- Middle Atlantic RL10-45 racks are made of 11-gauge steel and are 10-32 tapped to standard EIA spacing. They also come standard with U markings and rack screws. All racks can easily be ganged together with or without cable managers.
- Included, are provisions for bolting units to the floor and standard mounting widths are all available. Optionally, Power bars and cable managers are easily fitted to suit the end use.
- All racks shall be **black** only. Upon request, custom colors and sizes are available.
- Additional components shall be required including VDC10-45 10" vertical managers when ganging racks and VDC6-45 on each side. Vertical or zero U power bars will also be required but must be verified with each project.
- Standard Features Include:
    - Heavy gauge steel, Welded or knockdown
    - Universal EIA hole spacing
    - Various heights available
    - Only 19" mounting is required, with rack height of 45U
    - Ganging capabilities with or without vertical cable managers
    - Available tapped both sides
    - Optional heavy duty kits increase footprint to 36"

REFERENCE FIGURE 12 – RACK ELEVATION DETAIL A

REFERENCE FIGURE 13 – RACK ELEVATION DETAIL B

7.2.2.10 Main Computer Room Cabinet Requirements
- Middle Atlantic MRK-4436 cabinets are made with 11-gauge steel and have a static weight capacity of 10,000 lbs. They come with 10-32 tapped to standard EIA spacing. Additional rear Z rails are required
- The tops are configurable for any scenario.
- All cabinets shall be black only. Upon request, custom colors and sizes are available.

- Additional requirements for cabinets shall be defined for each individual project.

7.2.3 Intermediate Distribution Frame Type I (IDF I)
AKA: Communications Closets

Communications Co-Locate Closets will provide the IT services to the general area in which the closet is located. Each floor of each Sheridan Institute of Technology and Advanced Learning occupied building must have at least one (1) communications closet or communications co-locate closet. Cabling serving offices, classrooms, other services on a particular floor must be terminated in a communications closet or communications co-locate on the same floor.

REFERENCE FIGURE 14 – 5' x 8' I.T. CLOSET

REFERENCE FIGURE 15 – 7' x 6' I.T. CLOSET

REFERENCE FIGURE 16 – I.T. CLOSET CROSS SECTION 'A'

REFERENCE FIGURE 17 – I.T. CLOSET CROSS SECTION 'B'

REFERENCE FIGURE 18 – 4.5'x 6' SHALLOW I.T. CLOSET

7.2.3.1 Communications Closet General:
- Each closet must be a maximum of 235' (horizontal run) from the furthest telecommunications outlet that the closet serves. The remaining 60' is reserved for vertical cable run and patch cords. Please note that these lengths are for cable distance, NOT drawing scale distance.
- Equipment racks within the room must have at least four (4') feet clearance from a wall mounted cable termination field and three (3') feet of clearance from any other wall or obstruction.
- Entrance doors to the closet should swing outward where possible maximizing the usable space within the room.
- Entrance doors shall have direct access to hallways (i.e. never through a classroom, office or other building services utility rooms.
- Entrance doors shall not have any windows.
- Door width shall be a minimum of 36" wide and 84" high.
- There shall be no door sill in the entrance doorway.
- Doors should be fitted with automatic closers and have either card access or keypad access only.
- The closet shall not be adjacent to any washrooms, janitor's closets, or kitchen spaces. Generally, no plumbing piping, fixtures, or HVAC equipment that could produce leaks or where water may permeate into the room should be located within the confines of the communications closets.
- The closet shall not be directly below or adjacently below any of the rooms defined above.

- No water pipes except for sprinklers shall pass through the ceiling space of the communications closet.
- The minimum closet size is 8'-0" x 10'-0" (80 sq. ft.). These are minimum width x length requirements (i.e. a room with 4'-0" x 20'-0" is not acceptable)
- Communications closets should be centrally located within the physical area that they serve.
- Stack rooms wherever possible.
- Provide one room for every 100 to 20,000 sq.ft. and less than 295 ft. in length of cable.
- Adjust room sizes accordingly for additional systems (video, security, access control, etc.)

7.2.3.2 Communications Closet Ceilings:
- Communications closets do not require, nor is it recommended that they have finished ceilings. Closets without finished ceilings must have fireproofing encapsulated to reduce dust in the room.
- The minimum clear ceiling height in the communications closet is 9'-6" clear from the finished floor The only suspended fixture permitted below the 9'-6" clear is the communications cable tray, should it be required. Heights and clearances for this are defined in this document.
- Sprinkler heads within the room should be provided with protective cages to prevent accidental operation.

7.2.3.3 Communications Closet Floors:
- Communications closets require the installation of anti-static Vinyl Composite Tile (VCT).
- Floors should be level, free of high/low spots that would interfere with floor mounting bolts for equipment such as racks or cabinets.

7.2.3.4 Communications Closet Walls
- Walls should be 'slab-to-slab' partitions to satisfy one (1) hour fire rating or as local code requires in achieving that one (1) hour fire rating.
- Each wall of the closet (facing accessible ceiling areas) shall have either sleeves or a framed slot installed above the general ceiling height to allow cable to enter the closet overhead, while making the installation of the fire stop materials possible once cabling is installed.
- One wall of the Communications Closet will have a telecommunications plywood backboard. This shall be in sheets of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved to backbone cabling, sound masking, or paging. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16: centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.

- On another, either adjacent or opposite wall there shall be a requirement for a security backboard. This shall be one (1) sheet of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved for security cabling and/or building environmental controls as required. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16" centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.
- Drywall walls within the room are to be pained a light color to enhance room lighting.

7.2.3.5 Communications Closet Heating, Cooling and Ventilation:
- All communications closets will require 24/7 climate control.
- The air conditioning unit will maintain a positive pressure in the room with a minimum of one air change per hour.
- The air conditioning units shall be located outside the communications closet where possible and the air conditioned air shall be ducted into the closet.
- Room temperature shall be maintained at 18ºC to 24ºC.
- Air conditioning unit should be backed up by the emergency power generator where available but should not be on the UPS system.
- If air conditioning is inside room, all condensate pipes must be routed outside the room.
- The relative humidity in the room must be kept at 40%

7.2.3.6 Communications Closet Power:
- Each communications closet shall have a UPS supplied by Sheridan Institute of Technology and Advance Learning. All rack circuits and plugs shall be on building EPS (Emergency Power System) or Generator. The UPS panel will support equipment only and not lighting circuits or air conditioning equipment, as those should be on a panel backed up by the generator.
- All electrical panels within the telecommunications closet should support power within the communications closet only. There should be no panels mounted in the closet that support any equipment/lighting outside of the closet.
- There should only be one (1) utility electrical receptacle on each wall that does not have plywood on it or a door on it. These receptacles are not on the UPS panel and do not require generator back up.
- The communications closet shall contain free standing racks or cabinets that will require UPS power for LAN switches. If raised floor is installed in the facility, they can be under the raised floor. Type and quantity shall be defined for each project.
- UPS receptacles in the room should be identified as such to distinguish them from other receptacles.
- All receptacles reserved for power on the racks shall be mounted at the bottom, back of the rack at the right hand side (not on vertical cable management).

7.2.3.7 Communications Closet Lighting:

- Lighting intensity within the room should be a minimum of 50 foot candles measured at three (3') feet above the finished floor. Additional lighting should be provided over the wall field termination plywood. Low ratio frequency emission fluorescent lighting should be used.
- Lighting should be powered from a separate power source than the critical network equipment. Lighting should be on back up generator power but not on UPS.
- Lighting should be located a minimum 12" from the front and rear of the rack as not to obstruct cabletrays and access to cabletrays. Lighting should be mounted a minimal 12" above the highest point on the cabletray.
- Lighting should not interfere, cross or be installed perpendicular to the cable tray within the room.

7.2.3.8 Communications Closet Grounding and Bonding:

- All telecommunications closets shall have a telecommunications grounding busbar (TGB). The TGB shall be 6mm thick and 5omm high and sufficient width to accommodate fifteen (16) lugs. The TGB shall connect to the telecommunications bonding backbone (TBB) with a minimum 3/0 AWG copper cable. See grounding section of this document for more information on the telecommunication bonding backbone.
- All racks and cabinets including metal cable termination frames within the closet shall have their frames individually (NOT serially) connected to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor.
- All conduit, ladder rack or cabletray in the communications closet shall be bonded to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor. The conduit and ladder rack or cabletray may be serially connected to the TGB. Grounding strips should be used to connect separate sections of ladder rack or cabletray to ensure continuity.
- Metallic cable sheathe should be connected to the telecommunication grounding busbar using 14 AWG insulated copper conductors.
- Typically, the telecommunication grounding busbar will be mounted at the lower right corner of the plywood cable termination wall field. The bar should be mounted on insulated stand-offs as defined in the grounding section.

7.2.3.9 Communications Closet Rack Requirements

- Middle Atlantic RL10-45 racks are made of 11-gauge steel and are 10-32 tapped to standard EIA spacing. They also come standard with U markings and rack screws. All racks can easily be ganged together with or without cable managers.
- Included, are provisions for bolting units to the floor and standard mounting widths are all available. Optionally, Power bars and cable managers are
- easily fitted to suit the end use.
- All racks shall be black only. Upon request, custom colors and sizes are available.

- Additional components shall be required including VDC10-45 10" vertical managers when ganging racks and VDC6-45 on each side. Vertical or zero U power bars will also be required but must be verified with each project.
- Standard Features Include:
  - Heavy gauge steel
  - Welded or knockdown
  - Universal EIA hole spacing
  - Various heights available
  - Only 19" mounting is required, with rack height of 44U
  - Ganging capabilities with or without vertical cable managers
  - Available tapped both sides
  - Optional heavy duty kits increase footprint to 36"

7.2.4   Intermediate Distribution Frame Type II (IDF II)
AKA: Communications Co-Locate Closets

Communications co-locate closets will provide the IT services to the general area in which the closet is located. Each floor of each Sheridan Institute of Technology and Advanced Learning occupied building must have at least one (1) communications closet or communications co-locate closet. Cabling serving offices, classrooms, other services on a particular floor must be terminated in a communications closet or communications co-locate on the same floor.

7.2.4.1 Communications Co-Locate Closet General:
- Each co-locate closet must be a maximum of 235' (horizontal run) from the furthest telecommunications outlet that the co-locate closet serves. The remaining 60' is reserved for vertical cable run and patch cords. Please note that these lengths are for cable distance, NOT drawing scale distance.
- All co-locate closets will utilize four post, two section, front and rear lockable and vented cabinets.
- Equipment cabinets within the room must have at least four (4') feet clearance from a wall mounted cable termination field and three (3') feet of clearance from any other wall or obstruction.
- Entrance doors to the co-locate closet should swing inward where possible maximizing the usable space within the room.
- Entrance doors shall have direct access to hallways (i.e. never through a classroom, office or other building services utility rooms.
- Entrance doors shall not have any windows.
- Door width shall be a minimum of 36" wide and 84" high.
- There shall be no door sill in the entrance doorway.
- Doors should be fitted with automatic closers and have either card access or keypad access only.
- The co-locate closet shall not be adjacent to any washrooms, janitor's closets, or kitchen spaces. Generally, no plumbing piping, fixtures, or HVAC equipment that could produce leaks or where water may permeate into the room should be located within the confines of the co-locate closets.

- The co-locate closet shall not be directly below or adjacently below any of the rooms defined above.
- No water pipes except for sprinklers shall pass through the ceiling space of the co-locate closet.
- The minimum IT portion of the co-locate closet size is 8'-0" x 10'-0" (80 sq. ft.). These are minimum width x length requirements (i.e. a room with 4'-0" x 20'-0" is not acceptable)
- Co-locate closets should be centrally located within the physical area that they serve.
- Stack rooms wherever possible.
- Provide one co-locate closet for every 100 to 20,000 sq.ft. and less than 295 ft. in length of cable.
- Adjust room sizes accordingly for additional systems (video, security, access control, etc.)

7.2.4.2 Communications Co-Locate Closet Ceilings:
- Co-locate closets do not require, nor is it recommended that they have finished ceilings. Co-locate closets without finished ceilings must have fireproofing encapsulated to reduce dust in the room.
- If in row cooling is not being used at a co-locate closet, only then will a dropped T-bar ceiling be acceptable as a return air plenum.
- The minimum clear ceiling height in the communications closet is 9'-6" clear from the finished floor. The only suspended fixture permitted below the 9'-6" clear is the communications cable tray, should it be required. Heights and clearances for this are defined in this document.
- Sprinkler heads within the room should be provided with protective cages to prevent accidental operation.

7.2.4.3 Communications Co-Locate Closet Floors:
- Co-locate closets require the installation of anti-static Vinyl Composite Tile (VCT).
- Floors should be level, free of high/low spots that would interfere with floor mounting bolts for equipment such as racks or cabinets.

7.2.4.4 Communications Co-Locate Closet Walls
- Walls should be 'slab-to-slab' partitions to satisfy one (1) hour fire rating or as local code requires in achieving that one (1) hour fire rating.
- Each wall of the co-locate closet (facing accessible ceiling areas) shall have either sleeves or a framed slot installed above the general ceiling height to allow cable to enter the closet overhead, while making the installation of the fire stop materials possible once cabling is installed.

- One wall of the co-locate closet will have a telecommunications plywood backboard. This shall be in sheets of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved to backbone cabling, sound masking, or paging. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16: centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.
- On another, either adjacent or opposite wall there shall be a requirement for a security backboard. This shall be one (1) sheet of 4'-0" x 8'-0" x ¾" fire rated plywood stamped accordingly. The use and space on this backboard shall be reserved for security cabling and/or building environmental controls as required. All plywood shall be G1S, free of any imperfections and mounted good side out. If raising of backboard is required, it shall be done on wood 2" x 6" x 8'-0" studs mounted on 16" centers to create a vertical cable chase behind the plywood. Horizontal bracing or blocking is not allowed.
- Drywall walls within the room are to be pained a light color to enhance room lighting.

7.2.4.5 Communications Co-Locate Closet Heating, Cooling and Ventilation:
- All co-locate closets will require 24/7 climate control.
- The air conditioning unit will maintain a positive pressure in the room with a minimum of one air change per hour.
- The air conditioning units shall be located outside the communications closet where possible and the air conditioned air shall be ducted into the closet.
- Room temperature shall be maintained at 18ºC to 24ºC.
- Air conditioning unit should be backed up by the emergency power generator where available but should not be on the UPS system.
- If air conditioning is inside room, all condensate pipes must be routed outside the room.
- The relative humidity in the room must be kept at 40%

7.2.4.6 Communications Co-Locate Closet Power:
- Each co-locate closet shall have a UPS supplied by Sheridan Institute of Technology and Advance Learning. All rack circuits and plugs shall be on building EPS (Emergency Power System) or Generator. The UPS panel will support equipment only and not lighting circuits or air conditioning equipment, as those should be on a panel backed up by the generator.
- All electrical panels within the co-locate closet should support power within the co-locate closet only. There should be no panels mounted in the closet that support any equipment/lighting outside of the closet.
- There should only be one (1) utility electrical receptacle on each wall that does not have plywood on it or a door on it. These receptacles are not on the UPS panel and do not require generator back up.

- The co-locate closet shall contain free standing cabinets that will require UPS power for LAN switches. If raised floor is installed in the facility, they can be under the raised floor. Type and quantity shall be defined for each project.
- UPS receptacles in the room should be identified as such to distinguish them from other receptacles.
- All receptacles reserved for power on the cabinets shall be mounted inside the IT section of the cabinet.

7.2.4.7 Communications Co-Locate Closet Lighting:
- Lighting intensity within the co-locate closet should be a minimum of 50 foot candles measured at three (3') feet above the finished floor. Additional lighting should be provided over the wall field termination plywood. Low ratio frequency emission fluorescent lighting should be used.
- Lighting should be powered from a separate power source than the critical network equipment. Lighting should be on back-up generator power but not on UPS.
- Lighting should be located a minimum 12" from the front and rear of the rack as not to obstruct cabletrays and access to cabletrays. Lighting should be mounted a minimal 12" above the highest point on the cabletray.
- Lighting should not interfere, cross or be installed perpendicular to the cable tray within the room.

7.2.4.8 Communications Co-Locate Closet Grounding and Bonding:
- All co-locate closets shall have a telecommunications grounding busbar (TGB). The TGB shall be 6mm thick and 5omm high and sufficient width to accommodate fifteen (16) lugs. The TGB shall connect to the telecommunications bonding backbone (TBB) with a minimum 3/0 AWG copper cable. See grounding section of this document for more information on the telecommunication bonding backbone.
- All cabinets including metal cable termination frames within the closet shall have their frames individually (NOT serially) connected to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor.
- All conduit, ladder rack or cabletray in the communications closet shall be bonded to the telecommunication grounding busbar via a 6 AWG insulated copper grounding conductor. The conduit and ladder rack or cabletray may be serially connected to the TGB. Grounding strips should be used to connect separate sections of ladder rack or cabletray to ensure continuity.
- Metallic cable sheathe should be connected to the telecommunication grounding busbar using 14 AWG insulated copper conductors.
- Typically, the telecommunication grounding busbar will be mounted at the lower right corner of the plywood cable termination wall field. The bar should be mounted on insulated stand-offs as defined in the grounding section.

7.2.4.9 Communications Co-Locate Closet Cabinet Requirements

- Middle Atlantic MRK-4436 cabinets are made with 11-gauge steel and have a static weight capacity of 10,000 lbs. They come with 10-32 tapped to standard EIA spacing. Additional rear Z rails are required
- The tops are configurable for any scenario.
- All cabinets shall be black only. Upon request, custom colors and sizes are available.
- Co-Locate cabinets must have lockable secured doors both front and rear.

8.0   ROOM FUNCTION:

All classrooms will receive a whiteboard. The sizes and number of whiteboards will vary depending on room size and function. Exact size will be defined by the consultant and/or contractor and supplied only by the successful communications contractor. Mounting heights and sizes are defined in the reference sketch.

REFERENCE FIGURE 19 – WHITEBOARD DETAILS

8.1   STANDARD CLASSROOM

Function: Standard classrooms are designed with seating for 48, 36 or 24 students. These students sit at desks that can be moved or reconfigured. The podium where all the teaching equipment will be held will also be re-locatable. There will be no dedicated AV cabling in these rooms, instead all Audio/Video/Control signals will be sent over the network using any of the data jacks in the floor monuments and received by the projectors or sound system using devices that are also connected to our network.

REFERENCE FIGURE 20 – STANDARD CLASSROOM

8.2   SPLIT CLASSROOM

Function: Split classrooms are paired side by side with a moveable wall separating the two of them. Individually, Split rooms are designed the same way as standard rooms. However when the moveable wall is opened the two rooms become one, thus making the podiums act differently. One podium will act as the "master" and be able to take control of the Audio Visual equipment in both rooms. The other podium becomes the "slave" and can no longer control any of the equipment in either room. There will be no whiteboards or projectors mounted onto the moveable wall.

REFERENCE FIGURE 21 – SPLIT CLASSROOM

8.3   MEETING ROOMS

Function: Meeting rooms accommodate up to 14+ people at rectangular or wedge-shaped tables located in the center of the room. These rooms are similar to the group study rooms where the technology is used for presentation purposes but also may be used for video conferencing. These rooms are equipped with a minimum of one LCD screen mounted on the wall near the end of the table. The control device shall be mounted in or on the table to give the users the capability to control and display the LCD. All AV cabling for this room will run from the LCD to the table, so that there is easy access to display any laptop/tablet on the screen.

REFERENCE FIGURE 22 – 4-6 PERSON BREAKOUT ROOM

REFERENCE FIGURE 23 – 8 PERSON BREAKOUT ROOM

REFERENCE FIGURE 24 – 10-12 PERSON BREAKOUT ROOM

REFERENCE FIGURE 25 – 14+ PERSON BREAKOUT ROOM

8.4   LABS

Function: Labs accommodate multiple groups of students at lab style desks in rows. The number of students will depend on the size of the Lab. Depending on function of the lab, these desks may accommodate between two (2) and four (4) students each and not necessarily facing the front of the class. Labs are specialized classrooms. They are set up like a standard classroom but will have to accommodate specialized equipment on a case by case basis. They should include all the base functionality of a classroom with special needs layered on top.

REFERENCE FIGURE 26 – LAB

8.5   BREAKOUT/GROUP STUDY ROOMS

Function: These rooms are designed to allow a small group of students to meet and work collaboratively at a peninsula-style table that is connected to one of the walls. These rooms are equipped with an LCD screen on the opposite wall of the desk for presenting, as well as a wall jack and control device on the same wall to give the students the capability to control and display a laptop/tablet.

REFERENCE FIGURE 27 – BREAKOUT/GROUP STUDY ROOM

8.6   LECTURE HALLS

Function: Auditoriums and lecture halls are intended for large class sizes or special events. These rooms will have tiered seating and state of the art technology. Long throw projectors will be needed to allow for a large bright image to be displayed. All AV equipment will be stored in an AV room located in the back of the auditorium or in the podium at the front of the room.

REFERENCE FIGURE 28 – LECTURE HALL

REFERENCE FIGURE 29 – LECTURE HALL DETAILS

8.7   ADMINISTRATION OFFICES

Function: The need for AV in office spaces is the same as open or public spaces. Strategically placed LCDs are installed for digital signage purposes. The sizes of screens and placement height will vary throughout.

8.8   PUBLIC SPACES

Function: The need for AV in public spaces is very minimal at the college. Usually this only entails strategically placed LCDs around the campus for digital signage use. The sizes of screens and placement height will vary throughout.

8.9   PLUG CONFIGURATIONS

Plug configuration will vary throughout the Sheridan spaces. They are listed below with requirements for each one.

REFERENCE FIGURE 30 – OUTLET TYPES

Type A – Convenience Location
>   2-gang back box and cover plate (by Division 16)
>   1/2" conduit for electrical wiring
>   1" conduit to ceiling space for communications wiring
>   Internal barrier between electrical and communications
>   One (1) 15A duplex receptacle
>   Two (2) Category 6 Modular outlets on Decora strap
>   One (1) blank insert
>   Mounted at 12" A.F.F.

REFERENCE FIGURE 31 – TYPE 'A'

Type B – Printer Location
>   2-gang back box and cover plate (by Division 16)
>   1/2" conduit for electrical wiring
>   1" conduit to ceiling space for communications wiring
>   Internal barrier between electrical and communications
>   One (1) 20A duplex receptacle
>   One (1) Category 6 Modular outlet on Decora strap
>   Two (2) blank inserts
>   Mounted at 12" A.F.F.

REFERENCE FIGURE 31 – TYPE 'B'

Type C – Projector Location
>   2-gang back box and cover plate (by Division 16)
>   1" conduit for communications wiring
>   Internal barrier between electrical and communications
>   One (1) 15A duplex receptacle
>   One (1) Category 6 Modular outlet on Decora strap
>   Two (2) blank inserts
>   Mounted at 111" A.F.F.

REFERENCE FIGURE 32 – TYPE 'C'

Type D – Podium Location

> 3-gang back box and cover plate (by Division 16)
> 1" conduit for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Two (2) Category 6 Modular outlets on Decora strap
> > ▪ one of the 2 drops requires to be a purple jack.
> One (1) blank inserts
> Mounted in floor monument 6' off each wall and/or centre of room as defined on classroom sketches

REFERENCE FIGURE 32 – TYPE 'D'

Type E – Wireless Access Point Location

> 1-gang back box and cover plate (by Division 16)
> One (1) Category 6 Modular outlet on Decora strap
> Two (2) blank inserts
> Mounted above finished ceiling

REFERENCE FIGURE 33 – TYPE 'E'

Type F – Above Ceiling Outlet

> 3-gang back box and cover plate (by Division 16)
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Three (3) Category 6 Modular outlets on Decora strap
> Mounted above finished ceiling outside of classroom as defined on classroom sketches

REFERENCE FIGURE 33 – TYPE 'F'

Type G – Wall Mount Phone Location

> 1-gang back box and cover plate (by Division 16)
> 1" conduit to ceiling space for communications wiring
> One (1) Category 6 Modular outlets on Decora strap
> Two (2) blank inserts
> Mounted at 48" A.F.F.

REFERENCE FIGURE 34 – TYPE 'G'

Type H – Lecture Capture Camera Location

    2-gang back box and cover plate (by Division 16)
    1/2" conduit for electrical wiring
    1" conduit to ceiling space for communications wiring
    Internal barrier between electrical and communications
    One (1) 15A duplex receptacle
    One (1) Category 6 Modular outlet on Decora strap
    Two (2) blank inserts
    Mounted at 12" under finished ceiling

    REFERENCE FIGURE 34 – TYPE 'H'

Type J – LCD Location

    2-gang recessed back box and cover plate (by Division 16)
    1/2" conduit for electrical wiring
    1" conduit to ceiling space for communications wiring
    Internal barrier between electrical and communications
    One (1) 15A duplex receptacle
    One (1) Category 6 Modular outlet on Decora strap
    Two (2) blank inserts
    Mounted at 72" A.F.F.

    REFERENCE FIGURE 35 – TYPE 'J'

Type K – Spider Mfg. PHA2 Table Location

    PHA2 Spider box mounted in table
    1" conduit for communications wiring
    Internal barrier between electrical and communications
    One (1) 15A duplex receptacle
    Two (2) Category 6 Modular outlets on Decora strap
    Four (4) blank inserts

    REFERENCE FIGURE 35 – TYPE 'K'

Type L – Under Table Surface Mount Location

    3-gang surface mount box and cover plate (by Division 16)
    1" conduit for communications wiring
    Internal barrier between electrical and communications
    Two (2) 15A duplex receptacles
    Two (2) Category 6 Modular outlets on Decora strap
    One (1) blank insert
    Mounted to underside of table

    REFERENCE FIGURE 36 – TYPE 'L'

Type M – Podium Lecture Stand Location
> 3-gang back box and cover plate (by Division 16)
> 1/2" conduit to floor monument for electrical wiring
> 2" conduit to A/V Control Room for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Three (3) Category 6 Modular outlets on Decora strap
> Mounted inside podium

REFERENCE FIGURE 36 – TYPE 'M'

Type N – Lecture Hall Projector Location
> 3-gang back box and cover plate (by Division 16)
> 1/2" conduit for electrical wiring
> 2" conduit A/V Control Room for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Two (2) Category 6 Modular outlets on Decora strap
> One (1) blank insert
> Mounted above finished ceiling

REFERENCE FIGURE 37 – TYPE 'N'

Type P – A/V Closet Location
> 4-gang back box and cover plate (by Division 16)
> 1/2" conduit for electrical wiring
> Two (2) 1" conduits to ceiling space for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacle
> Four (4) Category 6 Modular outlets on Decora strap
> Two (2) blank inserts

REFERENCE FIGURE 37 – TYPE 'P'

Type Q – Spider Mfg. PHA2 Table Location
> PHA2 Spider box mounted in table
> 1" conduit for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Four (4) Category 6 Modular outlets on Decora strap
> Two (2) blank inserts

REFERENCE FIGURE 38 – TYPE 'Q'

Type R – Spider Mfg. PHA2 Table Location
> PHA2 Spider box mounted in table
> 2 @ 1" conduits for communications wiring
> Internal barrier between electrical and communications
> One (1) 15A duplex receptacles
> Two (2) Category 6 Modular outlets on Decora strap
> Two (2) blank inserts

> *REFERENCE FIGURE 38 – TYPE 'R'*

Type S – Wall Mount Clock Location
> 1-gang back box and cover plate (by Division 16)
> 1" conduit for communications wiring
> One (1) Category 6 Modular outlets on Decora strap
> Two (2) blank inserts
> Mounted at 12" Above Door Frame at classroom entrance

> *REFERENCE FIGURE 39 – TYPE 'S'*

Type T – Sheridan TV Outlet
> 3-gang back box and cover plate (by Division 16)
> 1" conduit for communications wiring
> Internal barrier between electrical and communications
> Two (2) 15A duplex receptacles
> Two(2) Category 6 Modular outlets on Decora strap
> One (1) Blank insert
> Mounted 108" A.F.F.
> Locations will be defined during design phase

> *REFERENCE FIGURE 39 – TYPE 'T'*

9.0 INFRASTRUCTURE FOR I.T.

9.1 CABLING – FIBRE

All fibre optic related sketches will be in the format of cut sheets attached to the appendices this document.

9.1.1 Inter Building
- Minimum 24 strand 8.3/125μ single mode fibre terminated on LC connectors (glass fiber as manufactured by corning, jacketed under Corning) between hub buildings
- Provide 30' slack loop in manhole.
- Provide 15' slack loop in telecommunications room.

9.1.1.1 Single Mode Fibres

.1 Low-Water-Peak Single-Mode Fiber (SMF-28e®)
- Primary Application: Industry standard fiber used to support campus and building backbone cabling systems comprising local area networks (LANs).
- The cabled optical fiber shall support industry-standard multi-gigabit Fibre Channel physical interface specifications.

.2 Outdoor Loose Tube (ALTOS®) All-Dielectric Gel-Free Cable, 2-288 Fibers
- Outside plant cable for outdoor duct or aerial overlash installation.
- Cable shall be Corning Cable Systems part number _ _ _ _ U4-T41_ _ D20

.3 Outdoor Loose Tube (ALTOS®) Armored Gel-Free Cable, 2-288 Fibers
- Rugged outside plant cable for direct burial, outdoor duct or aerial overlash installation.
- Cable shall be Corning Cable Systems part number _ _ _ _ U C-T41_ _ D20.

.4 Indoor/Outdoor Loose Tube (FREEDM®) Gel-Free Cable, 2-288 Fibers
- Campus and building backbone in lieu of transitioning from unlisted cable to NEC listed cable
- Cable shall be Corning Cable Systems part number _ _ _ _ UF-T41_ _ D20.

9.1.1.2   Rack Mountable Hardware

.1   Closet Connector Housing (CCH)
- Provide interconnect or cross-connect capabilities between outside plant, riser or distribution cables, and the opto-electronics.
- Housing shall be Corning Cable Systems Part number CCH-01U or CCH-02U or CCH-03U or CCH-04U, according to the required fiber capacity.

.2   LANscape® Solutions Connector Panels
- The panels are used with field-installable connectors or in applications where the pre-connectorized cables are routed directly from the equipment to the piece of interconnect hardware.
- Housing shall be Corning Cable Systems Part number CCH-01U or CCH-02U or CCH-03U or CCH-04U, according to the required fiber capacity.
- **P**anel part number shall be Corning Cable Systems CCH-CPXX-YY (where the XX is the fiber count and the YY is the adapter code). Example YY code is A9 --- LC Duplex for SM fiber.

9.1.1.3   Fiber Optic Connectors

.1   No-Epoxy and No-Polish (Unicam)
- LC UniCam® Standard Single-Mode Connector (duplex format required)
- Rapid termination of interbuilding indoor/outdoor and outdoor optical fiber cables that contain single-mode optical fiber.
- Single-Mode LC Connector shall be Corning Cable Systems part number 95-200-99.

9.1.1.4   Fiber Optic Cable Fan-Out Kits

.1   Buffer Tube Fan-Out Kits
- Indoor Buffer Tube Fan-Out Kits
- Furcation of optical fiber stranded loose tube cables to terminate individual fibers with field-installable connectors.
- Corning Cable Systems Buffer Tube Fan-Out Kit part numbers are the following:
    i.   FAN-BT25-06 Buffer-Tube Fan-Out Kit with (6) 25in color-coded tubes
    ii. FAN-BT47-06 Buffer-Tube Fan-Out Kit with (6) 47in color-coded tubes
    iii. FAN-BT25-12 Buffer-Tube Fan-Out Kit with (12) 25in color-coded tubes
    iv. FAN-BT47-12 Buffer-Tube Fan-Out Kit with (12) 47in color-coded tubes

9.1.1.5   Single Mode Fiber Optic Patch Cords

.1   Single-mode 2-fibre Patch Cord
  ▪ Patch Cord connectors shall be measured for insertion loss with the following values for each connector: typical of 0.1 dB and a maximum of 0.3 dB dB and guaranteed reflectance of less than or equal to -55 dB for UPC. Manufacturer shall be ISO 9001 and TL 9000 registered. Connectors shall be single mode LC UPC. Connector ferrule material shall be ceramic. Optical fiber cable type shall be zipcord construction suitable for use in indoor spaces and shall contain a riser-rated or plenum-rated jacket. Patch Cord shall be constructed with reverse-pair positioning as per TIA TSB-125. Patch Cord shall contain single-mode fibers compliant with TIA/EIA 568-B.3 and applicable TIA/EIA-604 document. Patch Cord jacket color shall be yellow. Patch Cord shall be available in different lengths. Manufacturer shall manufacture both cable and connectors used to manufacture patch cord.
  ▪ Patch Cord shall be made by Corning Cable Systems with the following part number: 040402R5120xxxM, where 'xxx' is the length in metres.
  ▪ Required cords:
    i.   110% coverage based on fibre count to room, where;
        ▪ 80% are 5m in length
        ▪ 30% are 10m in length

9.1.2   Intra Building

  ▪ Minimum 12 strand 50/125μ multi-mode and 12 strand multimode (glass fiber as manufactured by corning, jacketed under Belden/CDT) between hub and endpoint buildings.
  ▪ Provide 15' slack loop in each telecommunications room.
  ▪ Single, composite cable is preferred.

9.1.2.1   Multimode Fiber

.1   Pretium™ 300 - 850 nm Laser-Optimized 50 μm Multimode Fiber for 300 m @ 10GbE
  ▪ Industry-standard multimode fiber supports 10 Gb/s serial transmission for a guaranteed distance of 300 m using 850 nm VCSEL sources. Fiber supports current network requirements from 10 Mb/s to 622 Mb/s using LED-based protocols and enables cost-effective migration to laser-based protocols such as 10 Gigabit Ethernet, Gigabit Ethernet and 10 Gigabit Fibre Channel (10GFC). Bandwidth-intensive applications and congested backbone links requiring scalability are cost-effectively supported through premises intrabuilding and interbuilding optical fiber cable plant including local area networks (LANs), storage area networks (SANs) and data centers.

- The cabled optical fiber shall support industry-standard multi-gigabit Fibre Channel physical interface specifications.

.2 Pretium™ 550 - 850 nm Laser-Optimized 50 μm Multimode Fiber for 550 m @ 10GbE
- Industry-standard multimode fiber supports 10 Gb/s serial transmission for a guaranteed distance of 550 m using 850 nm VCSEL sources. Fiber supports current network requirements from 10 Mb/s to 622 Mb/s using LED-based protocols and enables cost-effective migration to laser-based protocols such as 10 Gigabit Ethernet, Gigabit Ethernet and 10 Gigabit Fibre Channel (10GFC). Bandwidth-intensive applications and congested backbone links requiring scalability are cost-effectively supported through premises intrabuilding and interbuilding optical fiber cable plant including local area networks (LANs), storage area networks (SANs) and data centers.
- The cabled optical fiber shall support industry-standard multi-gigabit Fibre Channel physical interface specifications.

9.1.2.2 EDGE Plug & Play

.1 EDGE Universal Preconnectorized MTP Indoor Trunk Cable Assembly
- 12 fiber MTP® Connectors pre-terminated on both ends for termination into pre-assembled connector modules and/or MTP adapter panels
- A representative part number shall be G7575xxyPNDDUzzzF, where "xx" is replaced with 12, 24, 36, 48, 96 or E4 (144) strand counts), "y" is replaced with "T" for OM3 50/125 or "Q" for OM4 50/125 and the length is designated in "yyy" feet.

.2 EDGE Universal Preconnectorized MTP Indoor Trunk Cable Assembly
- 12 fiber MTP® Connectors pre-terminated on both ends for termination into pre-assembled connector modules and/or MTP adapter panels
- A representative part number shall be G7575xxyPNDDUzzzF, where "xx" is replaced with 12, 24, 36, 48, 96 or E4 (144) strand counts), "y" is replaced with "T" for OM3 50/125 or "Q" for OM4 50/125 and the length is designated in "yyy" feet.

9.1.2.3 Modules

.1 Low Loss Plug & Play Universal Systems Closet Connector Housing (CCH) Modules
- Low loss modular patching for Data Center environments where pair wise polarity is maintained by the design of the module and trunk cable assemblies used. Modules allow quick connector changes in the front plane without re-termination of the backbone cable. The low loss Universal modules are mated to both ends of a Universal Trunk Cable

Assembly completing a Corning Cable Systems Universal Wiring System where pair-wise polarity is ensured.
- Modules shall be Corning Cable Systems part number EDGE-UM12-05-93x, where "x" is replaced with "T" for OM3 or "Q" for OM4

9.1.2.3 Multi-mode Fibre Optic Patch Cords

.1 Low- Loss 850-nm Laser-Optimized 50/125 μm 2-Fiber Patch Cord
- Patch Cord connectors shall be measured for insertion loss with the following values for each connector: typical of 0.2 dB and maximum of 0.3 dB. Connector reflectance shall be less than or equal to -20 dB. Boot color shall be aqua. Manufacturer shall be ISO 9001 and TL 9000 registered. Connectors shall be multimode LC. Available optical fiber cable types shall be suitable for use in indoor spaces and be listed as OFNR. Patch Cord shall contain OM3 50/125 um 850 nm laser-optimized, EMB multimode fiber and shall comply with TIA/EIA-568-B.3 and applicable TIA/EIA-604 document. Patch Cord jacket and connector color shall be aqua. The manufacturer shall have an in-depth knowledge, and more than 10 year history, of manufacturing optical fiber Patch Cords. Manufacturer shall manufacture both cable and connectors used to manufacture Patch Cord. Patch Cord shall be available in different lengths.
- Patch Cord shall be made by Corning Cable Systems with the following part number: 050502T5120xxxM, where 'xxx' is the length in metres
- Required cords:
  i. 110% coverage based on fibre count to room, where;
     - 80% are 5m in length
     - 30% are 10m in length

9.2 CABLING – COPPER

All copper related sketches will be in the format of cut sheets attached to the appendices this document.

9.2.1 Horizontal Cabling

9.2.1.1 Category 6 (FT6) UTP cable. (refer to standard specifications)
- Terminate on patch panel on rack.
- Cable shall be white and jacks shall be blue.
- Provide cable and connectors only from Sheridan Institute of Technology & Advanced Learning preferred manufacturers (Belden/CDT). Alternates will not be acceptable.

9.2.1.2   Category 6 (FT6) UTP Patch Cord.

.1   GigaFlex PS6+ Modular Cord
- The GigaFlex PS6+ Modular Cords are 4-pair 23 AWG UTP modular cords designed for the use with the Belden IBDN Systems 2400 and 4800LX, providing bandwidths of 250 MHz and 500 MHz, respectfully. The GigaFlex PS6+ Modular Cords have been designed to provide mated-connection performance that exceeds the Category 6 requirements.
- The GigaFlex PS6+ Modular Cord's patented design, with a very small footprint, makes them fully compatible with any of the highest density hubs with RJ45 jack connections.
- Patch Cord shall be made by Belden/CDT with the following part number: AX3500xx, where 'xx' defines the length and colour.
- Required cords:
  i.   130% coverage based on copper count to room, where;
     - 110% are 1'-0" in length, blue in colour
     - 20% are 7'-0" in length, black in colour

9.2.1.3   Multi-pair Category 5 (FT6) UTP cable (a.k.a. pigtails)
- Minimum 25-pair cable
- Terminate on plywood backboard on BIX frame at one end.
- Terminate on 1U 24-port patch panel on the rack at other end.
- Cable shall be gray and patch panel jacks shall be black.
- Design adequate slack loops in closets to relocate if racks move in future.
- Provide cable and connectors only from Sheridan Institute of Technology & Advanced Learning preferred manufacturers (Belden/CDT). Alternates will not be acceptable.
  (1) Provide 1 patch cord per cable run.
  (2) Ten (10'-0") foot cord for active end.
  (3) Provide 1- pair cross-connect wire.
  (4) Designate FT4/FT6 to meet code requirements.

9.3   REQUIREMENTS BASED ON ROOM FUNCTION

Rooms:
Please refer to individual room type detail sketches for drop counts and types.

General:
Unless noted otherwise, a typical outlet shall consist of (1) cable run unless otherwise specified.

- Every enclosed space shall be provided with a minimum of (1) cable run.

REFERENCE FIGURE 40 – VERTICAL CONDUIT REQUIREMENT

10.0 INFRASTRUCTURE FOR PAGING

All paging related sketches will be in the format of cut sheets attached to the appendices this document.

Related Sheridan Institute of Technology and Advanced Learning Guidelines
- Sheridan Institute of Technology and Advanced Learning Technical Guidelines.
- Tender Specification by Consultant related to current project.

Coordination Requirements
- Sheridan Institute of Technology and Advanced Learning Information Communication Technologies

Description
- This section covers requirements for Paging Control Systems. The Paging Control System is installed by successful contractor. General Requirements for this system for Consultants and Contractors will be provided by consultant.
- These guidelines provide reference to particular types, grades and models of products. In general, the references include both generic descriptions and specific product details. These references shall not be construed as a directive to sole-source products from any particular vendor except where this is specifically stated.
- Paging shall include the following:
  - .1 Telephone Access Modules
  - .2 Indoor Speakers
  - .3 Outdoor Speakers

10.1 EQUIPMENT

All equipment will be defined by Consultant, supplied and carried by Communications Contractor.

Main module to consist of a Viking FXI-1 universal paging interface. Features are listed below.

10.2 CABLING

All cabling for paging system is defined under speaker requirements. Any cabling required for network are defined in IT section of this document.

10.3 REQUIREMENTS BASED ON TELECOMMUNICATION ROOM FUNCTION

10.3.1 Main Computer Room

- Telephone Access Modules are designed to provide telephone access to most commonly available paging systems. Provides telephone and paging system connections, input and modular page port connector, as well as mode setting switches and adjustment control.
- All main paging modules shall be located in the main computer room where possible.
- The paging system must be connected to the PABX station port.
- The typical installation shall be a Viking FXI-1 with the following features:
    a. Integrate your paging system with virtually any POTS, Centrex, Digital or IP phone system
    b. Suppress background music during paging
    c. Provides contact closure to activate paging system if not provided by the phone system
    d. Add pre-announce tone to your paging system
    e. Features
    f. Select: FXO (loop start), FXS (ring trip) or paging port (VOX relay) interface mode
    g. No power supply required in FXS interface mode
    h. Up to 6 units can be powered from one adapter in the FXO or VOX mode
    i. 26V DC talk battery for interfacing with FXO or unused phone system line input/trunk port
    j. Floating 600 ohm paging output with volume control
    k. Normally open or closed relay for external paging amp activation or interfacing the paging amp with an external background music source
    l. 800 Hz pre-announce page tone (on/off)
    m. Compatible with 24 to 48 volt FXS operation
    n. Calling party control (CPC) detection for immediate disconnect
    o. Busy signal detect disconnect
    p. 2.5 to 5 second VOX silence disconnect timer
    q. Programmable VOX trigger sensitivity
    r. 16 or 36 second default disconnect timer
    s. Screw terminal block connections
    t. Wall mount housing: (2) #6x3/4 panhead screws included

10.3.2 Communications Hub Room

- Additional Viking FXI-1 can be installed in Hub Rooms but all main paging modules shall be located in the main computer room where possible.
- The paging system must be connected to the PABX station port.
- The typical installation shall be a Viking FXI-1

10.3.3 Co-Locate Hub Room

- Additional Viking FXI-1 can be installed in Co-locate Hub Rooms but all main paging modules shall be located in the main computer room where possible.
- The paging system must be connected to the PABX station port.
- The typical installation shall be a Viking FXI-1

10.4 REQUIREMENTS BASED ON LOCATION FUNCTION

10.4.1 Indoor Paging

2 conductor 16 AWG or 18AWG cable. (refer to standard specifications)
- Terminate on BIX frame located on the backboard.
- Provide cable and connectors only from Sheridan Institute of Technology & Advanced Learning preferred manufacturers (Belden/CDT). Alternates will not be acceptable.
- All intra building zones shall be wired back to a central location on a single floor closet regardless of number of floors in the building.
- ONLY split termination if maximum distance requirements are exceeded.

10.4.2 Outdoor Paging

Category 6 (FT6) UTP cable. (refer to standard specifications)
- Terminate on BIX frame located on the backboard.
- Provide cable and connectors only from Sheridan Institute of Technology & Advanced Learning preferred manufacturers (Belden/CDT). Alternates will not be acceptable.
- All outdoor paging cables shall be enclosed in minimum 1" EMT conduit entire length of run.
- All intra building zones shall be wired back to a central location on a single floor closet regardless of number of floors in the building.
- ONLY split termination if maximum distance requirements are exceeded.

10.4.3 Indoor Speakers

Typical requirements for indoor paging speakers shall consist of:

- Arnscott part number A460K (speaker)
- Arnscott part number SE40SB (enclosure)
- Arnscott part number G70W (grill)
- Arnscott part number A70-4 (transformer)

REFERENCE FIGURE 41 – INDOOR SPEAKERS

10.4.4 Outdoor Speakers

Typical requirements for outdoor paging speakers shall consist of:

- Bogen part number SPT15A

REFERENCE FIGURE 42 – INDOOR SPEAKERS

11.0 INFRASTRUCTURE FOR SECURITY

All Security related sketches will be provided by the security vendor on a project to project requirement.

Related Sheridan Institute of Technology and Advanced Learning Guidelines
- Sheridan Institute of Technology and Advanced Learning Technical Guidelines.
- Tender Specification by Consultant related to current project.

Coordination Requirements
- Sheridan Institute of Technology and Advanced Learning Electronic Systems and Secure Access (ESSA).

Description
- This section covers requirements for Access Control Systems. The Access Control System is installed by ESSA. General Requirements for this system for Consultants and Contractors will be provided by consultant.
- These guidelines provide reference to particular types, grades and models of products. In general, the references include both generic descriptions and specific product details. These references shall not be construed as a directive to sole-source products from any particular vendor except where this is specifically stated.
- IP based system that monitors both live and recorded events for security access shall include the following:
    - .1 IP cameras.
    - .2 Power transformers.
    - .3 Card Readers

11.1 EQUIPMENT

All equipment will be defined, supplied and carried by Sheridan Security, Parking & Emergency Preparedness.

11.2 CABLING

For all Security installations the following wiring specifications apply

- All cables runs must be free of breaks and splices
- Use only stranded conductor
- Multi-pair cables must have individually shielded pairs
- IP Cameras: PoE fed over FT6 PLENUM RATED CATEGORY 6 cable
- Interior PTZ housings: 1 pair #16 stranded copper shielded cable
- Exterior PTZ housings: 1 pair #12 stranded copper shielded cable
- RM-4 to controller: 3 pair individually shielded #18 stranded copper cable
- Relay (for lock) to Lock Power Supply: 1 pair #18 stranded copper cable

- Lock to RM-4: 2 pair individually shielded #18 stranded cable
- D.C. to RM-4: 2 pair #22 Stranded copper cable
- REX to RM-4: 2 pair #22 Stranded copper cable
- READER to RM-4: 6 conductor #22 shielded copper cable

11.3 REQUIREMENTS BASED ON TELECOMMUNICATION ROOM FUNCTION

11.3.1 Main Computer Room

11.3.2 Communications Hub Room

11.3.3 Co-Locate Hub Room

11.4 REQUIREMENTS BASED ON DOOR FUNCTION

11.4.1 Single Door

.1 Card Reader
- Install junction box with a ¾" conduit leading to RM-4
- Reader is to be placed on the wall adjacent to the knob. Not hinge side.
- Bottom of reader positioned between 38" and 40" above floor level
- Edge of reader positioned at least 2" from the door frame

.2 Electric Lock
- Install ¾"conduit to RM4 enclosure (Share with Reader conduit if on same wall)
- Commercial Grade
- ¾" keeper depth
- 12/24VDC operating range
- Fail Secure
- Built in LBM required (Latch Bolt Monitor)

.3 Door Contact
- Share conduit with REX module
- 1k DEOL (1k ohm Double end of line Normally Closed configuration)
- Tied in series with LBM
- Mounted on top of door frame not the side
- Center of D.C. must be drilled from 1.5" to 3.5" from edge of door (Latch side)
- Contact and Magnet must be lightly glue into place using silicone

.4   Request to Exit
   ▪ Install ¾" conduit from top of door frame (Latch Side) to RM-4 Enclosure
   ▪ Mount REX to top edge of door frame on secure side
   ▪ Should be mounted above door knob/handle
   ▪ Aim REX to view 3' away from the base of the door

.5   RM-4 Door Control Module
   ▪ Must be located within 10' of door (suggested but can reach 20'-25')
   ▪ A separate relay (arm-1 or comparable) must be mounted with RM-4
   ▪ Mount in ceiling above door (if drop tiles are available)
   ▪ Mount above door on drywall (For locations with no nearby drop-tiles)
   ▪ Secure in small steel enclosure (White 6"x8" KEYED Enclosure)
   ▪ Conduits from Door Lock/Reader and REX/D.C lead into enclosure and a single conduit leads out back to main controller in closet.

11.4.2 Double Doors

Requirements match those of the Standard however some additions/modifications exist.

.1   Card reader conditions reflect those of the double door

.2   Electric Lock
   ▪ Independent conduit for Lock is to be placed on the non-swing door
   ▪ Transfer hinge must be installed to route power and status to lock
   ▪ Conditions b.1. – b.vi. apply

   NOTE: *for a.i. CONDUIT CANNOT BE SHARED WITH READER AS THEY NO LONGER SHARE the SAME WALL IN THIS SCENARIO*

.3   Door Contact
   ▪ Install door contact on both doors (Following conditions c.i. – c.vi)

.4   Request to exit conditions reflect those of the Standard Door Requirements

.5   RM-4 conditions reflect those of the Standard Door Requirements

12.0 INFRASTRUCTURE FOR AUDIO VISUAL

12.1 EQUIPMENT

The room will be equipped with a standard, easy-to-use instructor interface. The audio/video (A/V) system will be controlled by a control system with the control panel mounted on the instructor station. System parameters can be monitored, administered, and controlled over the campus network. The A/V equipment will be located in an equipment rack inside of the instructor station.

It is important for Sheridan Institute of Technology and Advanced Learning to implement a standard operating protocol so faculty can depend on a standard, familiar interface in each classroom.

The audio system (exact type to be determined by room requirements) will be designed to fit the room's environment with an appropriate speaker system (with instructor speech reinforcement as required). The program sources are the same as for the video system. Large classrooms and auditoriums will have audience microphone capability provided throughout the student seating area.

The room will incorporate speech reinforcement with a wired or wireless microphone included on an as-needed basis according to room requirements. A line-level audio output jack (RCA) will be available on the front of the equipment rack for interfacing hearing assist or other equipment.

12.2 CABLING

The room will be equipped with Gigabit Ethernet connectivity. The junction box for AV connectivity shall be a Panduit PZICEA and shall come with four data jacks and a 15A duplex receptacle mounted inside the housing as a minimum.

Wireless Access Points in the classroom shall provide 802.11b wireless networking capability.

12.3 DEVICES

12.3.1 Hardware Devices

All hardware devices shall be defined, supplied, and installed by others on a project to project basis.

12.3.2 I/O Connections

All I/O connections shall be defined, supplied, and installed by others on a project to project basis.

12.4 REQUIREMENTS BASED ON ROOM FUNCTION

12.4.1 General

12.4.1.1 Instructor Station

The room will be equipped with a special lectern/instructor stations and shall be specified by others on a case-by-case basis. These lectern/instructor stations shall be relocatable to any position in the room.

12.4.1.2 A/V Power Requirements

A 20A un-switched dedicated circuit shall be provided for the A/V system, with duplex outlets located in the cabling junction box and at a dedicated wall projector locations. A green wire ground shall be required on all new wall projector locations.

12.4.1.3 A/V Conduit Requirements

Access to wiring connections shall be at the cabling junction box.

12.4.1.4 Cabling Junction Box

The room will be equipped with a Panduit Ceiling Mounted Media Rack.

- Designed to accept up to 2 RU of active electronics as deep as 17.5" and up to 6 RU of standard 19" passive connectivity (PZICEA only)
- Designed to accept up to 8 RU standard 19" passive connectivity (PZICE only)
- Thermal management design optimizes air flow for improved heat dissipation; ideal for high heat load PoE enabled switch applications
- Mount in 2' x 2', 2' x 4', and 2' x 6' drop ceilings
- 50 pound door weight capacity
- Include doorplate, equipment mounting bracket, integrated horizontal cable slack manager
- AC power ready – receptacle not included (PZICEA only)
- Includes low decibel 60 CFM fan (PZICEA only)

12.4.1.5 Data Requirements

The room will be equipped with Gigabit Ethernet connectivity. The cabling junction box shall house four data jacks as a minimum.

12.4.1.6   Wireless Requirement

Wireless access points in each classroom shall provide wireless networking capability. A requirement for a minimum of four (4) wireless nodes in each classroom (1 per quadrant) shall be required.

12.4.1.7   Telephone

A wall-mounted campus phone, with restricted ringing and calling capabilities, shall be located near the instructor station at ADA recommended height. The main function of the phone shall be communication with the Classroom Support Hotline.

12.4.1.8   Audio System

The monaural audio system (exact type to be determined by room requirements) will be designed to fit the room's environment with an appropriate speaker system (with instructor speech reinforcement as required). The program sources are the same as for the video system. Large classrooms and auditoriums will have audience microphone capability provided throughout the student seating area.

The room will incorporate speech reinforcement with a wired or wireless lavaliere microphone included on an as-needed basis according to room requirements. A line-level audio output jack (RCA) will be available on the front of the equipment rack for interfacing hearing assist or other equipment.

12.4.1.9   Control System

All functionality for the control system in standard classrooms shall be able to control Automated screens (where applicable), lighting, and blinds.

12.4.2 Large Classroom Supplemental Information

12.4.2.1   Projection Capability

Large classrooms, lecture halls, and auditoriums require additional Projection Capable Classroom technology infrastructure, which will be individually specified on a case-by-case basis. Requirements may include:

- Increased data connectivity/bandwidth
- Separate AV booth
- Additional AV equipment closets
- Dual projection systems
- Additional I/O modules and systems

- Additional internal future growth conduit
- Auto-tracking cameras
- Auto-balancing sound system
- Audience microphone locations
- Secondary instructor station(s)

12.4.2.2   Control System

The networking option will consist of an integrated controller located in the instructor station. An eight-button panel will be located on the instructor station. The control system will have an optional network connection to allow remote support from Classroom Technical Services. The following functions will be programmed into the system:

- Video projector power control
- Projector source selection
- Volume control
- Video mute
- Audio mute

A level of automation will be programmed into the system in order to simplify room operation for the user. In order to save video projector lamp life, the system will be programmed to shut down after a specified amount of time with no user activity. The room will also be programmed to prevent system operation after hours. The system operation can be controlled by day or by week at OCM-specified access times.

12.4.2.3   Monitoring Option

The networked control system option allows the OCM Classroom Support Hotline operator to monitor and troubleshoot the operating characteristics of the room technology and to assist the instructor with any problems. Remote control and operation of the room equipment is enabled to facilitate the remote resolution of problems during actual classroom teaching activity. The control systems communication protocols permit 24-hour monitoring of system parameters and enhance proactive problem solving to eliminate system down time. A software-based automated management program oversees the operating parameters of the classroom systems, sends repair and maintenance alerts, and allows monitoring and analysis of system operation.

12.4.2.4   Standard Classroom

- Whiteboards to be mounted 39" AFF to the bottom of the whiteboard.
- One duplex and 1 data jack located behind each projector wall locations.

- The noise criteria (NC) should be NC25 and Reverberation Time (RT) should be between 0.6 and 0.7 sec
- Walls between classrooms should be designed to STC-60 standard and walls between classrooms and washrooms should be designed to STC-50 standard.
- Ambient noise to the room should not exceed 25db
- Zoned lighting is needed to darken the area near the projectors to eliminate any fading of the projected image.
- Blackout blinds are needed to control the amount of ambient light coming into the room.
- All lighting and blinds should be controllable using low voltage relay device that our room controllers can connect too.
- All lighting shall be independently controlled from either a wall switch or at the lectern location (quasi 3-way functionality)

12.4.2.5   Split Classroom

- Whiteboards to be mounted 39" AFF to the bottom of the whiteboard.
- One duplex and 1 data jack located behind each projector wall locations.
- The noise criteria (NC) should be NC25 and Reverberation Time (RT) should be between 0.6 and 0.7 sec
- Walls between classrooms should be designed to STC-60 standard and walls between classrooms and washrooms should be designed to STC-50 standard.
- Ambient noise to the room should not exceed 25db
- Zoned lighting is needed to darken the area near the projectors to eliminate any fading of the projected image.
- Blackout blinds are needed to control the amount of ambient light coming into the room.
- All lighting and blinds should be controllable using low voltage relay device that our room controllers can connect too.
- All lighting shall be independently controlled from either a wall switch or at the lectern location (quasi 3-way functionality)

12.4.2.6   Meeting Rooms

- Blocking or reinforced walls are needed to support LCD TV.
- Two duplex and 2 data jacks located behind each LCD.
- All power and data behind LCD's will be recessed into the wall.
- One (1), Two (2) or Three (3) 2" RMC conduits are needed from wall locations to the meeting table. These are defined in each meeting room type.
- Depending on ceiling height all meeting room LCDs should be mounted 4' AFF to the bottom of the LCD
- System control touch panels should be mounted in the table for all meeting rooms.

- Data and Power to be delivered to Spider box at table. Reference to room size must be made for quantities.
- Data at ceiling location for Wireless Access Point. Reference to room size must be made for quantities.

12.4.2.7 Labs

Labs will be treated the same as standard classrooms and may require project specific requirements that will be provided if necessary.

12.4.2.8 Breakout/Group Study Rooms

- Blocking or reinforced walls are needed to support each LCD TV.
- Two duplex and 2 data jacks located behind each LCD.
- All power and data behind LCD's will be recessed into the wall.
- 2" RMC conduit is needed from LCD location to the other wall where input wall plate will be terminated. There should be a break in the conduit where the touch panel will be located above the table.
- Depending on ceiling height all group study LCDs should be mounted 4' AFF to the bottom of the LCD
- System control touch panels should be mounted 4' AFF

12.4.2.9 Auditoriums/Lecture Halls

- 2" RMC conduit is needed from podium location in front of room to AV room located at the back of the auditorium
- Blackout blinds are needed to be able to control the ambient light.
- Zoned lighting is needed to darken the area near the projectors to eliminate any fading of the projected image.
- The noise criteria (NC) should be NC25 and Reverberation Time (RT) should be between 0.6 and 0.7 sec

12.4.2.10 Administration Offices

- Blocking or reinforced walls are needed to support each LCD TV.
- Two duplex and 2 data jacks located behind each LCD.
- All power and data behind LCD's will be recessed into the wall.

12.4.2.11 Public Spaces

- Blocking or reinforced walls are needed to support each LCD TV.
- Two duplex and 2 data jacks located behind each LCD.
- All power and data behind LCD's will be recessed into the wall.

13.0 APPENDICES

13.1 LABELLING CONVENTIONS

13.1.1 Numbering Format:

The new numbering format is based on the CAN/CSA-T568-93 standard with minor adaptations for Sheridan's environment.

Format: [campus]-[tc designation]-[rack][panel position]-[jack position]

Detail:

[campus]
>Single character value; range: A through Z.
>Denotes the Campus.
>Currently defined values would be:
>- "D" for Davis Campus;
>- "S" for Skills Training Centre;
>- "T" for Trafalgar Campus;
>- "M" for Mississauga Campus.

[tc designation]
>Variable-length character value
>Refer to *Telecommunication Closet Designations*.

[rack]
>Single character value; range: 1 through Z.
>Each data rack in a TC will be assigned a unique value in the range.

[panel position]
>Double-digit numeric value; range: 01 through 44.
>Panel Position in rack identified by top of panel in rack in vertical units. Numbering begins at 01 closest to the floor. Refer to *Default TC Rack Layouts*.

[jack position]

>Double-digit numeric value; range: 01 through 24 or 48.
>This identifies the jack position within the panel based on manufacturer numbering. 1U panels will number 01 through 24, 2U panels 01 through 48, etc.

[daisy-chain] (for indoor paging speakers)

    Double-digit alpha-numeric value; range: A-Z and 1-5.

    This identifies the indoor speaker location based on the chain identifier (A) and the speaker in the chain (3). Both the BIX frame and speaker will have matching identifiers for easy recognition.

[home run] (for outdoor paging speakers)

    Double-digit alpha-numeric value; range: labeled identical to closest outside door location. (i.e. P3 or D7).

    This identifies the outdoor speaker location based on the closest exterior door with an existing tag. Both the BIX frame and speaker will have matching identifiers for easy recognition.

13.1.2 Label Configuration:

There are two allowable configurations for labels. In both cases, only 10 characters will be required in the jack labeling; the campus designation will be inferred and used in documentation only. However, the full 12 characters would be entered in the switch port description to ensure the jack has a unique reference across the entire network.

For the workstation end, a double line layout would be used to conserve space. The single line layout can be used on single jack faceplates where space permits.

    Single Line:

        [tc designation]-[rack]-[U-position]-[panel position]-[jack position]

    Double Line:

        [tc designation]-[rack]-[U-position]
        [panel position]-[jack position]

There will be no need for jack labeling in the TC. There will be labels required for the rack and the vertical units, but since the patch panels come pre-numbered by the manufacturer, generated labels are not required.

Examples:

B103-134-26	This drop terminates in TC-B103, on the 1st rack, in the patch panel at 34U, in the 26th jack position. (label on faceplate)
SC112-1 42-44	This drop terminates in TC-SC112, on the 1st rack, in the patch panel at 42U, in the 44th jack position. (label on faceplate)
D-C205-125-06	This drop is at the Davis Campus, terminates in TC-C205, on the 1st rack, in the patch panel at 25U, in the 06th jack position. (port description field on switch)
BR-D7	Brampton Campus – Door Location, would reference an outdoor speaker at the Brampton campus near door B4.
T-A3	Trafalgar Campus - would reference a chain of speakers 'A' in this example, with the 3rd speaker in the chain being identified.

14.0   DETAIL DRAWINGS

All Detail Drawings pages included herein are defined in the document. Page numbers are not included as the drawings themselves and number of drawings may be revised during periodic Master Document updates.

15.0   MANUFACTURER CUT SHEETS

All Manufacturer Cut Sheet pages included herein are NOT defined in the document; they are a simple reference only. Page numbers are not included as the manufacturers themselves and number of drawings may be revised during periodic Master Document updates.

Contractor shall be responsible to supply manufacturer cut sheets or catalogue technical papers for all recommended products to the Consultant and Client for approval prior to commencing the project.

The following pages are samples only for:

> Belden/CDT
> Corning
> WBT
> APC
> Middle Atlantic
> Viking
> Bogen
> Arnscott

MINIMUM 2'-0"

GROUND LEVEL

WARNING TAPE

MINIMUM 2"

TOP LEVEL OF
CONCRETE

MINIMUM 1"

4" CONDUIT

MINIMUM 1-1/2"

MINIMUM 1-1/2"

MINIMUM 1"

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE

VERSION 5.0

Sheridan
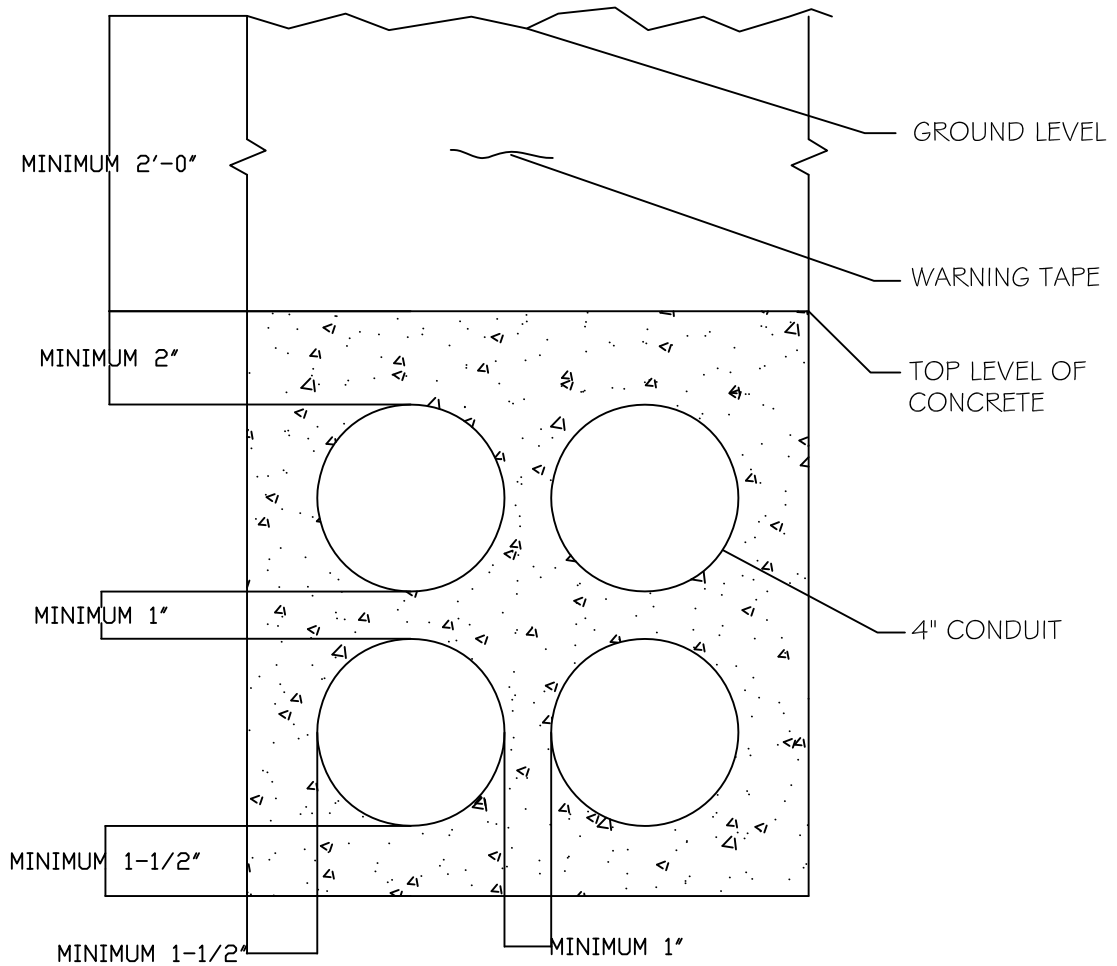
TITLE: FIGURE 01 INCOMING CONDUIT

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

BUILDING 1

HUB ROOM
NO. 01
BLDG. 1

HUB ROOM
NO. 02
BLDG. 1

HUB ROOM
NO. 03
BLDG. 1

BUILDING 2

HUB ROOM
NO. 01
BLDG. 2

HUB ROOM
NO. 02
BLDG. 2

COMMUNICATIONS
ROOM
BLDG. 2

MAIN
COMMUNICATIONS
ROOM

MANHOLE FEED
POINT FROM
SERVICE PROVIDER
AT STREET

BUILDING 3

HUB ROOM
NO. 02
BLDG. 3

HUB ROOM
NO. 03
BLDG. 3

COMMUNICATIONS
ROOM
BLDG. 3

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
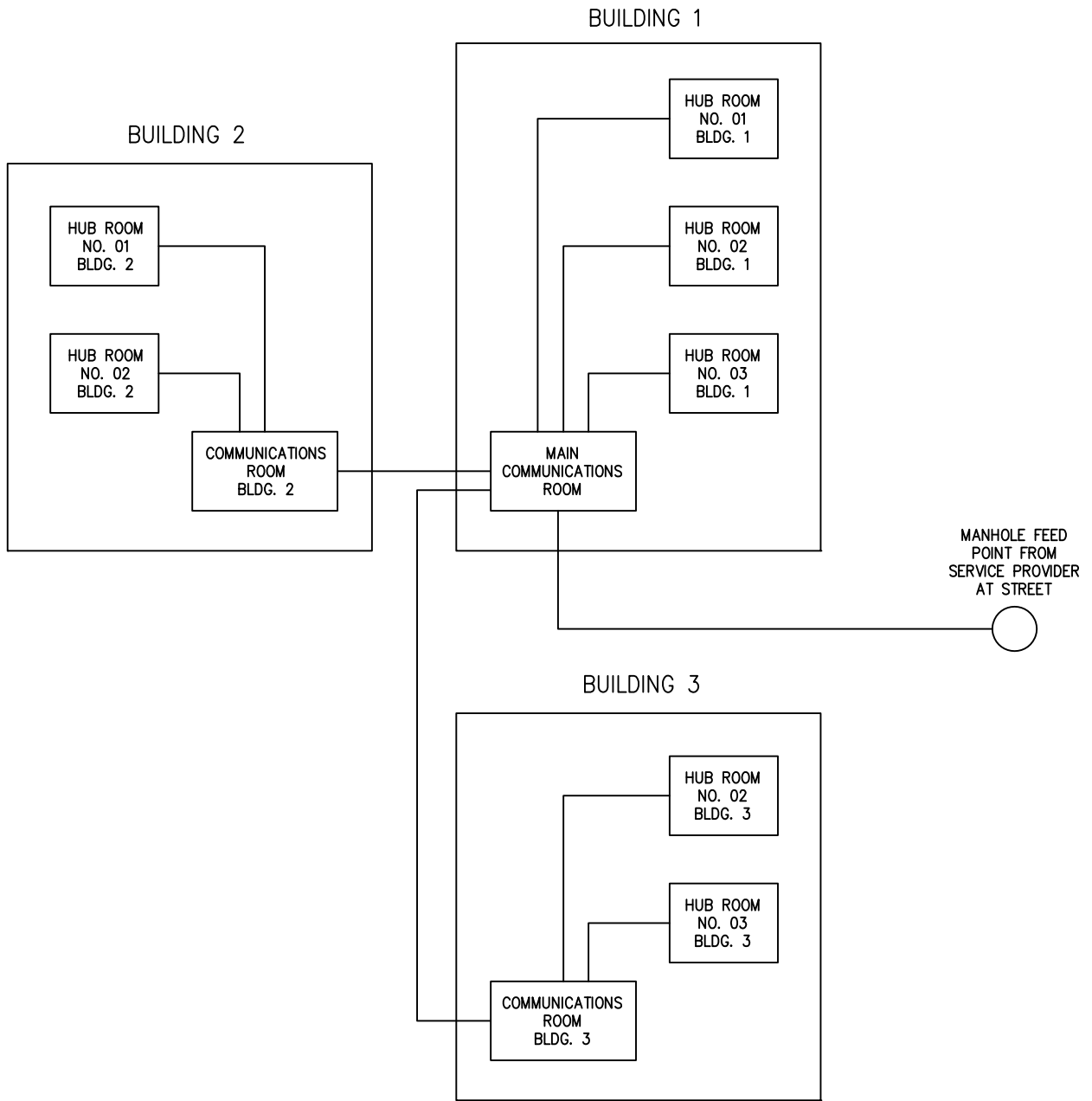
TITLE: FIGURE 02   CAMPUS ENVIRONMENT

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

4@4" CORE HOLES BETWEEN FLOORS IN STACKED HUB ROOM SCENARIOS

MIN. 2"

MIN. 4"

FIRESTOP

FIBRE

COPPER

RESERVED FOR FUTURE

SECURITY
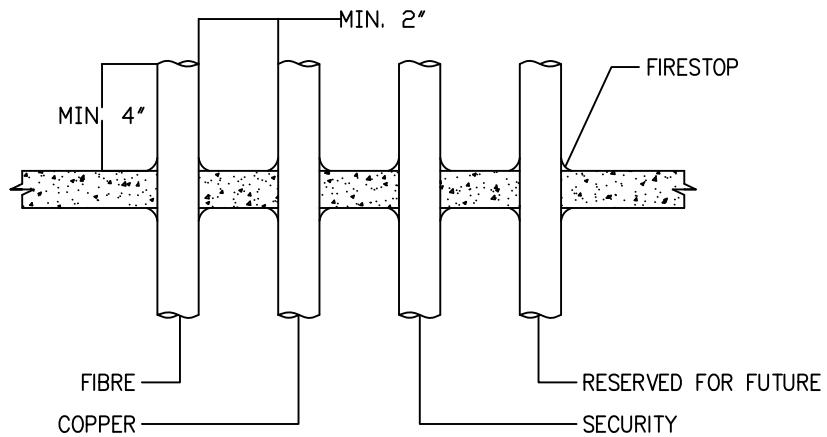
NOTE:

ALL USED CONDUITS AND REMAINING SPACE IN CONDUITS MUST BE FIRE STOPPED BY
THE COMMUNICATIONS CONTRACTOR.

Sheridan

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

TITLE: FIGURE 03   INTERFLOOR CORE REQUIREMENTS

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |
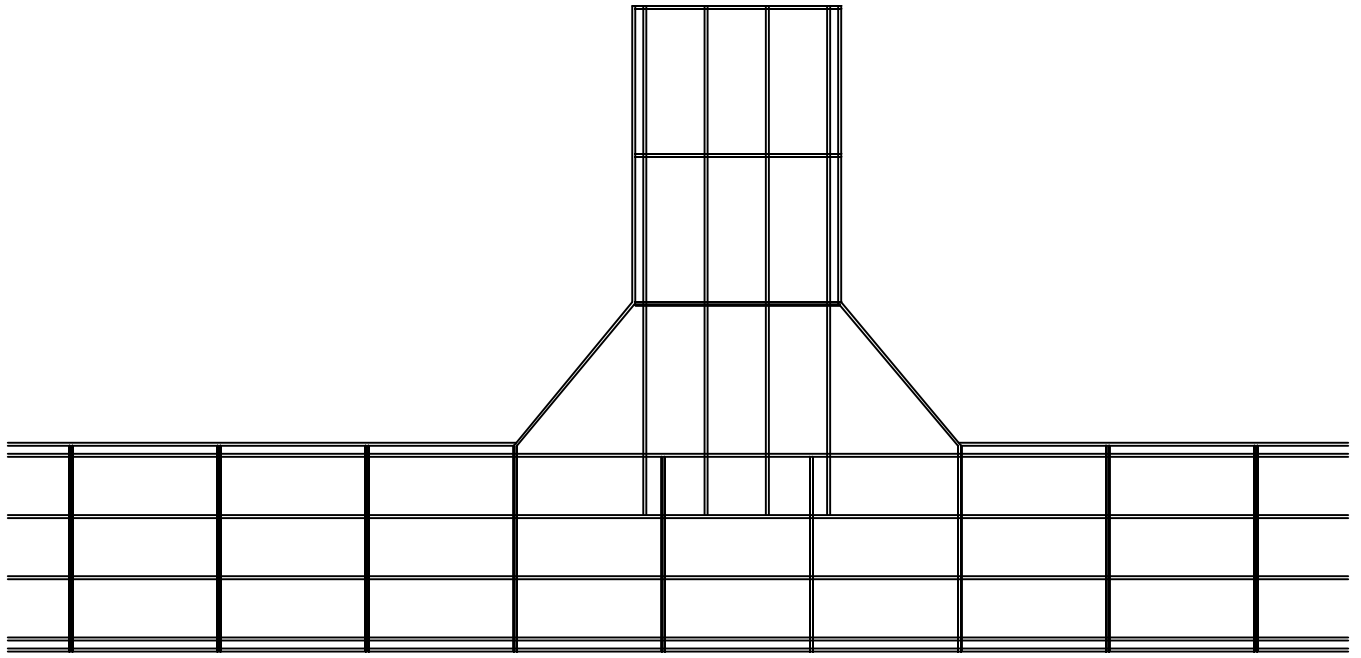
TYPICAL 6" T-JUNCTION WBT TRAY
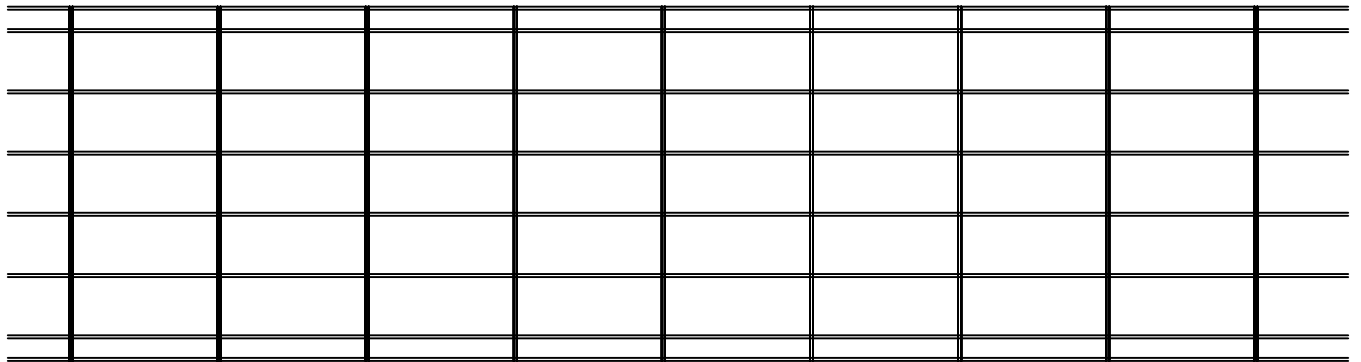
TYPICAL 12" WBT TRAY

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VERSION 5.0

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TITLE: FIGURE 04   WBT MONOMESH TRAY DETAIL

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

THREADED ROD FROM SLAB ABOVE

SUPPORT STRAP

DO NOT EXCEED THE QUANTITY
SPECIFIED FOR J-HOOK SIZES

NOTES:

1) COMMUNICATIONS CONTRACTOR TO VERIFY AVAILABLE
   ROUTING FOR J-HOOKS WITH ELECTRICAL REFLECTED
   CEILING PLANS.

2) COMMUNICATIONS CONTRACTOR TO VERIFY CONDUIT
   AND RACEWAYS PROVIDED BY ELECTRICAL REFLECTED
   ON ELECTRICAL PLAN DRAWINGS AND REFERENCED ON
   COMMUNICATIONS T-SERIES DRAWINGS.

3) ENSURE LIFT OR TALL LADDERS ARE SUPPLIED

20'-0"

12'-0"

RACK NO. 01
RACK NO. 02
RACK NO. 03
RACK NO. 04

CABINET NO. 01
CABINET NO. 02
CABINET NO. 03
CABINET NO. 04

A/C UNIT

RESERVE 3' X 3' SPACE FOR A/C. ALLOW FOR 3' CLEARANCE.

MESH TYPE CABLETRAY APPROX. 8'-0" A.F.F. (TYPICAL)

T.G.B. (BI DIVISION 16)

3/4"T X 8'H X 8'W WITH 6" OFFSET PLYWOOD BACKBOARD FOR COMMUNICATIONS ONLY (BY DIVISION 16)

BIX BLOCKS

PAGING AMPLIFIER AND TAN B MODULES

15A DUPLEX RECEPTACLE (ON UPS) (BY DIVISION 16)

15A DUPLEX RECEPTACLE (BY DIVISION 16)

T.G.B. (BY DIVISION 16)

3/4"T X 8'H X 4'W WITH 6" OFFSET PLYWOOD BACKBOARD FOR SECURITY ONLY (BY DIVISION 16)

SLEEVES THROUGH WALL (TYPICAL) (BY DIVISION 16)

2 DUPLEX RECEPTACLES MOUNTED AT THE BOTTOM OF THE RACK/CABINET (NOT ON VERTICAL CABLE MANAGER). TYPICAL PER RACK/CABINET. (BY DIVISION 16)

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TITLE: FIGURE 07   12'X20' CR LAYOUT

DATE: AUG. 26, 2013   SCALE: N.T.S.   DRAWN BY: AK   CHECKED BY: CA
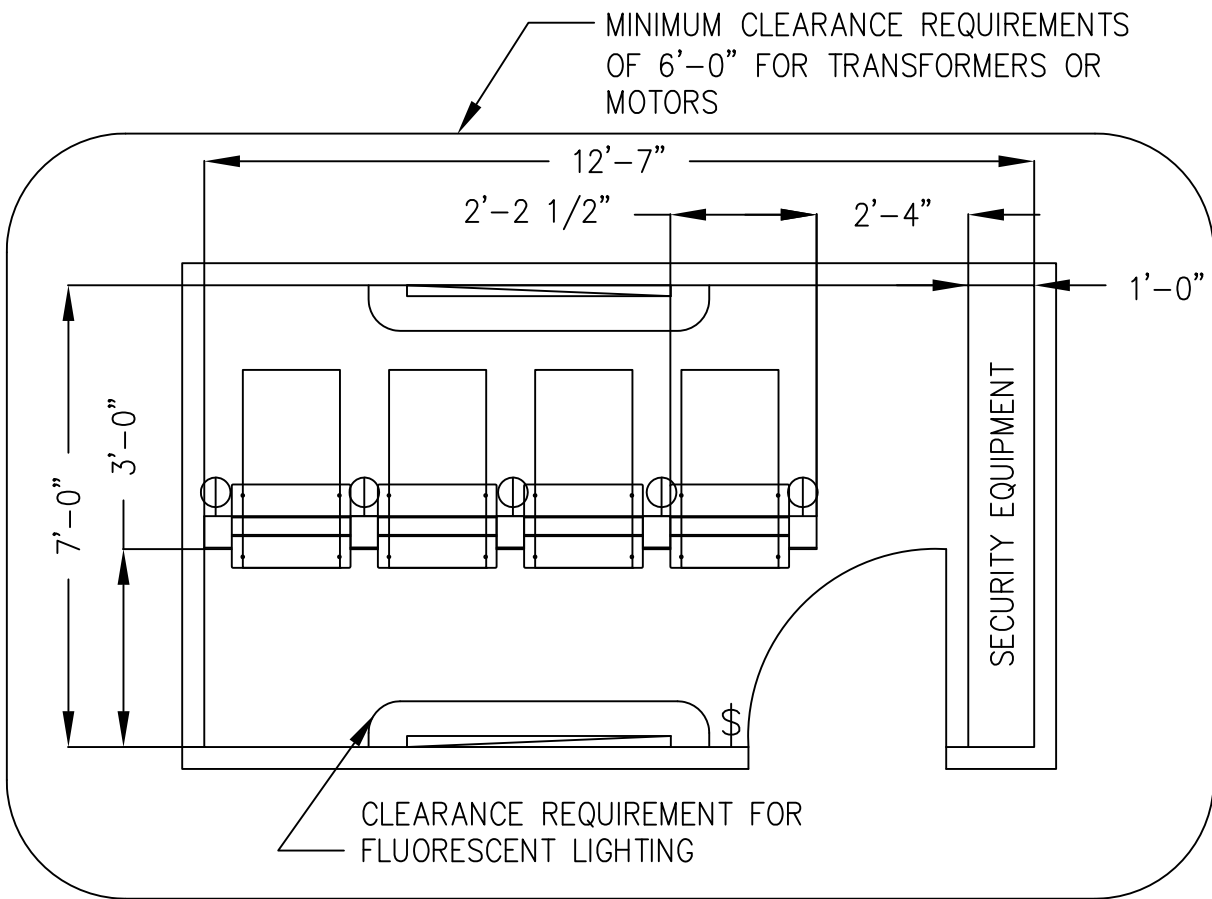
MINIMUM CLEARANCE REQUIREMENTS
OF 6'-0" FOR TRANSFORMERS OR
MOTORS

12'-7"

2'-2 1/2"

2'-4"

1'-0"

SECURITY EQUIPMENT

7'-0"

3'-0"

$

CLEARANCE REQUIREMENT FOR
FLUORESCENT LIGHTING

MINIMUM CLEARANCE REQUIREMENTS
OF 6'−0" FOR TRANSFORMERS OR
MOTORS

8'−3"

2'−2$\frac{1}{2}$"

2'−4"

1'−0"

7'−0"

3'−0"

SECURITY EQUIPMENT

C

$

CLEARANCE REQUIREMENT FOR
FLUORESCENT LIGHTING

Sheridan
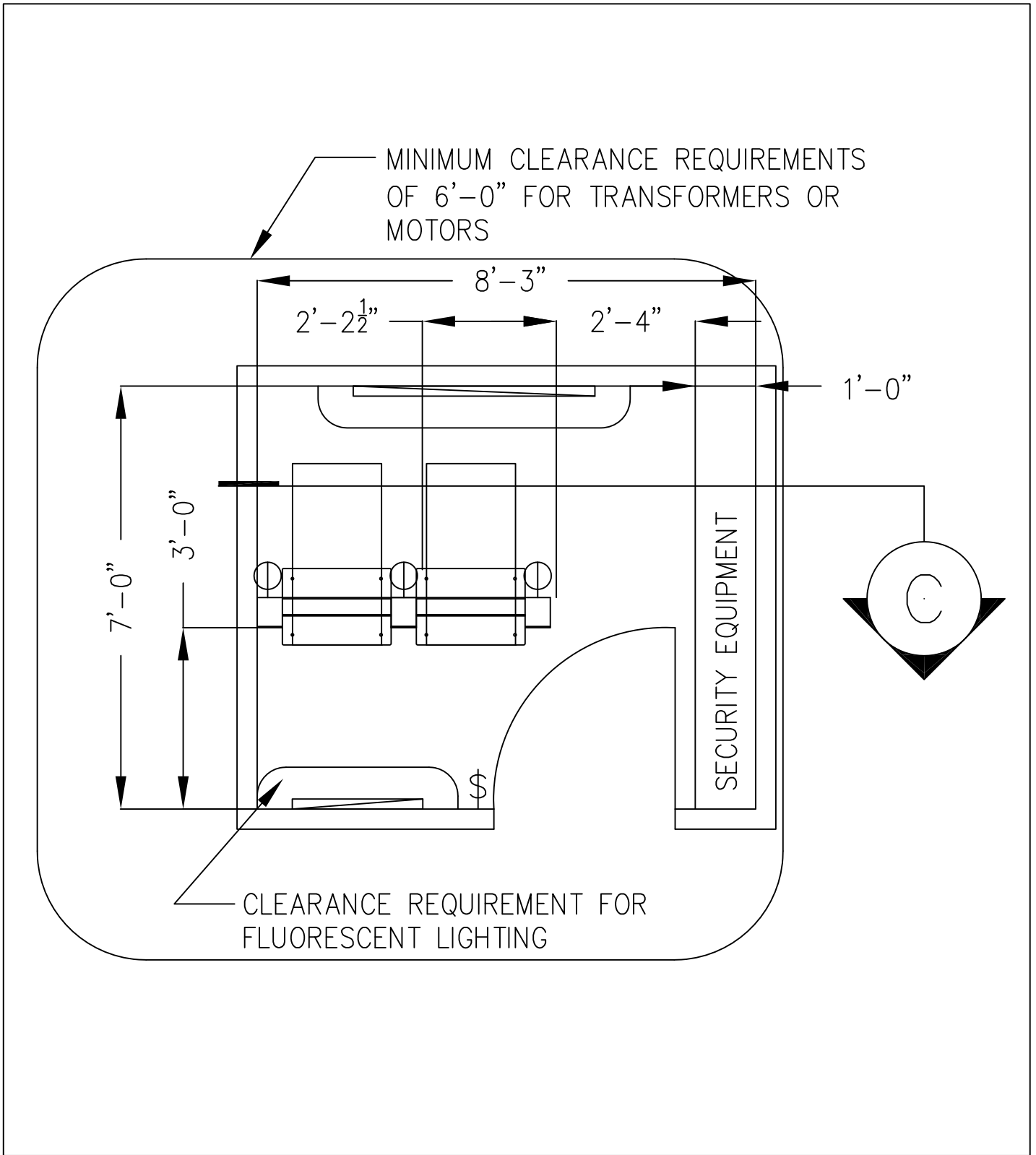
MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

TITLE: FIGURE 09   7'X8' CR LAYOUT

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

WIRE SPRINKLER HEAD GUARD

QUICK RESPONSE STANDARD
SPRAY SPRINKLER

MASTER GUIDELINES FOR
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Sheridan
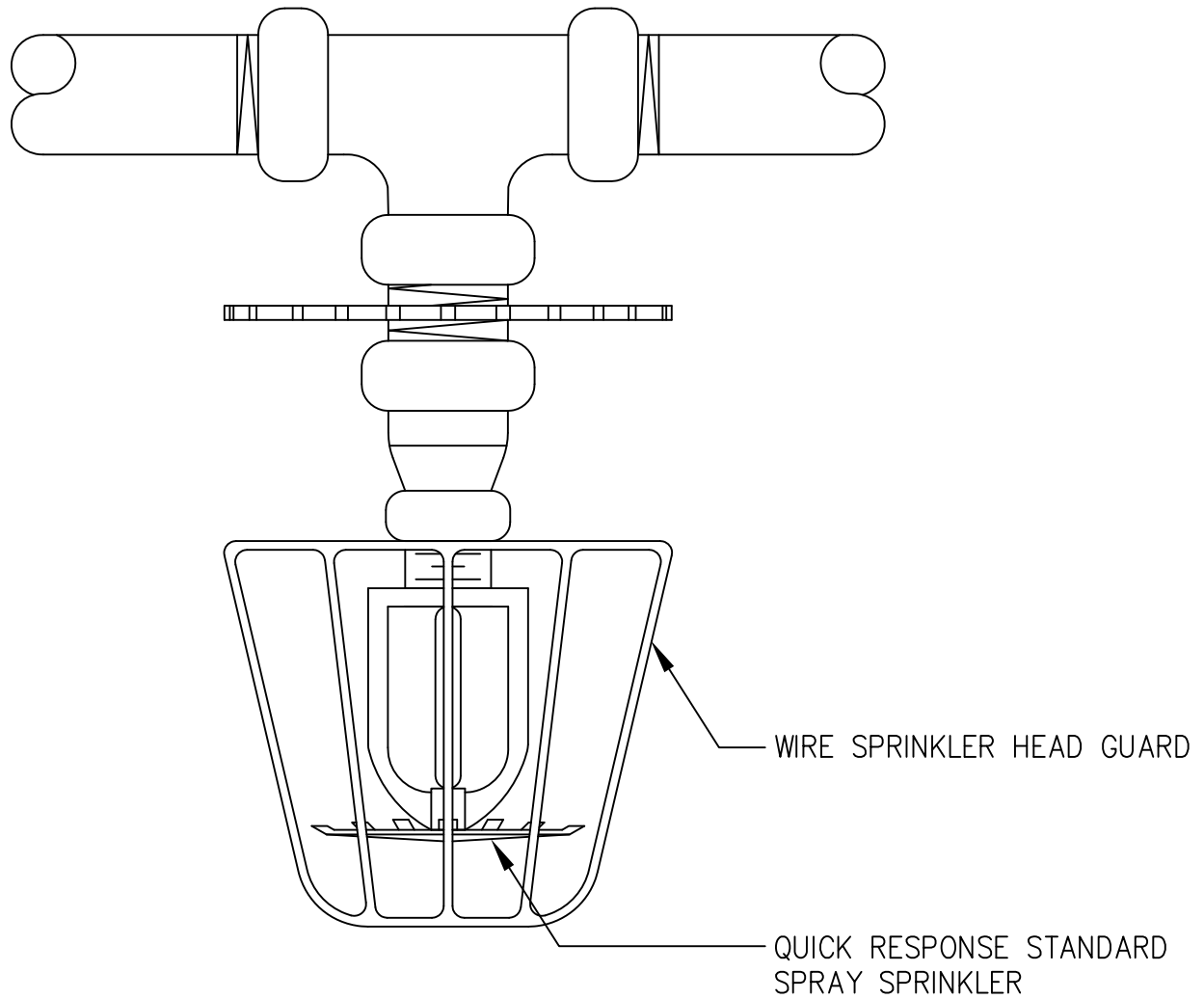
TITLE: FIGURE 10 TYPICAL SPRINKLERS CAGES

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

1' - 3"

0' - 6"

6' - 11"

2' - 4"

7' - 3"

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
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Sheridan
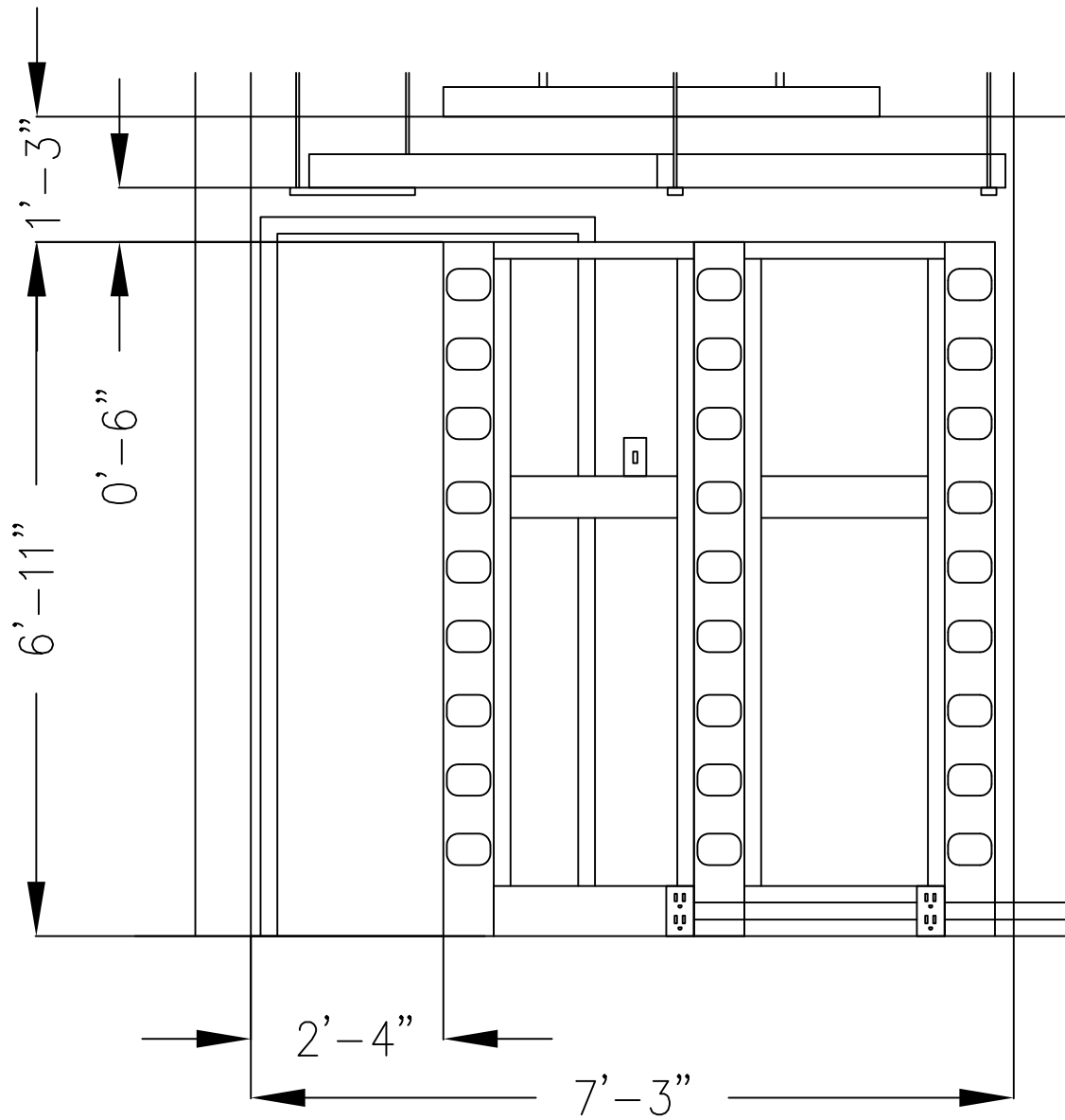
TITLE: FIGURE 11 CR RACK CROSS SECTION

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

CISCO
CATALYST
6509

PULL OUT WORKSHELF

CISCO
CATALYST
6509

UPS

UPS

PDU

UPS

PDU

UPS

PDU

UPS
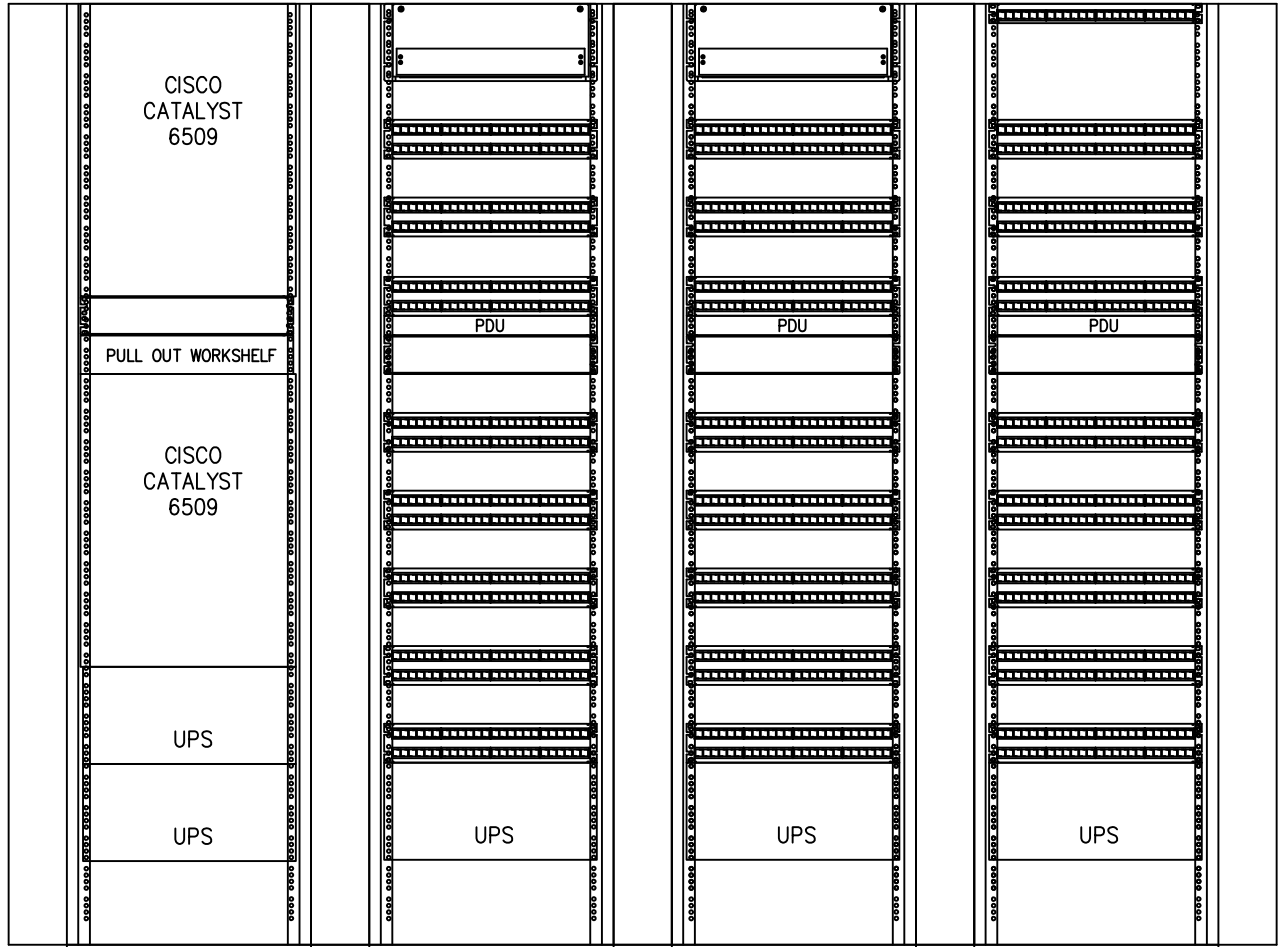
TITLE: FIGURE 12 RACK ELEVATION DETAIL A

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

PDU   PDU   PDU

UPS   UPS   UPS

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
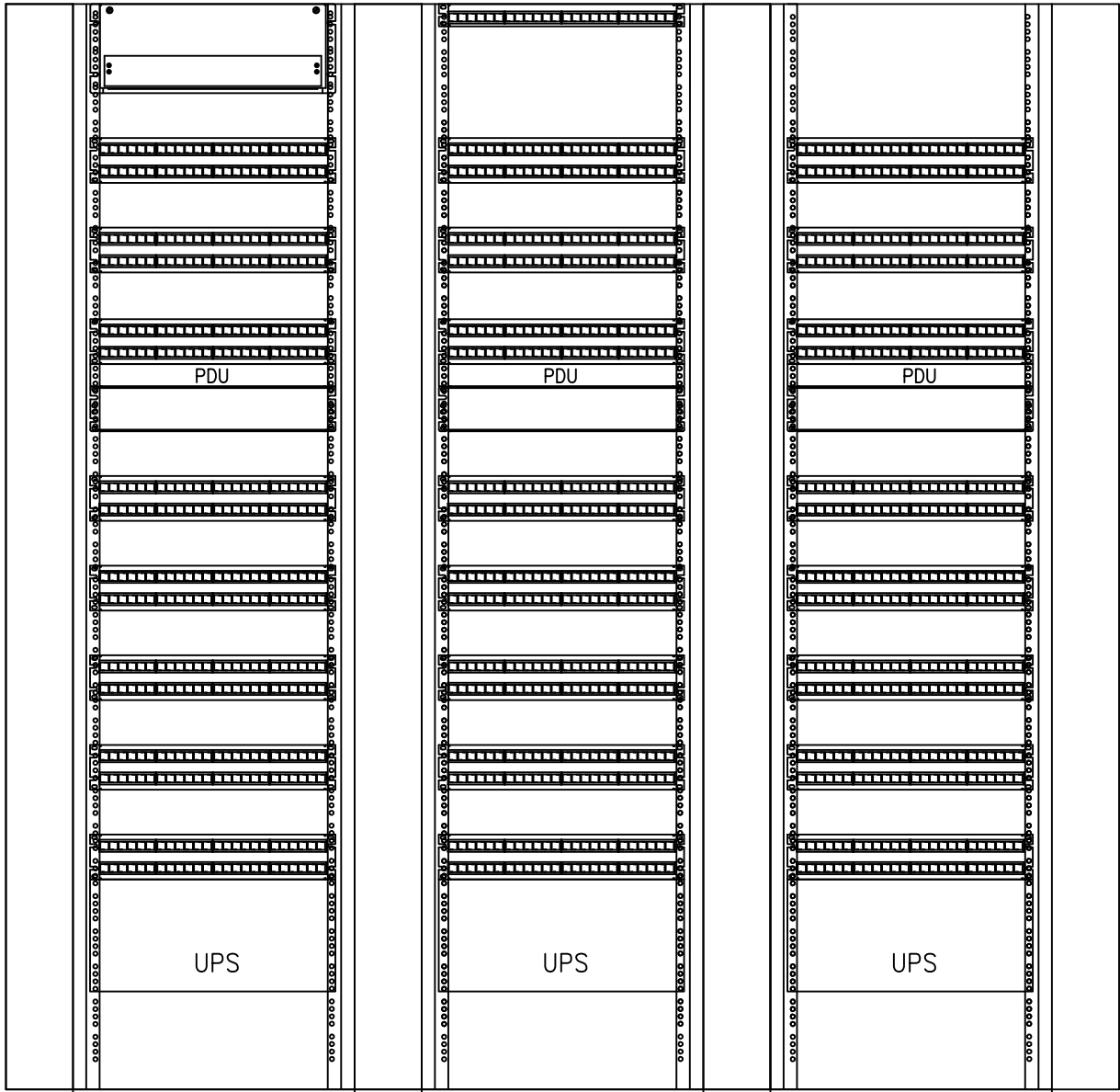
TITLE: FIGURE 13 RACK ELEVATION DETAIL B

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

MINIMUM CLEARANCE REQUIREMENTS
OF 6'−0" FOR TRANSFORMERS OR
MOTORS

8'−2"

2'−2½"   2'−4"

1'−0"

SECURITY EQUIPMENT

5'−0"

1'−0"

6"

1'−11"

MINIMUM CLEARANCE REQUIREMENTS
OF 6'-0" FOR TRANSFORMERS OR
MOTORS

6'-0"

2'-4"

1'-0"

7'-0"

3'-0"

SECURITY EQUIPMENT

A

B

1'-3"

0'-6"

6'-11"

2'-3 1/2"

5'-0"

SECTION A

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan

TITLE: FIGURE 16   IT CLOSET CROSS SECTION 'A'

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |
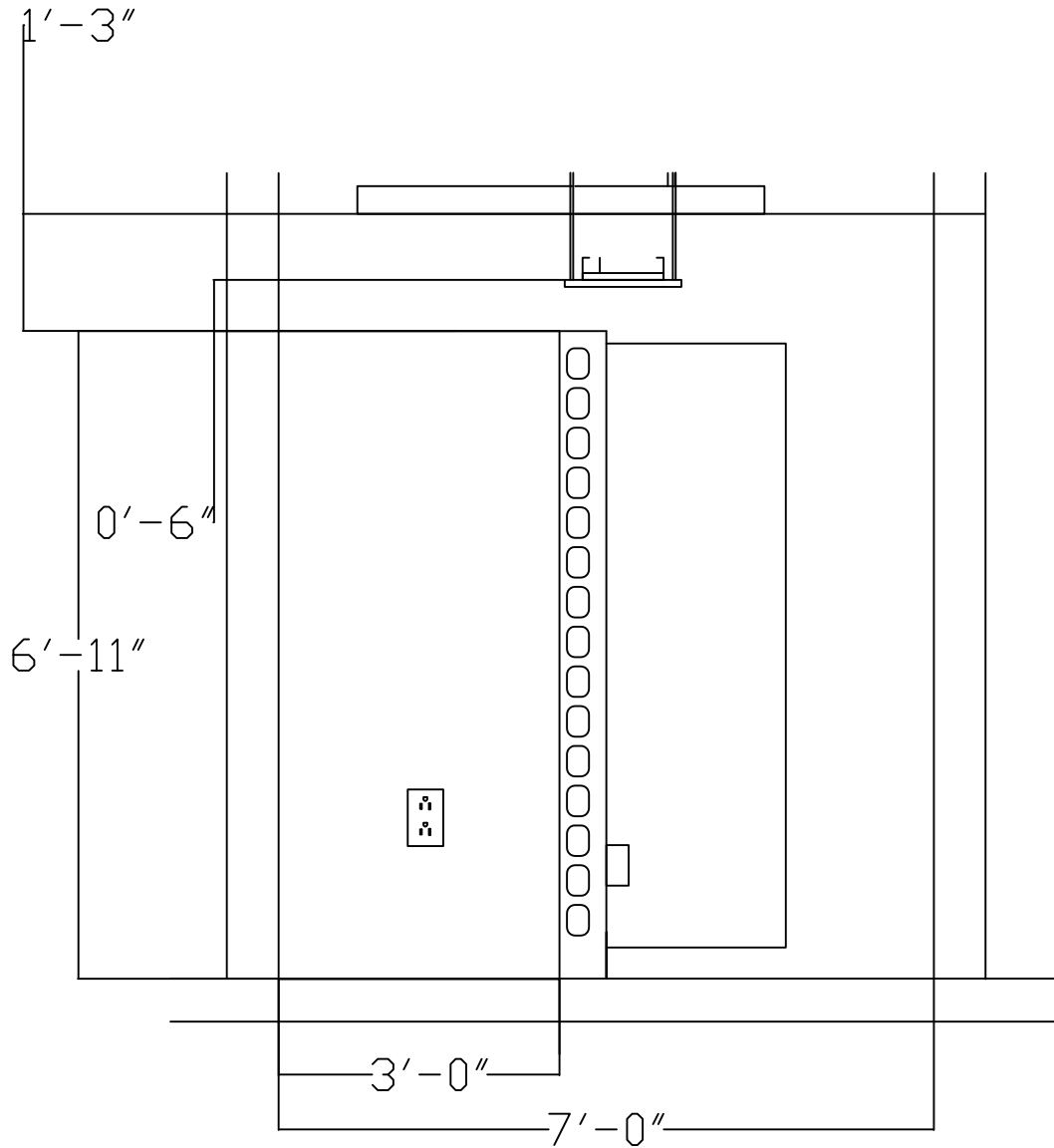
1'-3"

0'-6"

6'-11"

3'-0"

7'-0"

SECTION B

MINIMUM CLEARANCE REQUIREMENTS
OF 6'-0" FOR TRANSFORMERS OR
MOTORS

6'-0"

2'-4"

1'-0"

SECURITY EQUIPMENT

4'-6"

0'-6"

2'-1 1/2"

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
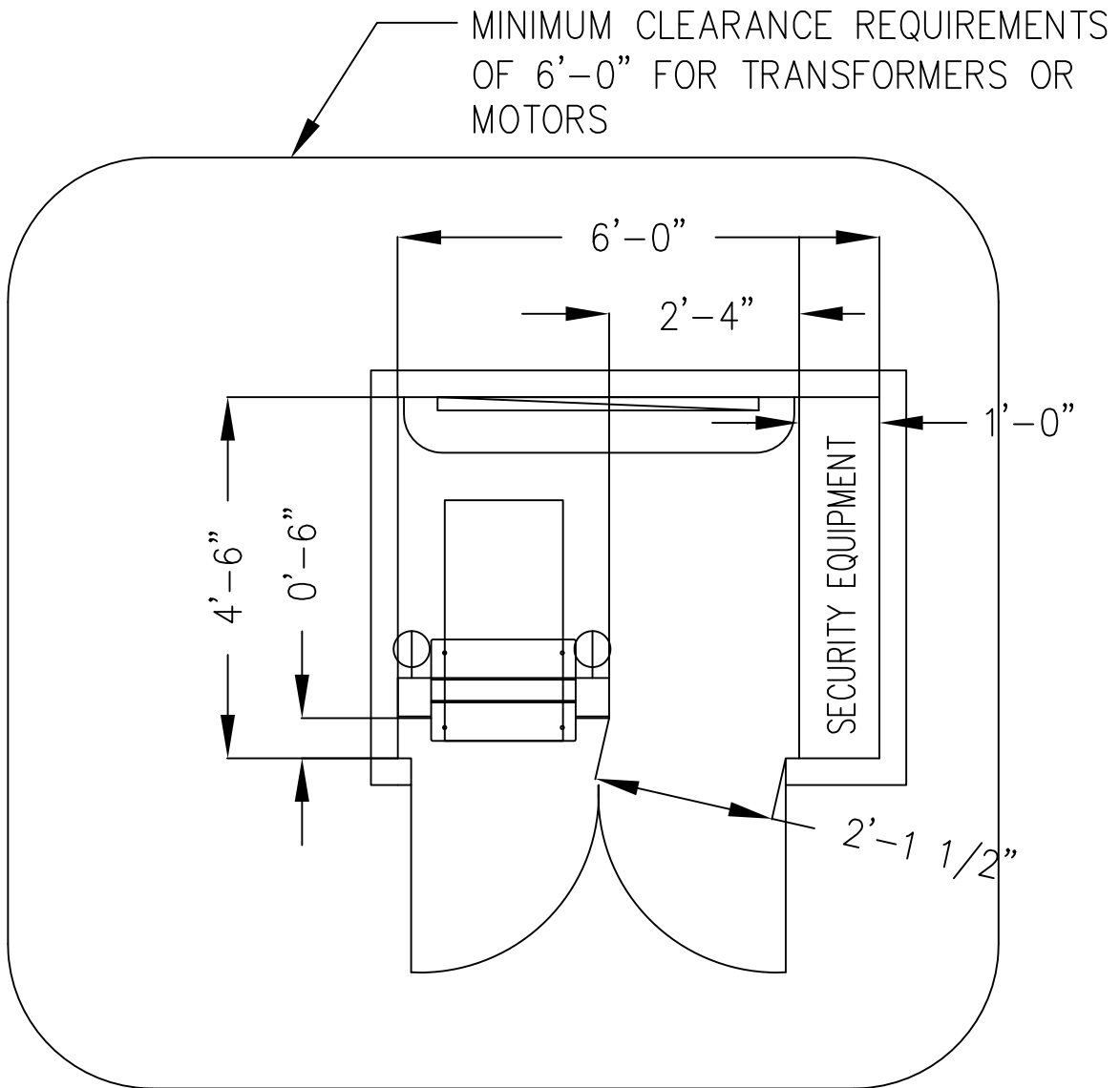
TITLE: FIGURE18   4-6"X6' SHALLOW IT CLOSET

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

BFP

C172
A

4'

4'

WB 7200 X 1200

4'

4'

2'

2'

3'-3"

3'-3"

C172
B

BFP

C306
A

BFP

2'

2'

4'

4'

WB 4800 X 1200

4'

4'

3'-3"

3'-3"

2'

4'

WB 2400 X 1200

4'

3'-3"

BFP

MASTER GUIDELINES FOR COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
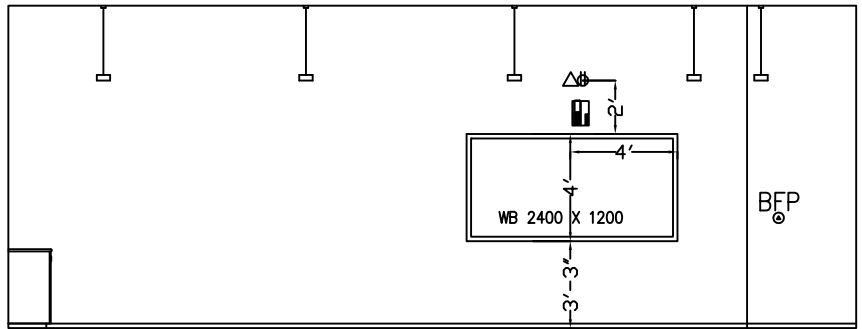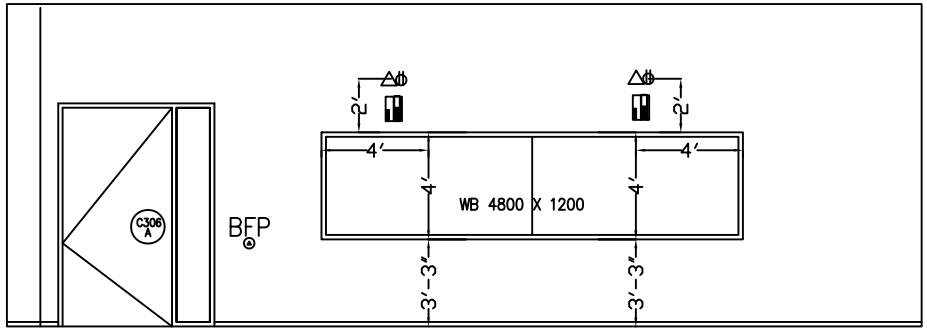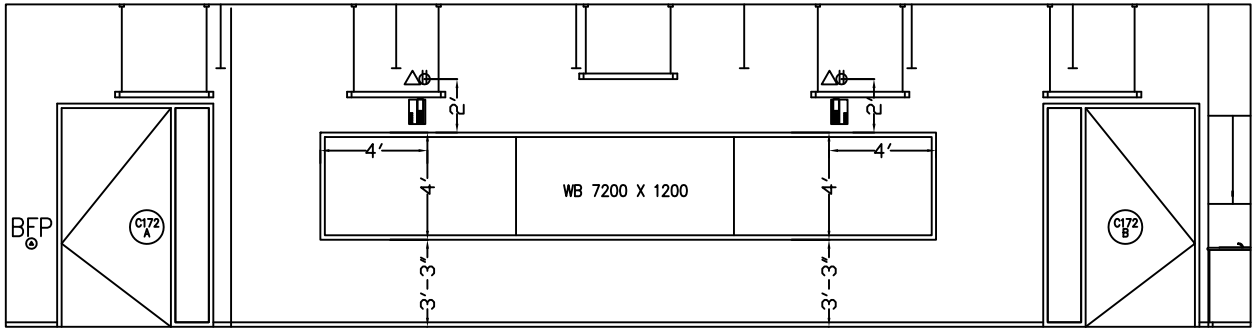
TITLE: FIGURE19   WHITEBOARD DETAILS

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |
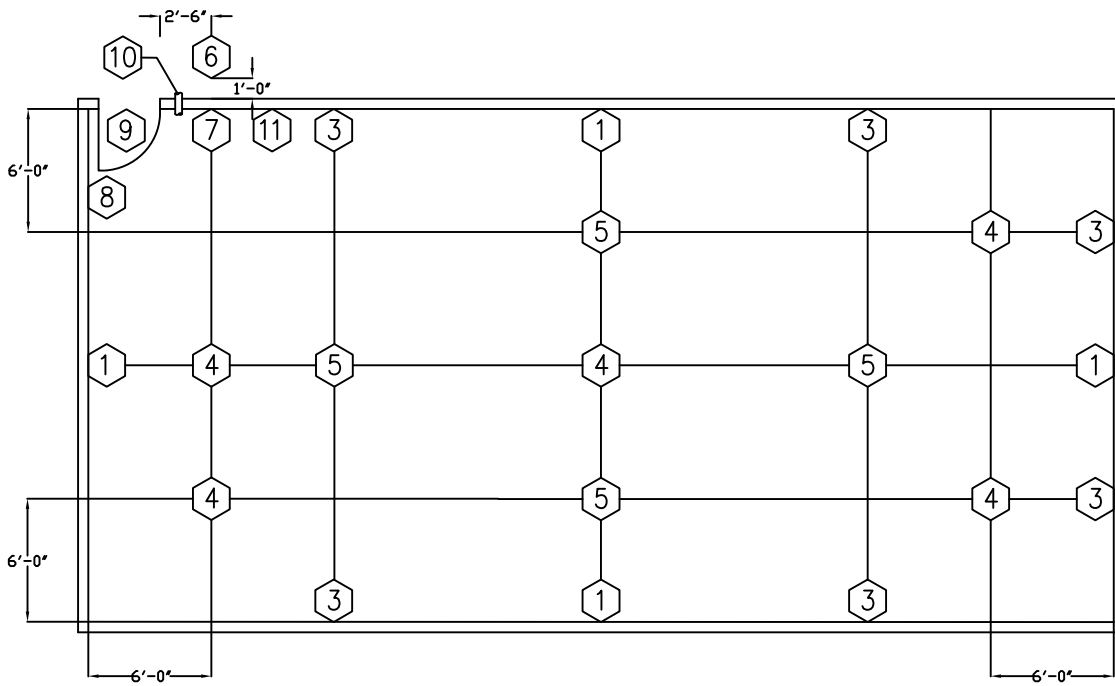
OUTLET TYPE REQUIREMENT

- (1) TYPE 'A' OUTLET
- (2) TYPE 'B' OUTLET (IF REQUIRED)
- (3) TYPE 'C' OUTLET
- (4) TYPE 'D' OUTLET
- (5) TYPE 'E' OUTLET
- (6) TYPE 'F' OUTLET
- (7) TYPE 'G' OUTLET
- (8) TYPE 'H' OUTLET
- (9) TYPE 'S' OUTLET
- (10) 4" CONDUIT STUB FROM MEDIA RACK LOCATION TO CEILING SPACE INSIDE CLASSROOM
- (11) PATHWAY FROM CEILING SPACE TO UNDER RAISED FLOOR. SEE FIGURE REV. 4.7, SK-08 FOR DETAIL

(9) WALL CLOCK LOCATION DETAIL

DOORFRAME

TYPE 'S' LOCATION

(10) CONDUIT STUB DETAIL DETAIL

TOP VIEW   SIDE VIEW

MASTER GUIDELINES FOR COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
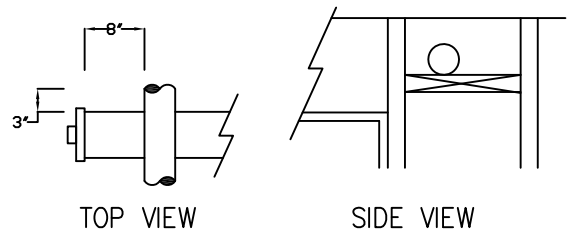
TITLE: FIGURE 20   STANDARD CLASSROOM

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |
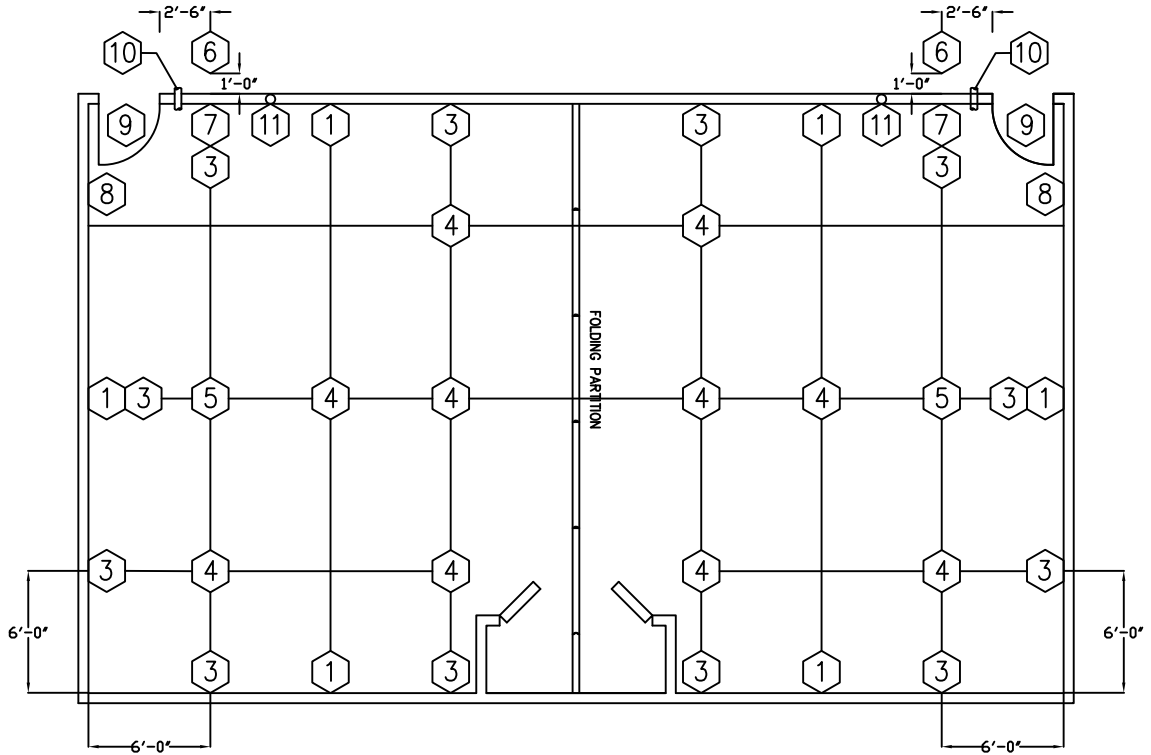
OUTLET TYPE REQUIREMENT

1. TYPE 'A' OUTLET
2. TYPE 'B' OUTLET (IF REQUIRED)
3. TYPE 'C' OUTLET
4. TYPE 'D' OUTLET
5. TYPE 'E' OUTLET
6. TYPE 'F' OUTLET
7. TYPE 'G' OUTLET
8. TYPE 'H' OUTLET
9. TYPE 'S' OUTLET
10. 4" CONDUIT STUB FROM MEDIA RACK LOCATION TO CEILING SPACE INSIDE CLASSROOM
11. PATHWAY FROM CEILING SPACE TO UNDER RAISED FLOOR. SEE FIGURE REV. 4.7, SK-08 FOR DETAIL

9 WALL CLOCK LOCATION DETAIL

DOORFRAME

TYPE 'S' LOCATION

10 CONDUIT STUB DETAIL DETAIL

TOP VIEW   SIDE VIEW

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

Sheridan
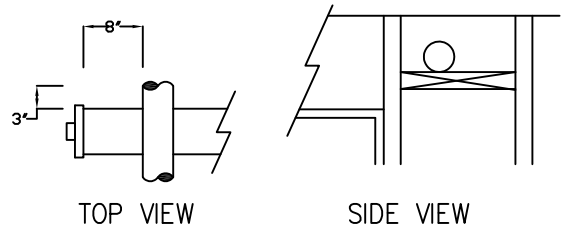
TITLE: FIGURE 21   SPLIT CLASSROOM

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

@ 72"C/L

TABLE TOP VIEW   TABLE UNDERSIDE VIEW

1. 2 @ 2" CONDUIT STUBBED UP THROUGH FLOOR NEAR CENTRE OF TABLE
2. FOR TABLE OUTLET DETAILS, SEE ENLARGED VIEWS BELOW
3. DOUBLE GANG BOX @ 72" AFF CENTERED ON WALL BEHIND DISPLAY
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT ALL DISPLAY LOCATIONS
4. ONE (1) 2" CONDUIT LINKS FROM DISPLAY TO TABLE, NOT TO EXCEED 40'
5. TYPE 'J' OUTLET, SEE OUTLET DETAILS
6. MINIMUM 3'-0" CLEAR FOR HANDICAP ACCESS
7. TYPE 'Q' OUTLET MOUNTED ON TABLE TOP
8. TYPE 'L' OUTLET MOUNTED AT UNDERSIDE OF TABLE
9. WALL MOUNTED DISPLAY, SIZE SPECIFIED BY PROJECT DESIGN TEAM
10. HDMI AND/OR DVI CABLES FED THROUGH CONDUIT (BY OTHERS)
11. TYPE 'A' OUTLET MOUNTED AT 12" A.F.F.
12. TYPE 'S' OUTLET MOUNTED AT 12" ABOVE FINISHED DOOR FRAME
13. TYPE 'E' OUTLET MOUNTED IN CEILING SPACE

Sheridan

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

TITLE: FIGURE 22   6 PERSON MEETING ROOM

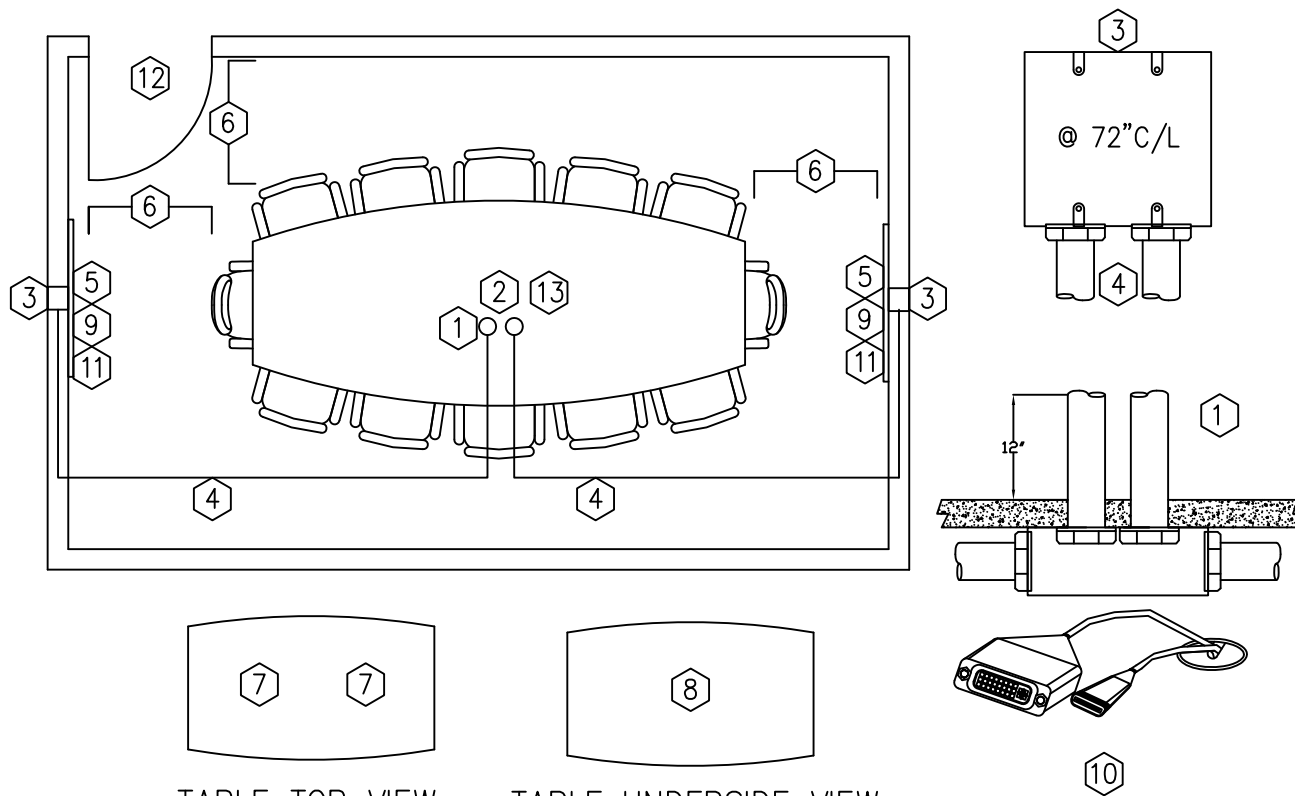| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

@ 72"C/L

TABLE TOP VIEW   TABLE UNDERSIDE VIEW

12"

1. 2 @ 2" CONDUIT STUBBED UP THROUGH FLOOR NEAR CENTRE OF TABLE
2. FOR TABLE OUTLET DETAILS, SEE ENLARGED VIEWS BELOW
3. DOUBLE GANG BOX @ 72" AFF CENTERED ON WALL BEHIND DISPLAY
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT ALL DISPLAY LOCATIONS
4. ONE (1) 2" CONDUIT LINKS FROM DISPLAY TO TABLE, NOT TO EXCEED 40'
5. TYPE 'J' OUTLET, SEE OUTLET DETAILS
6. MINIMUM 3'-0" CLEAR FOR HANDICAP ACCESS
7. TYPE 'Q' OUTLET MOUNTED ON TABLE TOP
8. TYPE 'L' OUTLET MOUNTED AT UNDERSIDE OF TABLE
9. WALL MOUNTED DISPLAY, SIZE SPECIFIED BY PROJECT DESIGN TEAM
10. HDMI AND/OR DVI CABLES FED THROUGH CONDUIT (BY OTHERS)
11. TYPE 'A' OUTLET MOUNTED AT 12" A.F.F.
12. TYPE 'S' OUTLET MOUNTED AT 12" ABOVE FINISHED DOOR FRAME
13. TYPE 'E' OUTLET MOUNTED IN CEILING SPACE

Sheridan

MASTER GUIDELINES FOR
COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

TITLE: FIGURE 23   8 PERSON MEETING ROOM

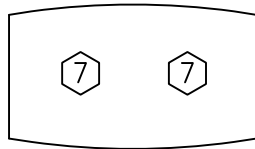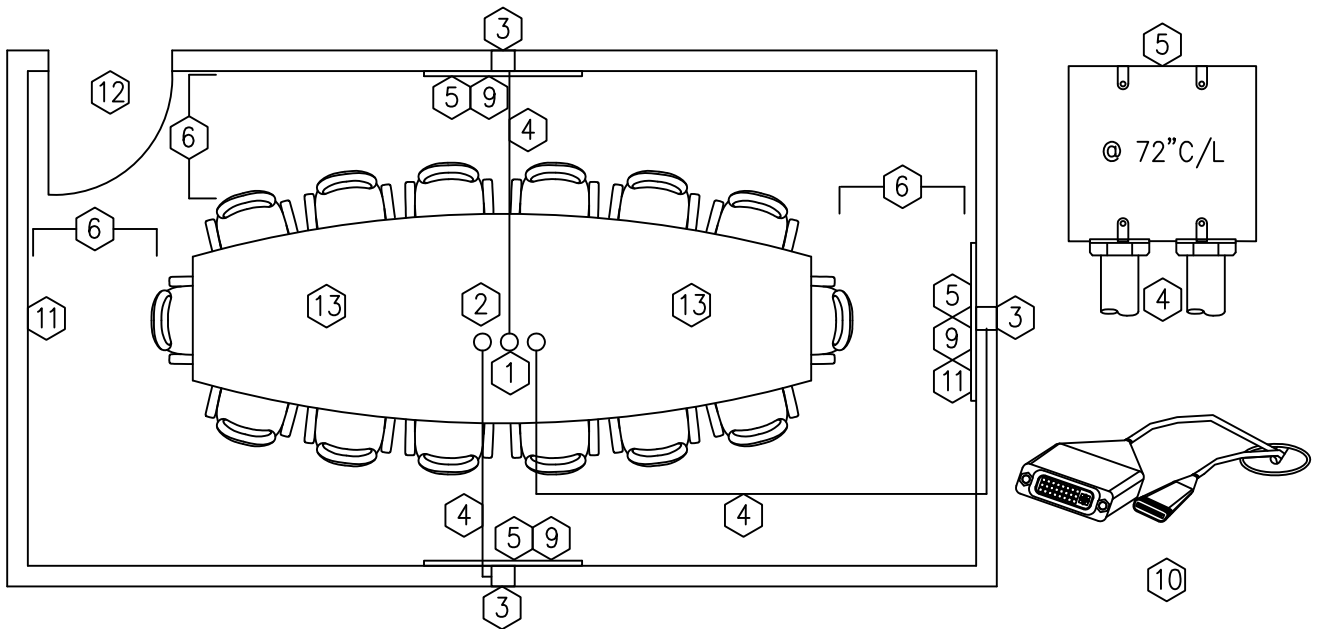DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA
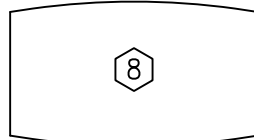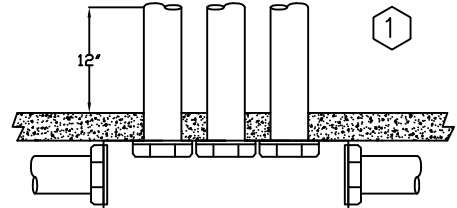
@ 72"C/L

12'

TABLE TOP VIEW   TABLE UNDERSIDE VIEW

1. 2 @ 2" CONDUIT STUBBED UP THROUGH FLOOR NEAR CENTRE OF TABLE
2. FOR TABLE OUTLET DETAILS, SEE ENLARGED VIEWS BELOW
3. DOUBLE GANG BOX @ 72" AFF CENTERED ON WALL BEHIND DISPLAY
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT ALL DISPLAY LOCATIONS
4. ONE (1) 2" CONDUIT LINKS FROM DISPLAY TO TABLE, NOT TO EXCEED 40'
5. TYPE 'J' OUTLET, SEE OUTLET DETAILS
6. MINIMUM 3'-0" CLEAR FOR HANDICAP ACCESS
7. TWO (2) TYPE 'R' OUTLET MOUNTED ON TABLE TOP
8. TYPE 'L' OUTLET MOUNTED AT UNDERSIDE OF TABLE
9. WALL MOUNTED DISPLAY, SIZE SPECIFIED BY PROJECT DESIGN TEAM
10. HDMI AND/OR DVI CABLES FED THROUGH CONDUIT (BY OTHERS)
11. TYPE 'A' OUTLET MOUNTED AT 12" A.F.F.
12. TYPE 'S' OUTLET MOUNTED AT 12" ABOVE FINISHED DOOR FRAME
13. TYPE 'E' OUTLET MOUNTED IN CEILING SPACE

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VERSION 5.0

TITLE: FIGURE 24   10-12 PERSON MEETING ROOM

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

@ 72"C/L

TABLE TOP VIEW   TABLE UNDERSIDE VIEW

12"

1. 2 @ 2" CONDUIT STUBBED UP THROUGH FLOOR NEAR CENTRE OF TABLE
2. FOR TABLE OUTLET DETAILS, SEE ENLARGED VIEWS BELOW
3. DOUBLE GANG BOX @ 72" AFF CENTERED ON WALL BEHIND DISPLAY
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT ALL DISPLAY LOCATIONS
4. ONE (1) 2" CONDUIT LINKS FROM DISPLAY TO TABLE, NOT TO EXCEED 40'
5. TYPE 'J' OUTLET, SEE OUTLET DETAILS
6. MINIMUM 3'-0" CLEAR FOR HANDICAP ACCESS
7. TWO (2) TYPE 'R' OUTLET MOUNTED ON TABLE TOP
8. TYPE 'L' OUTLET MOUNTED AT UNDERSIDE OF TABLE
9. WALL MOUNTED DISPLAY, SIZE SPECIFIED BY PROJECT DESIGN TEAM
10. HDMI AND/OR DVI CABLES FED THROUGH CONDUIT (BY OTHERS)
11. TYPE 'A' OUTLET MOUNTED AT 12" A.F.F.
12. TYPE 'S' OUTLET MOUNTED AT 12" ABOVE FINISHED DOOR FRAME
13. TYPE 'E' OUTLET MOUNTED IN CEILING SPACE

Sheridan

MASTER GUIDELINES FOR
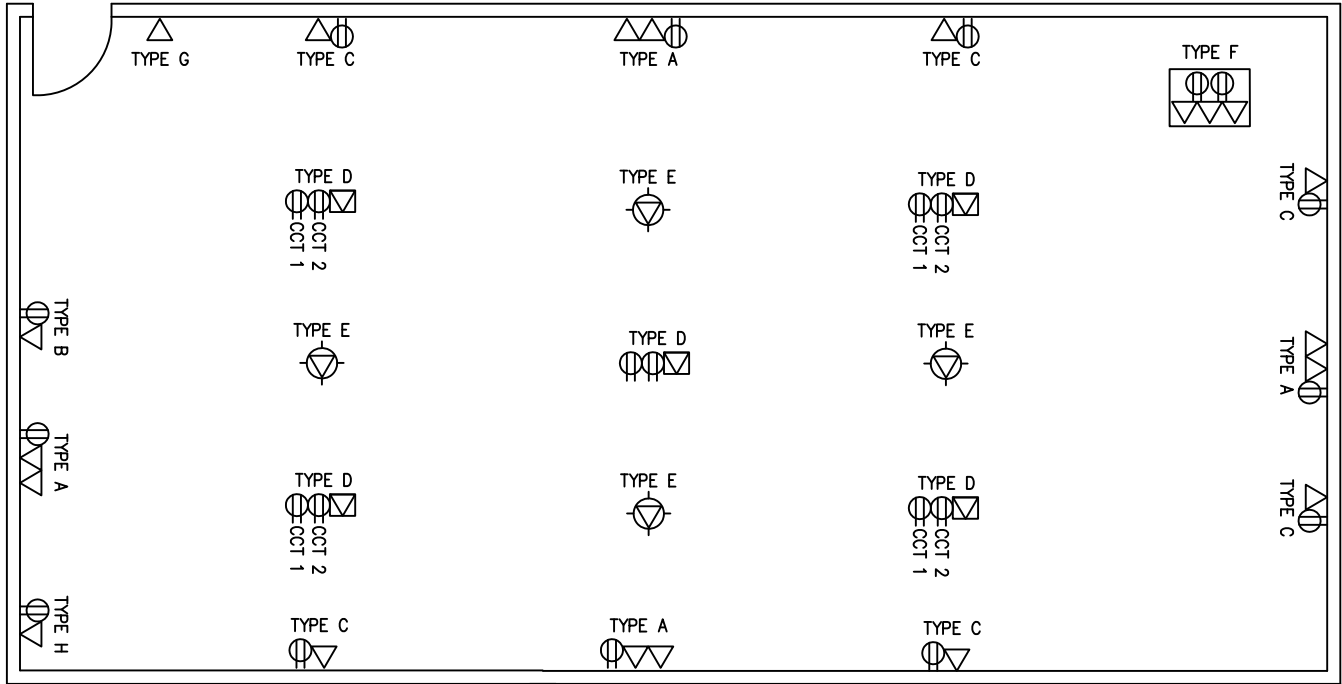COMMUNICATIONS INFRA STRUCTURE

VERSION 5.0

TITLE: FIGURE 25 14+ PERSON MEETING ROOM

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

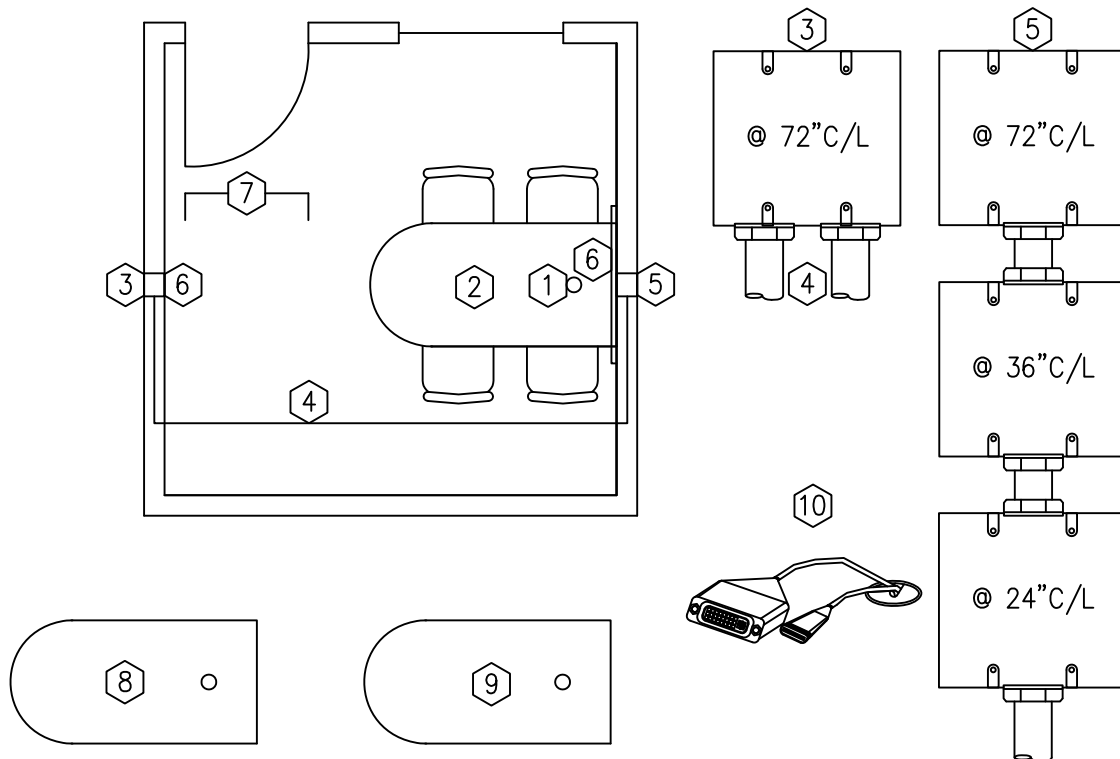2:1 STANDARD LAB

@ 72"C/L   @ 72"C/L

@ 36"C/L

@ 24"C/L

TABLE TOP VIEW   TABLE UNDERSIDE VIEW

1. 2" GROMMETTED OPENING FOR CABLES TO PASS THROUGH FROM UNDERSIDE
2. FOR TABLE OUTLET DETAILS, SEE ENLARGED VIEWS BELOW
3. DOUBLE GANG BOX @ 72" AFF CENTERED ON WALL BEHIND DISPLAY
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT ALL DISPLAY LOCATIONS
4. TWO (2) 1-1/4" CONDUIT LINKS FROM DISPLAY TO TABLE, NOT TO EXCEED 40'
5. DOUBLE GANG BOX @ 24", 36", 72" AFF CENTERED ON TABLE FOR COMMUNICATIONS
   32"W x 18"H x 3/4" PLYWOOD BACKING REQUIRED AT 72" LOCATION ONLY
6. TYPE 'J' OUTLET, SEE OUTLET DETAILS
7. MINIMUM 3'-0" CLEAR FOR HANDICAP ACCESS
8. TYPE 'K' OUTLET MOUNTED ON TABLE TOP
9. TYPE 'L' OUTLET MOUNTED AT UNDERSIDE OF TABLE
10. HDMI AND/OR DVI CABLES FED THROUGH CONDUIT (BY OTHERS)

MASTER GUIDELINES FOR
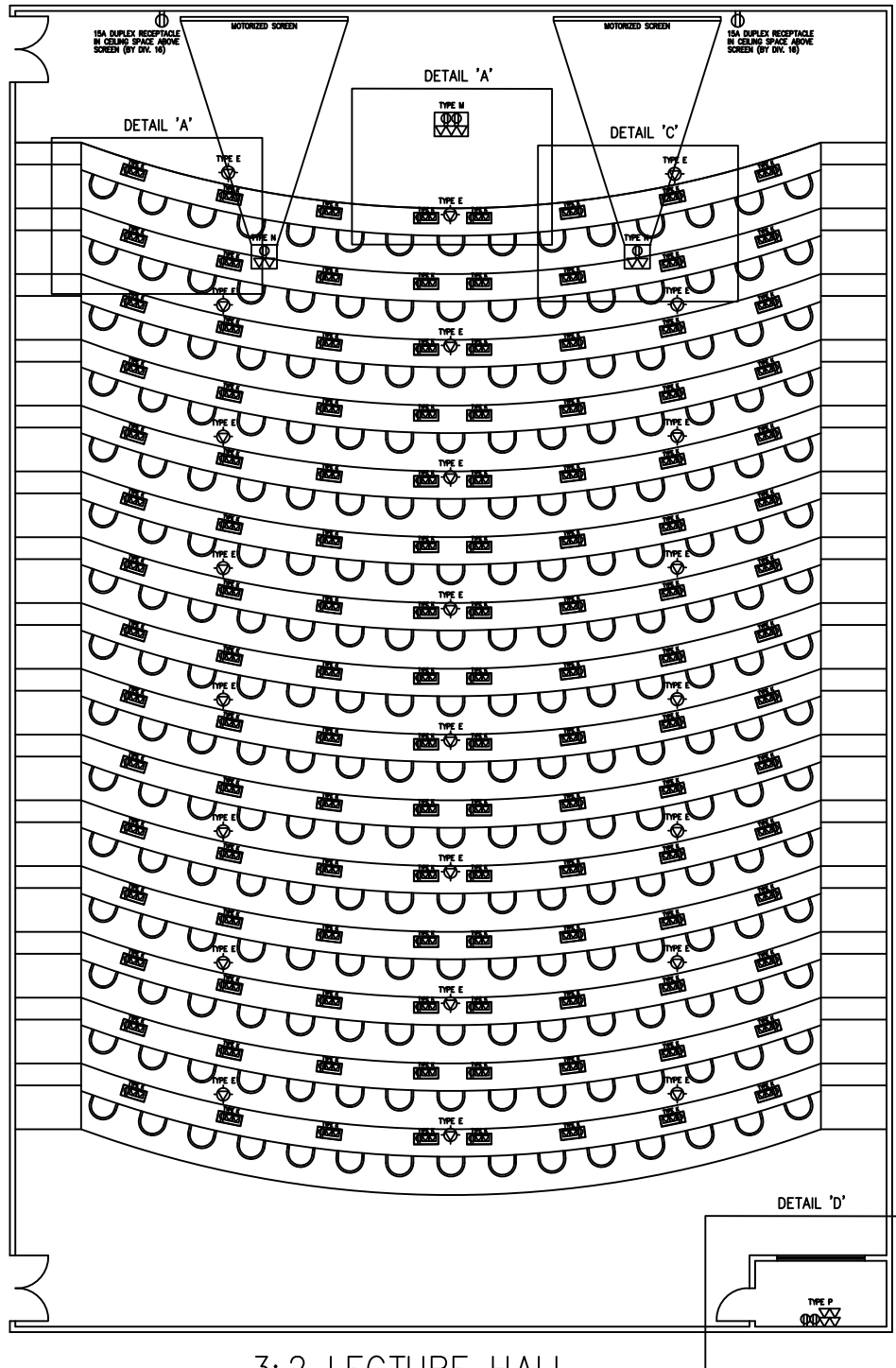COMMUNICATIONS INFRA STRUCTURE
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TITLE: FIGURE 27   4-6 PERSON BREAKOUT ROOM

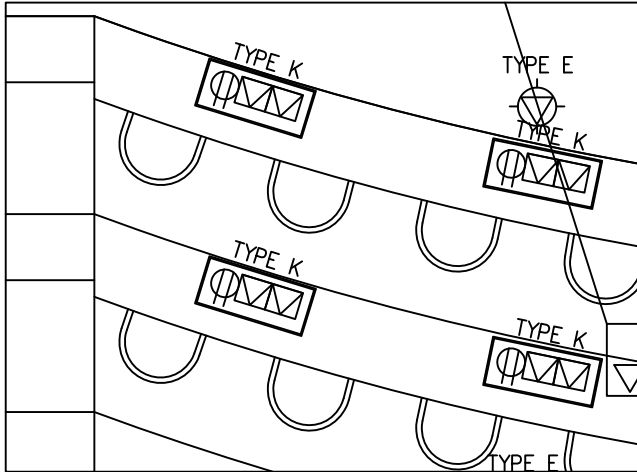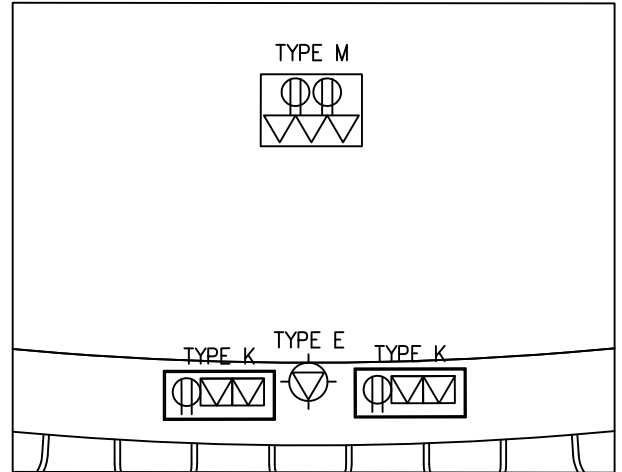DATE: AUG. 26, 2013   SCALE: N.T.S.   DRAWN BY: AK   CHECKED BY: CA

3:2 LECTURE HALL

TYPE K

TYPE E

TYPE K

TYPE K

TYPE K

TYPE E

DETAIL 'A' SEATING REQUIREMENTS

TYPE M

TYPE K   TYPE E   TYPE K

DETAIL 'B' PODIUM REQUIREMENTS

TYPE E

TYPE K

TYPE K

TYPE N

TYPE K

TYPE K

TYPE E

DETAIL 'A' SEATING REQUIREMENTS

TYPE P
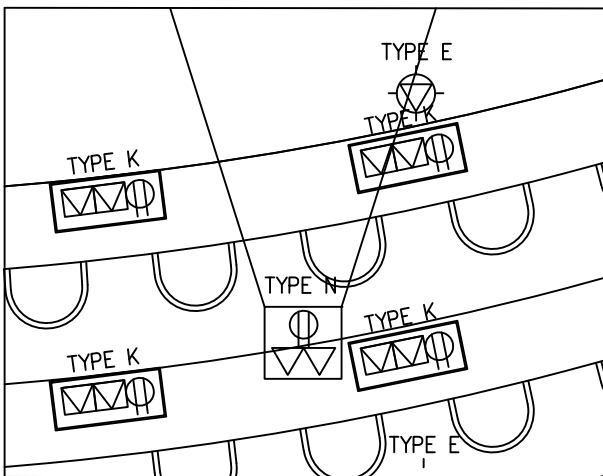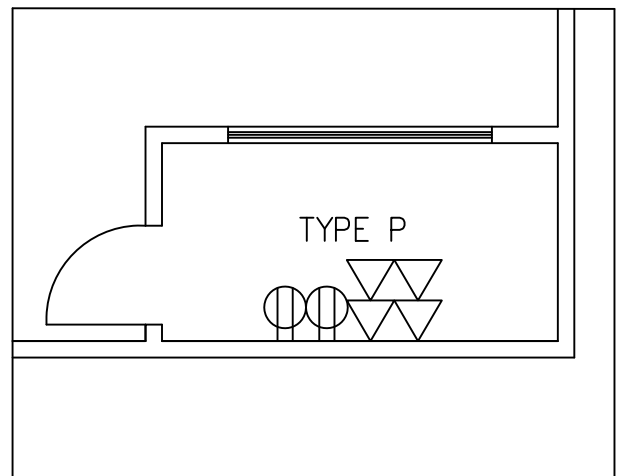
DETAIL 'D' A/V CONTROL ROOM

Sheridan

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COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

TITLE: FIGURE 29 LECTURE HALL DETAILS A-D

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

TYPE A
TYPE A – CONVENIENCE LOCATION
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED AT 12" A.F.F.

TYPE B
TYPE B – PRINTER LOCATION
  ONE (1) 20A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED AT 12" A.F.F.

TYPE C
TYPE C – PROJECTOR LOCATION
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  ONE (1) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED AT 111" A.F.F.

TYPE D
TYPE D – PODIUM LOCATION
  TWO (2) 15A DUPLEX RECEPTACLES (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROP (BY COMMS)
    ONE (1) BLUE
    ONE (1) PURPLE
  MOUNTED IN FLOOR MONUMENT.

TYPE E
TYPE E – WIRELESS ACCESS POINT LOCATION
  ONE (1) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED IN CEILING SPACE.

TYPE F
TYPE F – ABOVE CEILING MOUNT
  TWO (2) 15A DUPLEX RECEPTACLES (BY DIVISION 16)
  THREE (3) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED ABOVE FINISHED CEILING

TYPE G
TYPE G – WALL MOUNT PHONE LOCATION
  ONE (1) PANDUIT KWP6PY STAINLESS PHONE PLATE
  ONE (1) CATEGORY 6 DATA DROP (BY COMMS)
 MOUNTED AT CLASSROOM LIGHT SWITCH HEIGHT

TYPE H
TYPE H – LECTURE CAPTURE CAMERA LOCATION
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  ONE (1) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED AT 12" B.F.C.

TYPE J
TYPE J – LCD LOCATION
  ONE (1) RECESSED POWER AND DATA BACK BOX
  TWO (2) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED AT 72" A.F.F.

TYPE K
TYPE K – SPIDER MFG. PHA2 TABLE BOX
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED FLUSH IN TABLE
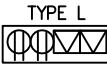
TYPE L
TYPE L – UNDER TABLE SURFACE MOUNT
  TWO (2) 15A DUPLEX RECEPTACLES (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED IN FLOOR MONUMENT.

TYPE M
TYPE M – PODIUM LECTURE STAND
  TWO (2) 15A DUPLEX RECEPTACLES (BY DIVISION 16)
  THREE (3) CATEGORY 6 DATA DROPS (BY COMMS)
  ONE (1) 2" EMT CONDUIT TO A/V CLOSET

TYPE N
TYPE N – LECTURE HALL PROJECTOR LOCATION
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROPS (BY COMMS)
  EITHER DROP POLE OR CEILING MOUNT

TYPE P
TYPE P – A/V CLOSET COMBINATION
  TWO (2) 15A DUPLEX RECEPTACLES (BY DIVISION 16)
  FOUR (4) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED ON WALL RACK OR FLOOR RACK

TYPE Q
TYPE Q – SPIDER MFG. PHA2 TABLE BOX
  TWO (2) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  FOUR (4) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED FLUSH IN TABLE

TYPE R
TYPE R – SPIDER MFG. PHA2 TABLE BOX
  ONE (1) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROPS (BY COMMS)
  MOUNTED FLUSH IN TABLE

TYPE S
TYPE S – WALL MOUNT CLOCK LOCATION
  ONE (1) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED AT 12" ABOVE ENTRANCE DOOR FRAME

TYPE T
TYPE T – SHERIDAN TV OUTLET LOCATION
  ONE (1) RECESSED POWER AND DATA BACK BOX
  TWO (2) 15A DUPLEX RECEPTACLE (BY DIVISION 16)
  TWO (2) CATEGORY 6 DATA DROP (BY COMMS)
  MOUNTED AT 108" A.F.F.

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VERSION 5.0

TITLE: FIGURE 30   OUTLET TYPES

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

TYPE A

1/2" CONDUIT (BY DIV 16)

MIN. 1" (25mm) CONDUIT UP TO ACCESSIBLE CEILING SPACE (BY DIVISION 16).

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

BLANK

15A DUPLEX (BY DIV 16)

2-GANG BACK BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE A

TYPE B

1/2" CONDUIT (BY DIV 16)

MIN. 1" (25mm) CONDUIT UP TO ACCESSIBLE CEILING SPACE (BY DIVISION 16).

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

BLANK

BLANK

20A DUPLEX (BY DIV 16)

2-GANG BACK BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE B

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TITLE: FIGURE 31   OUTLET DETAILS 'A' & 'B'

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

TYPE C

Type C labels (left to right, top):
1/2" CONDUIT (BY DIV 16)

MIN. 1" (25mm) CONDUIT UP TO ACCESSIBLE CEILING SPACE (BY DIVISION 16).

15A DUPLEX (BY DIV 16)

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

BLANK

BLANK

2-GANG BACK BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE D

Type D labels:
1/2" CONDUIT (BY DIV 16)

MIN. 1" (25mm) CONDUIT UP TO ACCESSIBLE CEILING SPACE (BY DIVISION 16).

15A DUPLEX (BY DIV 16)

15A DUPLEX (BY DIV 16)

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET (PURPLE)

BLANK

3-GANG BACK BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

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TITLE: FIGURE 32   OUTLET DETAILS 'C' & 'D'
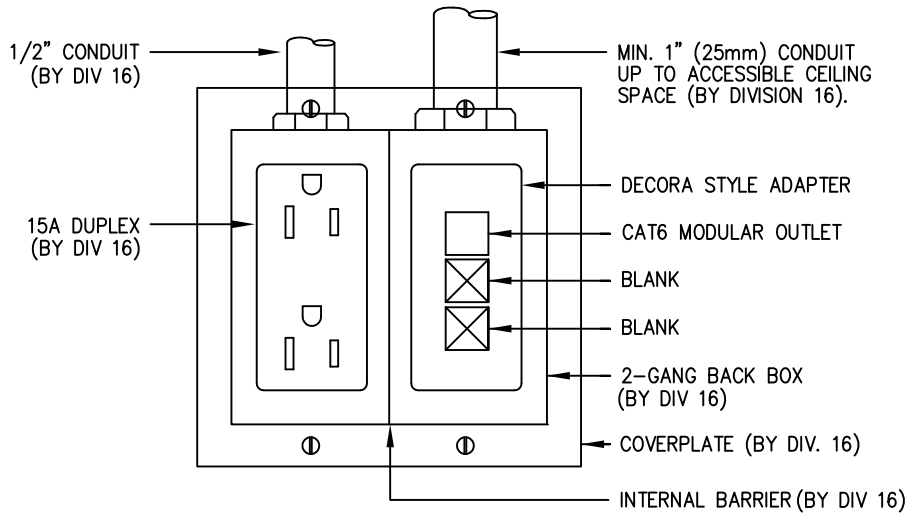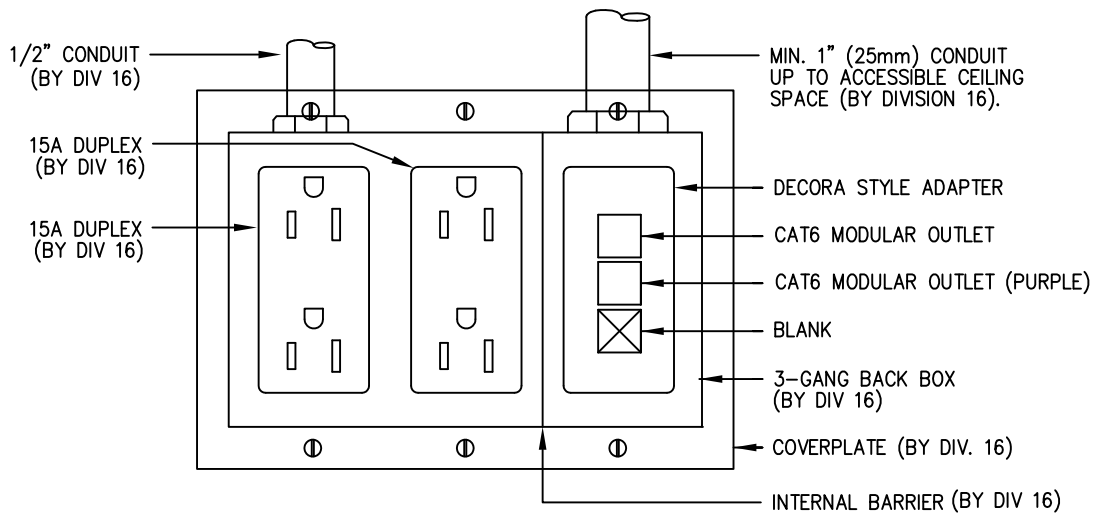
| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |
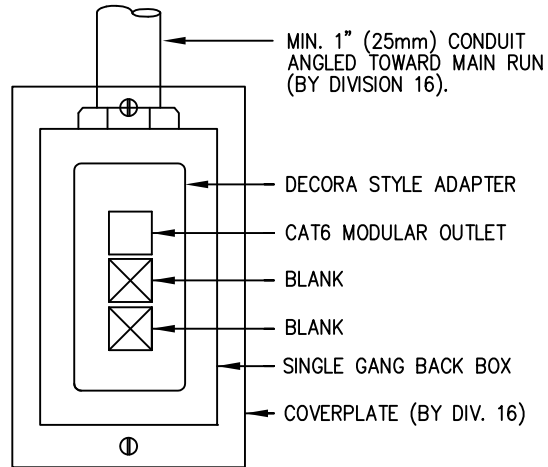
MIN. 1" (25mm) CONDUIT ANGLED TOWARD MAIN RUN (BY DIVISION 16).

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

BLANK

BLANK

SINGLE GANG BACK BOX

COVERPLATE (BY DIV. 16)

TYPE E

1/2" CONDUIT (BY DIV 16)

MIN. 1" (25mm) CONDUIT UP TO ACCESSIBLE CEILING SPACE (BY DIVISION 16).

15A DUPLEX (BY DIV 16)

DECORA STYLE ADAPTER

15A DUPLEX (BY DIV 16)

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

3-GANG BACK BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE F

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VERSION 5.0

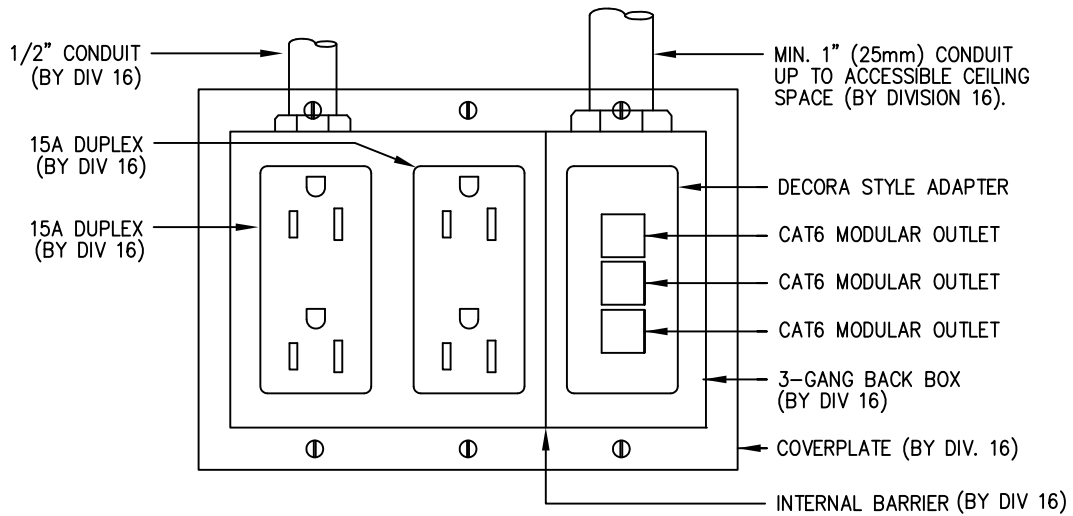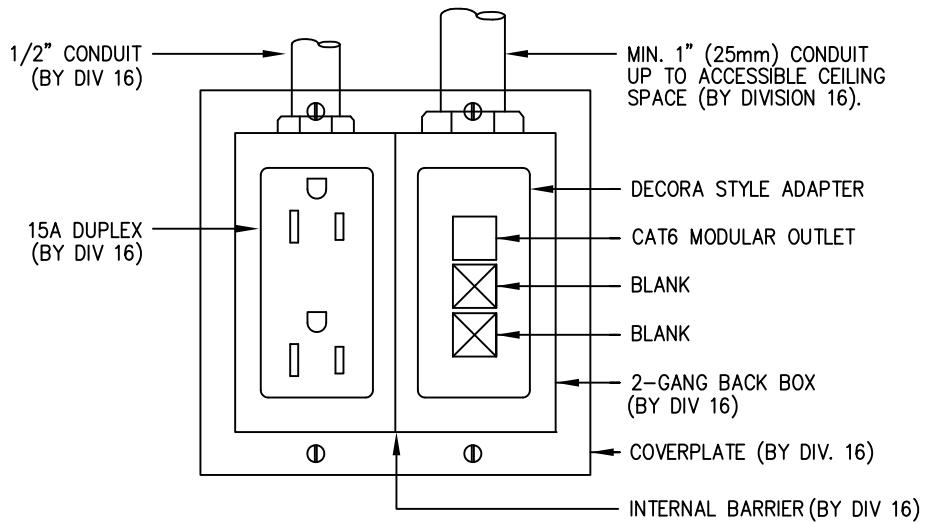TITLE: FIGURE 33   OUTLET DETAILS 'E' & 'F'

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

MIN. 1" (25mm) CONDUIT
UP TO ACCESSIBLE CEILING
SPACE (BY DIVISION 16).

BLANK

CAT6 MODULAR OUTLET

BLANK

SINGLE GANG BACK BOX
(BY DIV 16)

COVERPLATE (BY COMMS)

TYPE G

1/2" CONDUIT
(BY DIV 16)

MIN. 1" (25mm) CONDUIT
UP TO ACCESSIBLE CEILING
SPACE (BY DIVISION 16).

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

BLANK

BLANK

15A DUPLEX
(BY DIV 16)

2-GANG BACK BOX
(BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)
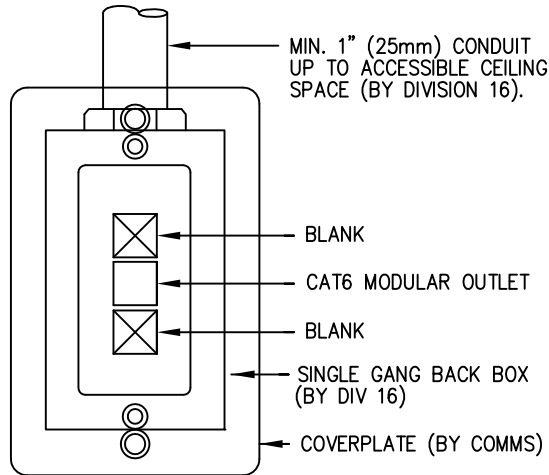
TYPE H

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Sheridan

VERSION 5.0

TITLE: FIGURE 34 OUTLET DETAILS 'G' & 'H'

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

1/2" CONDUIT
(BY DIV 16)

MIN. 1" (25mm) CONDUIT
UP TO ACCESSIBLE CEILING
SPACE (BY DIVISION 16).

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

BLANK

15A DUPLEX
(BY DIV 16)

2-GANG RECESSED BACK
BOX (BY DIV 16)

INTERNAL BARRIER (BY DIV 16)

TYPE J

BLANK

CAT6 MODULAR OUTLET

BLANK

15A DUPLEX
(BY DIV 16)

PHA2 PHANTOM
2-GANG SPIDER BOX

INTERNAL BARRIER

BLANK

CAT6 MODULAR OUTLET

BLANK
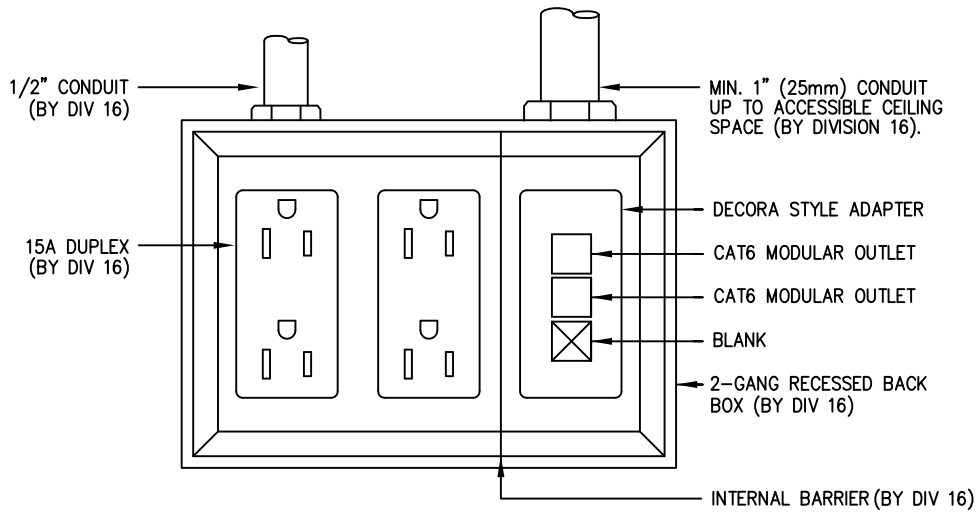
TYPE K

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VERSION 5.0

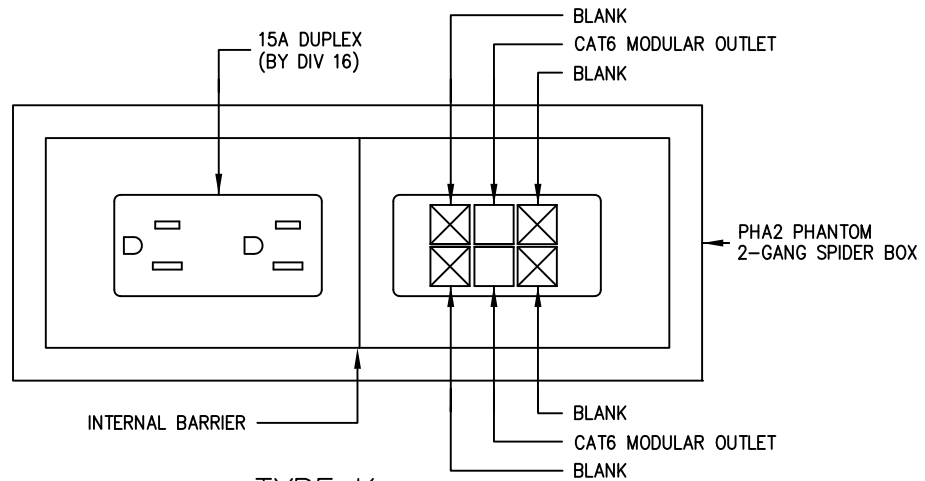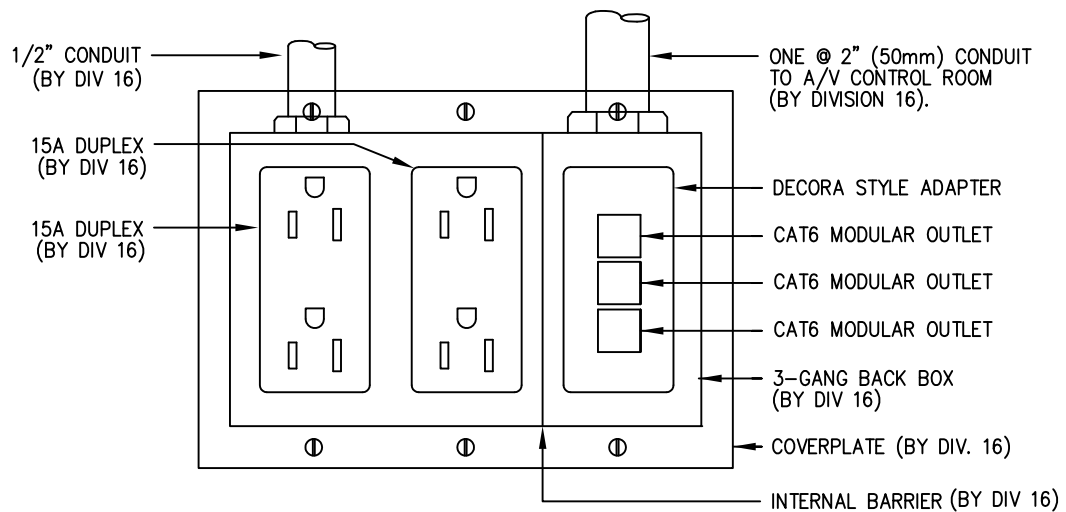TITLE: FIGURE 35 OUTLET DETAILS 'J' & 'K'

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA
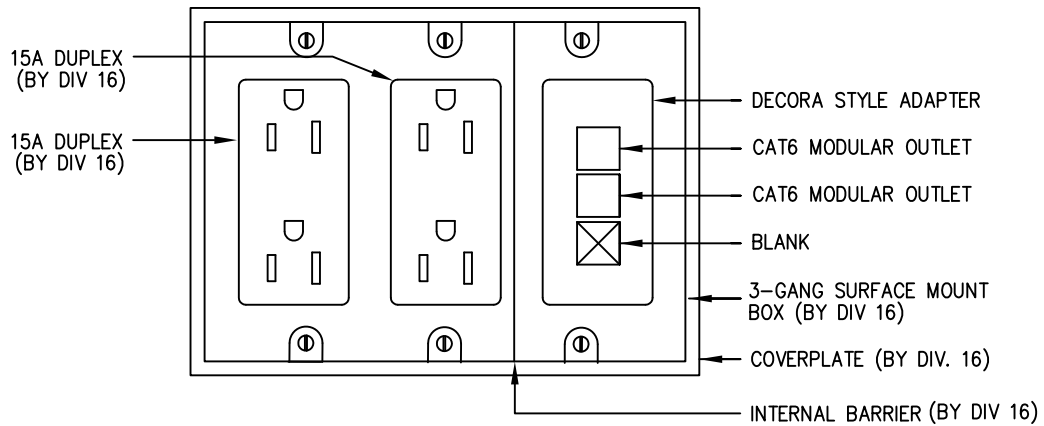
15A DUPLEX
(BY DIV 16)

15A DUPLEX
(BY DIV 16)

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

BLANK

3-GANG SURFACE MOUNT
BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE L

1/2" CONDUIT
(BY DIV 16)

ONE @ 2" (50mm) CONDUIT
TO A/V CONTROL ROOM
(BY DIVISION 16).

15A DUPLEX
(BY DIV 16)

15A DUPLEX
(BY DIV 16)

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

3-GANG BACK BOX
(BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)

TYPE M

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COMMUNICATIONS INFRA STRUCTURE
VERSION 5.0

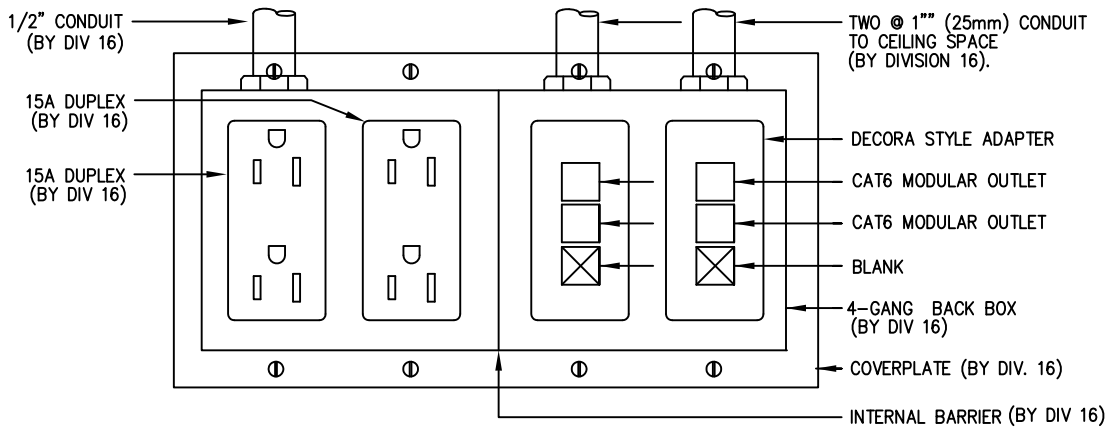TITLE: FIGURE 36 OUTLET DETAILS 'L' & 'M'

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |

TYPE N

15A DUPLEX (BY DIV 16)
15A DUPLEX (BY DIV 16)

ONE @ 2" (50mm) CONDUIT TO A/V CONTROL ROOM (BY DIVISION 16).
DECORA STYLE ADAPTER
CAT6 MODULAR OUTLET
CAT6 MODULAR OUTLET
BLANK
3-GANG SURFACE MOUNT BOX (BY DIV 16)
COVERPLATE (BY DIV. 16)
INTERNAL BARRIER (BY DIV 16)

TYPE P

1/2" CONDUIT (BY DIV 16)
15A DUPLEX (BY DIV 16)
15A DUPLEX (BY DIV 16)

TWO @ 1"" (25mm) CONDUIT TO CEILING SPACE (BY DIVISION 16).
DECORA STYLE ADAPTER
CAT6 MODULAR OUTLET
CAT6 MODULAR OUTLET
BLANK
4-GANG BACK BOX (BY DIV 16)
COVERPLATE (BY DIV. 16)
INTERNAL BARRIER (BY DIV 16)

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TITLE: FIGURE 37 OUTLET DETAILS 'N' & 'P'

DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

15A DUPLEX
(BY DIV 16)

BLANK
CAT6 MODULAR OUTLET
BLANK

PHA4 PHANTOM
4-GANG SPIDER BOX

BLANK
CAT6 MODULAR OUTLET
BLANK

INTERNAL BARRIER

TYPE Q

15A DUPLEX
(BY DIV 16)

BLANK
CAT6 MODULAR OUTLET
BLANK

PHA4 PHANTOM
4-GANG SPIDER BOX

INTERNAL BARRIER

BLANK

TYPE R

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Sheridan
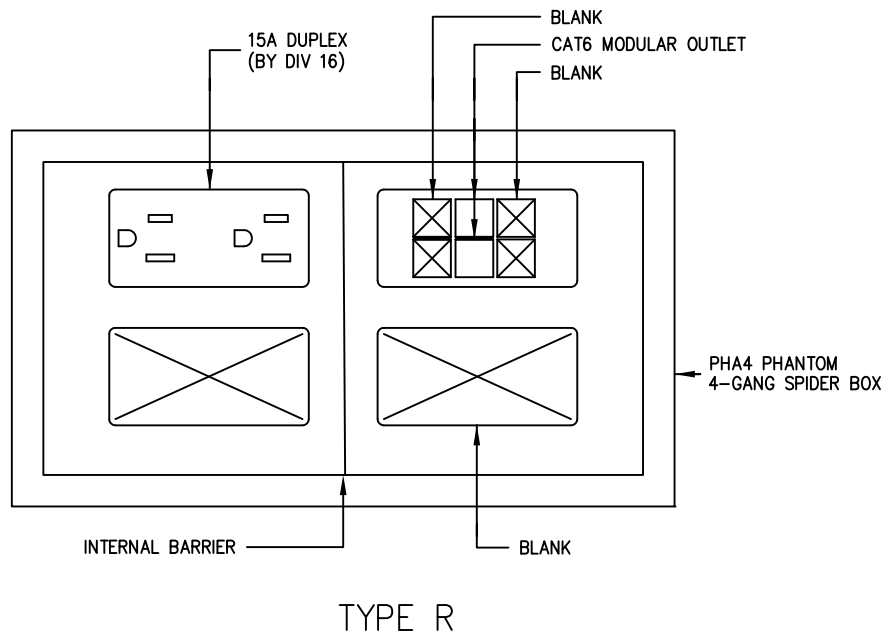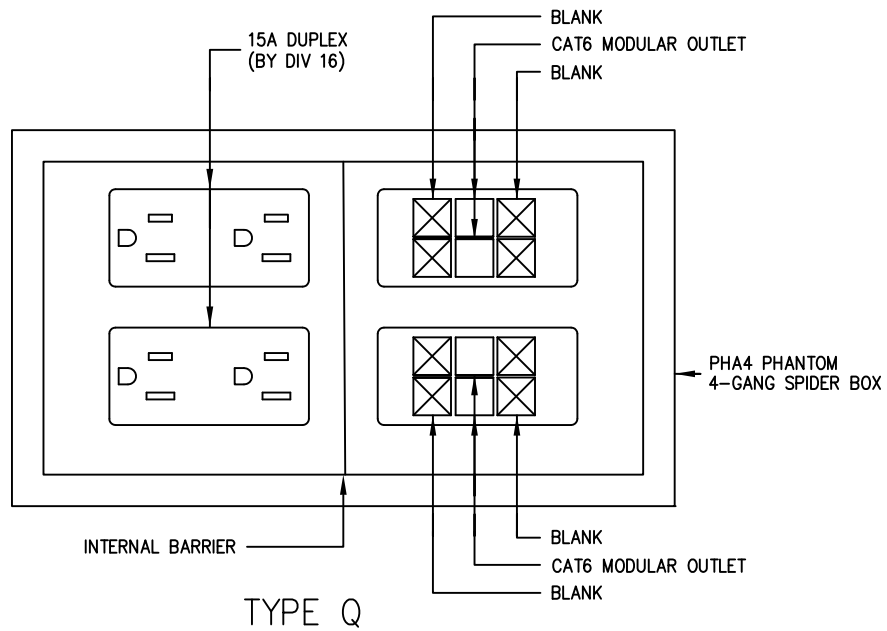
TITLE: FIGURE 38 OUTLET DETAILS 'Q' & 'R'
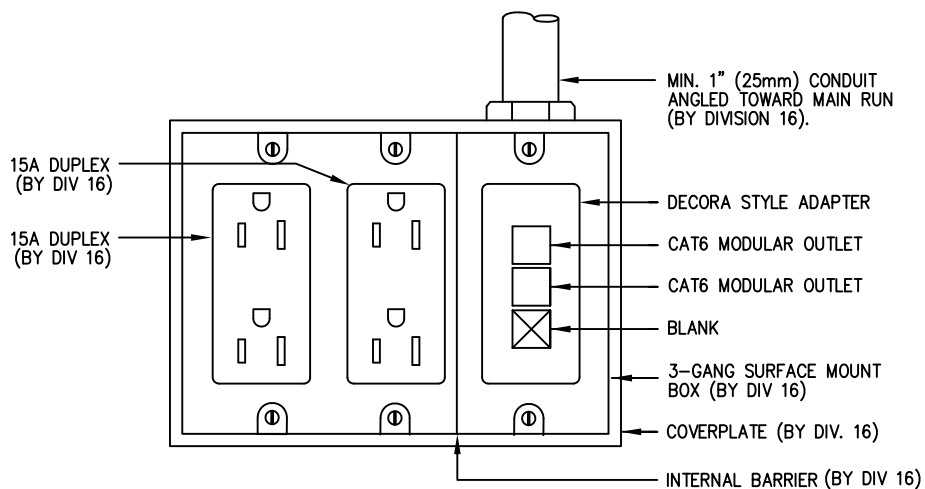
DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA

MIN. 1" (25mm) CONDUIT ANGLED TOWARD MAIN RUN (BY DIVISION 16).

DECORA STYLE ADAPTER

BLANK

CAT6 MODULAR OUTLET

BLANK

SINGLE GANG BACK BOX

COVERPLATE (BY DIV. 16)

TYPE S

MIN. 1" (25mm) CONDUIT ANGLED TOWARD MAIN RUN (BY DIVISION 16).

15A DUPLEX (BY DIV 16)

15A DUPLEX (BY DIV 16)

DECORA STYLE ADAPTER

CAT6 MODULAR OUTLET

CAT6 MODULAR OUTLET

BLANK

3-GANG SURFACE MOUNT BOX (BY DIV 16)

COVERPLATE (BY DIV. 16)

INTERNAL BARRIER (BY DIV 16)
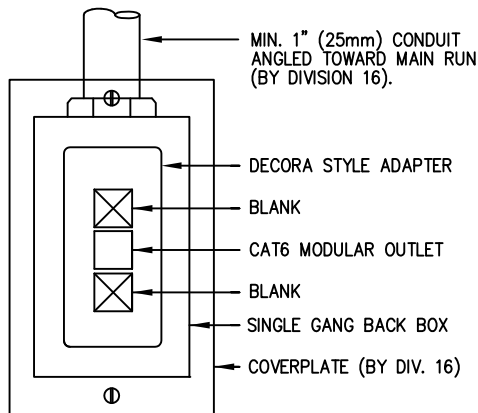
TYPE T

MASTER GUIDELINES FOR COMMUNICATIONS INFRA STRUCTURE

Sheridan

VERSION 5.0

TITLE: FIGURE 39 OUTLET DETAILS 'S' & 'T'
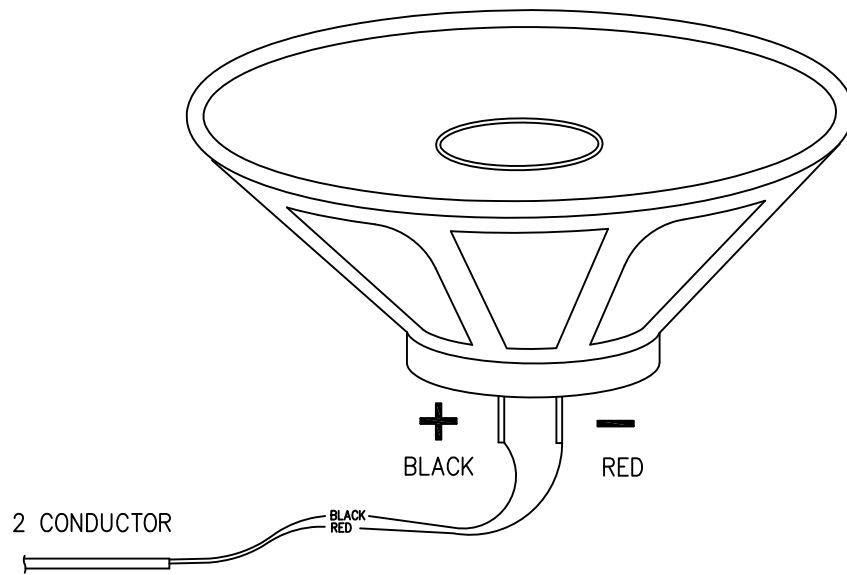
DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA
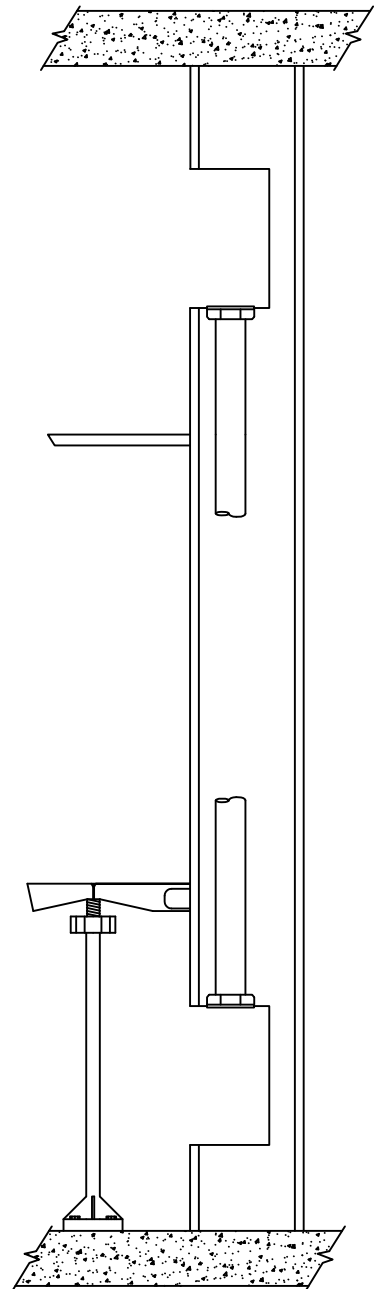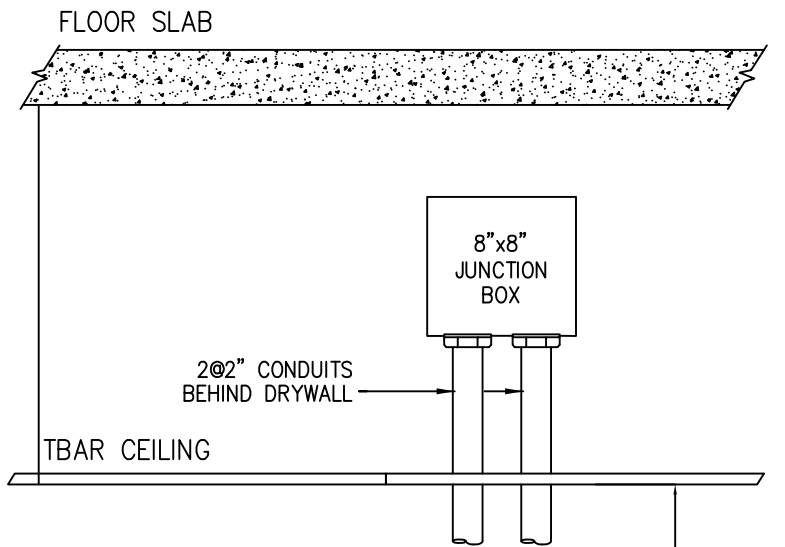
FLOOR SLAB

8"x8"
JUNCTION
BOX

2@2" CONDUITS
BEHIND DRYWALL

TBAR CEILING

HEIGHT WILL VARY

RIASED FLOOR

2@2" CONDUITS
BEHIND DRYWALL

BOX
JUNCTION
8"x8"

FLOOR SLAB

FRONT VIEW

SIDE VIEW

2 CONDUCTOR

BLACK
RED

+ BLACK

− RED

+   −

BLUE/WHITE   BLUE

CAT6 4-PAIR

BLUE/WHITE
WHITE/BLUE

ORANGE/WHITE
WHITE/ORANGE

GREEN/WHITE
WHITE/GREEN

BROWN/WHITE
WHITE/BROWN

TWIST AND WRAP
REMAINING THREE PAIRS
FOR FUTURE USE.

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VERSION 5.0

TITLE: FIGURE 42 OUTDOOR SPEAKERS

| DATE: AUG. 26, 2013 | SCALE: N.T.S. | DRAWN BY: AK | CHECKED BY: CA |