DOWNES CONSTRUCTION COMPANY

ADDENDUM #02

TO

INVITATION TO BID #01

March 14, 2018

WESTERN CONNECTICUT STATE UNIVERSITY
RENOVATIONS TO
HIGGINS HALL & HIGGINS ANNEX

STATE PROJECT NO: BI-RD-290-CMR

The Contract Documents are modified and/or supplemented as follows and should be included in the Subcontractor's lump sum bid as it relates to their Bid Package Scope of Work:

1. **All bidders** should note that the bid due date has been **postponed** to **Thursday, March 29, 2018 at 2:00pm**. Bids should be delivered to Downes Construction's office on 200 Stanley Street, New Britain, CT.

2. **All bidders** should note that the pre-bid conference agenda and sign-in sheet is attached to this Addendum for record purposes.

3. **All bidders** should review and incorporate the attached TSKP Studio Supplement #01 and its contents as listed below:
    - 100% CD Bid Package Supplement #1 Narrative
    - Specification Section 076200 – WCSU Higgins – Surface Applied Vapor Reduction System
    - Specification Section 079500 – WCSU Higgins – Expansion Control
    - Drawing A0.04
    - Drawing A0.05
    - Drawing A0.06
    - Drawing A0.07
    - Drawing A1.31A
    - Drawing A2.21
    - Drawing D1.21B
    - Drawing D1.31A
    - Drawing D1.31B
    - Drawing IT0.01
    - Drawing ITD1.01A
    - Drawing ITD1.01B

4. **All bidders** should review and incorporate the attached revised Drawing List dated 3/14/18.

5. **All bidders** should incorporate the following Bid RFI questions with answers as they relate to their bid package scope of work:

RFI **Question –** Will there be room on site for CONEX box storage.

Answer – *As evident by the Site Logistics Plan, space is at a premium. It is likely that CONEX Boxes will NOT be allowed on site. However, there may be opportunity for select MEP trades to utilize un-programmed spaces in the Lower Level of Area A for some storage and logistics.*

RFI **Question –** Where will contractor dumpster locations be?

Answer *– All dumpster locations will be coordinated and discussed during the pre-installation meeting with the successful trade contractor and with the Downes Field Superintendent.*

RFI **Question –** No lead paint testing information. A lot of welding to existing steel. Is primer lead based and need to be removed?

Answer – *For the purposes of the bid, bidders should assume that existing steel contains lead paint. Selective lead paint removal will occur as per the Allowance established in* ***BP #2.1 – Demolition & Abatement*** *bid package.*

RFI **Question –** Where is Sprayed Fire Resistive Material (CAFCO) located on job?

Answer – *Please refer to attached revised egress plans and fire stopping detail sheet showing the extent of spray fireproofing. This work is being re-assigned to the* ***BP #9.1 – Drywall and Carpentry Contractor.***

RFI **Question –** Please provide location for underlayment's specs for new flooring.

Answer – *See new spec section 072600 included with this Addendum.*

RFI **Question –** Please provide location topical moisture mitigation system specifications for new flooring.

Answer – *See new spec section 072600 included with this Addendum. DCC Note: Refer to Item #31 in the* ***BP #9.5 – Flooring*** *Scope of work.*

RFI **Question –** No expansion joints Specs? None on project?

Answer – *There is an expansion joint between 1949 and 1958 addition at all floors. New expansion joint and cover is required on floors and walls. See new spec section 079500. 03/12/2018. This work is assigned to* ***BP #9.2 – General Trades*** *as referenced elsewhere in this addendum.*

RFI **Question –** How do you know extent of masonry crack repair? Detail on drawings.

Answer – *Locations have been identified on A3 series elevations.*

RFI **Question –** Is there a detail to cap existing mechanical equipment that is removed? Note 14 on Demo Dwgs Roof Plan

Answer – *All mechanical equipment including the curb and associated flashing to be removed. Area to be infill with new structural infill and insulation matching the existing and covered with new roofing. Refer to updated notes on roof demo and construction plan. TSKP 03/12/2018.*

RFI **Question –** Where are the bluestone, limestone and paver Specs for new entrance stair and ramp**.**

Answer – *Refer to spec section 093033 / 2.2.E.*

RFI **Question –** Need specs. on existing acoustical tile in math emporium and lecture halls so contractor knows - premium tile.

Answer – *Spec will be provided. Note that existing lecture hall ceiling tile and grid shall be removed and new ceiling and gird shall be installed. TSKP 03/13/2018**.***

RFI **Question –** New CAT or turn down existing CAT for temporary lower level math emporium?

Answer – *KR Response: Refer to drawing E1.01BT for exact scope of work required. New CAT will be run from existing adjacent IDF to all temporary classroom spaces. Existing CAT supplying existing Math Emporium on 1st floor shall be protected from damage during construction.*

RFI **Question –** No specification shown for limestone cap at the west entrance shown on 1/A4.02 and 1/A4.21.

Answer – *See added paragraph to section 044413 included in the attached TSKP Supplement #1 attached to this Addendum..*

RFI **Question –** Provide location of specification for Wood Veneer Wall Panels 15/A8.05.

Answer – *Refer to Specs. Section 064000 / 2.11.*

RFI **Question –** Please provide copy of WCSU IT specifications.

Answer – *KR Response: Downes shall provide CT Board of Regents IT standards to all bidders for review. Downes Note: Standards are attached to this Addendum.*

RFI **Question –** Please provide copy of WCSU Security Specification.

Answer – *KR Response: Downes shall provide WCSU IT standards to all bidders for review. Downes Note: Standards are attached to this Addendum*.

RFI **Question –** Per specification Section 28 15 00 2.13 D.7 and 3.6, is Card Reader Grounding required to head end per WCSU standards?

Answer – *KR Response: Card reader grounding to head end is an important part of the WCSU Security standards. This should be part of the composite cable pulled to each access-controlled door indicated on the drawings. See 8\SC6.01 for a detail of the composite cable.*

RFI **Question –** Confirm single mode fire alarm is existing.

Answer – *KR Response: Singlemode optical fiber between Old Main and Higgins Hall is existing. Refer to 2/IT4.00.*

RFI **Question –** In Bid Package #8.1, specification section 087113 Automatic Door Operators is not present in the specifications. Please advise

Answer – *Delete references to this section in the bid package scope of work.*

RFI **Question –** Drawing M1 -21A shows TB2-18 & TB2-19 encased in a double layer gypsum board box. This is also detailed on M4-02. This is not typical work done by the Mechanical contractor and usually done by the General Trades/Drywall contractors. Please advise which trade should carry this work in their bid

Answer – *This gypsum board box and similar shown elsewhere is the responsibility of the* ***BP #9.1 – Drywall and Carpentry.***

RFI **Question –** Is **BP#27.1 Communication, BP#28.1 Security and BP#28.2 Fire Alarm** responsible to provide their own conduit, sleeves, back boxes and pull strings for their own work? Please advise

Answer – *Refer to Item #1 and Item #85 in the BP #26.1 Scope of Work. Conduit, sleeves, back boxes and pull strings for Division 27 and 28 are by BP #26.1.*

RFI **Question –** Are **BP#27.1 Communication, BP28.1 Security** and **BP#28.2 Fire Alarm** responsible for the demolition of their own equipment and material?

Answer – *Existing MEP, Comm., Security and Fire Alarm demolition is by* ***BP #2.1 – Demolition and Abatement****.*
BP #27.1 – Communications System (M/WBE) *is responsible for existing fiber demolition, splicing and tel/data/communications demolition/removals within IDF's..*
BP #1.1 – Temporary Light & Power *is responsible for coordinating within* ***BP #2.1 – Demolition and Abatement*** *on selective demolition in support of maintenance of existing power, fire alarm and communications serving adjacent buildings and to the occupied LL of Higgins Annex.*

RFI **Question –** Specification section 075323-13 Par. 3.10.C.1 calls for an FM Global testing per FM-Global Data Sheet 1-52. Please confirm this testing is by owner.

Answer- *<u>If</u> up-lift testing is required it will be performed by the owner.*

6. **All bidders on Bid Package #9.1 – Drywall and Carpentry** should make the following revisions to their bid package scope of work:
   <u>ADD</u> the following item (3):
   A. Under Item 2, insert the following additional Specifications Sections:

Division 07 / Sections:	**Thermal and Moisture Protection**	
07 81 00	Applied Fireproofing	

   Refer to TSKP Supplement #1 revised egress plans included with this addendum regarding scope.

7. **All bidders on Bid Package #9.2 – General Trades** should make the following revisions to their bid package scope of work:
   <u>DELETE</u> the following item(s):

B. Delete references to **AUTOMATIC DOOR OPERATORS** in Item #1 and Item #2 in the Bid Package Scope of work.

INSERT the following item (3):

C. Under Item 2, insert the following additional Specifications Sections:

Division 07 / Sections:	**Thermal and Moisture Protection**	
07 95 00	Expansion Control	

Refer to TSKP Supplement #1 narrative included with this addendum regarding scope.

8. **All bidders on Bid Package #9.4 – Acoustical Ceilings (SBE)** should make the following revisions to their bid package scope of work:

   REVISE the following item(s):

   A. Revise allowance numbering under Item 39 to reflect 9.4-1, 9.4-2 and 9.4-3.

9. **All bidders on Bid Package #9.5 – Flooring (SBE)** should make the following revisions to their bid package scope of work:

   REVISE the following item(s):

   A. Revise allowance numbering under Item 52 to reflect 9.5-1 and 9.5-2.

   INSERT the following item (3):

   B. Under Item 2, insert the following additional Specifications Sections:

Division 07 / Sections:	**Thermal and Moisture Protection**	
07 26 00	Surface Applied Vapor Reduction Systems	

10. **All bidders on Bid Package #9.6 – Painting (SBE)** should make the following revisions to their bid package scope of work:

    REVISE the following item(s):

    A. Revise allowance numbering under Item 54 to reflect 9.6-1.

    DELETE the following item(s):

    B. Delete Specifications Section 078100 from Item #2 in the bid package scope of work. This work is being assigned to the BP #9.1 – Drywall & Carpentry Contractor.

11. **All bidders on Bid Package #21.1 – Fire Suppression System** should make the following revisions to their bid package scope of work:

    REVISE the following item(s):

    A. Revise allowance numbering under Item 82 to reflect 21.1-1.

12. **All bidders on BP #26.1 – Electrical System, BP #27.1 – Communications System, BP #28.1 – Security System and BP #28.2 – Fire Alarm System (M/WBE)** should incorporate into the contract documents the attached:

    - Telecommunications and Infrastructure Standards V. 4.0 dated October 24,2016.
    - WCSU Security Management System Specifications dated 5/31/17.
    - Card Access Systems Operation

ATTACHMENTS AS INDICATED ABOVE.

END ADDENDUM #02 TO INVITATION TO BID #01

WESTERN CONNECTICUT STATE UNIVERSITY
RENOVATIONS TO HIGGINS HALL & HIGGINS ANNEX
PRE-BID CONFERENCE AGENDA
INVITATION TO BID #01
LOCATION – ROOM 114, HIGGINS HALL – WCSU, DANBURY, CT
DATE - 03/09/2018
TIME – 10:00 AM

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1. **Introduction**

Construction Manager
Jeff Anderson – Downes Construction
Mike Dell'Accio – Downes Construction
DAS Division of Construction Services
Peter Simmons
Tony DeNapoli
Western Connecticut State University
Luigi Marcone
Peter Visentin
Commission on Human Rights & Opportunities (CHRO)
Alvin Bingham
Construction Administrator
Ray Wiley – O&G Industries
Architect
Christine O'Hare – TSKP Studio
Mehmet Sahin – TSKP Studio
MEP, FP, IT Engineers
Ed Ruggiero – Kohler Ronan
Matthew Feichtner – Kohler Ronan
Ben Mezic – Kohler Ronan
Structural, Civil Engineers
Herb May – Macchi Engineers
Landscape
Bill Richter – Richter & Cegan
Emily Weckman– Richter & Cegan

2. **Project Description**

The Higgins Hall and Higgins Annex project consists of a comprehensive interior/exterior renovations and vestibule/canopy addition, resulting in a complete re-programming of the space usage. The work will include renovating classrooms and faculty offices, support spaces. A small addition is included to identify and consolidate major building entry in cohesion with the campus master plan and the re-programmed layout of spaces.

All building systems will be replaced including but not limited to, HVAC, plumbing, electrical, A/V and telecom infrastructure, elevators, fire suppression and control systems. Where identified, exterior fenestration and entryways shall be replaced. The resulting renovations shall provide for a fully compliant ADA, code, and High Performance Building regulations facility.

There are existing IDF Rooms and communications systems cabling passing through the buildings that must be protected and maintained throughout the construction period.
There are existing HAZMAT throughout the building as defined on ATC Drawings.

Existing Building:
Higgins Hall is a multi-story structure originally constructed in 1949. Subsequent additions were added in 1958 and 1969.

1949 Addition:
The 1949 addition is a steel a masonry bearing wall structure constructed of concrete slabs supported on both precast concrete I-members (first floor) and steel joists (upper floors). The members span between masonry block walls. Gabled roof construction is comprised of steel trusses supporting steel purlins. Flat roofs are comprised of steel joist supporting cast in place concrete slabs. Foundation system is a conventional shall spread footing system.

1958 Addition:
The 1958 addition is a steel framed structure constructed of concrete slabs on steel form supported by steel joists and girders. Foundation system consists of 30 ton cast in place concrete tapered piles.

1969 Addition:
The 1969 addition is a concrete and steel framed bearing wall structure. First floor slab are constructed of cast in place one-way concrete slabs that span between concrete beams. Upper floors are comprised of steel beams that support 4 inch concrete slabs. The beams span between masonry bearing walls. Roof construction is comprised on concrete slabs supported by steel joists. Foundation system consists of 50 ton cast in place concrete friction piles approximately 50 feet long.

3. Partially Occupied Building

The renovations to Higgins Hall & Higgins Annex at Western Connecticut State University (WCSU) require that the Lower Level (LL) in the Higgins Annex (Area B) remain occupied throughout construction while WCSU is in school session. All work will be performed in such a manner in support of maintaining WCSU operations in all respects and will be closely coordinated with the Construction Manager. Special temporary protection enclosures will be provided to separate the work area from the occupied area. Shutdowns and "tie- ins" of all utility services will be scheduled in advance with the Construction Manager during hours that minimize or eliminate any impact to WCSU. Each Subcontractor is responsible to relocate, maintain, support, remove, re-install, maintain functionality, maintain uninterrupted services, and maintain the current systems for the systems covered under their Scope of Work as required in order to maintain occupancy of the designated areas.
Refer to Occupancy Narrative included in the Downes Project Manual for additional information.

4. Bid Documents

- Available via Email from Downes Construction by Emailing higginshallbid@downesco.com to all interested bidders. Bid Documents Include:
  - Downes Project Manual (1 Volume)
  - TSKP Studio Specifications (3 Volumes)
  - TSKP Studio Drawings (2 Volumes)

Addendum #1 (Regarding Pre-Bid Postponement Only)

- Addenda will be issued to those bidders who received documents directly from Downes Construction. Addenda will also be uploaded to the DAS Portal.

5. **Bid Due Date and Time** – Thursday March 22, 2018 at 2:00 PM

6. **Deliver Bids to:**

   Downes Construction Company, LLC
   Main Office
   200 Stanley Street, P.O. Box 727
   New Britain, CT 06050

7. **Bid Form Review:**
   - Bid Form is contained in the Downes Project Manual.
   - Submit in duplicate – One (1) Original and One (1) Copy.
   - Note 100% Performance and 100% Labor & Material Payment Bonds will be required. The added cost of these bonds must be indicated in the appropriate space on the Bid Form.
   - Acknowledge receipt of Addenda in the appropriate space on the bid form. Indicate Bid Breakdown in the appropriate space on the bid form.
   - Please provide pricing for ALL Unit Prices requested.
   - ~~Provide all alternate pricing requested.~~ No alternates included.
   - Please provide bid breakdown as requested in the individual bid packages in the spaces provided on the Bid Form.
   - The following MUST be included as separate attachments with the Bid Forms.
     A. Bid Security in the amount of Ten Percent (10%) of the Base Bid Sum (Bid Bond or Certified Check) for any bid for work with an estimated value of at least Fifty Thousand Dollars ($50,000.00) If the bidder is a small contractor or minority business enterprise pursuant to Connecticut General Statutes Section 4a-60g and further described in Appendix I, Administrative and Statutory Requirements, it may provide in lieu of a bid bond, a letter of credit in an amount equal to Ten Percent (10%) of the bid amount if the estimated value is less than one hundred thousand dollars and in an amount equal to Twenty-Five Percent (25%) of the bid amount, if the estimated value is one hundred thousand dollars or greater. – Obligee is Downes Construction Company, LLC;
     B. Substitution Listing (As Applicable);
     C. Workman's Compensation Experience Modification Factor (EMR);
     D. Acknowledgement of Surety regarding execution of Performance & Payment Bonds (As Applicable);
     E. Non-Collusion Affidavit;
     F. Contractor's Qualification Statement (AIA Document A305, 1986 Edition), provide past experience with projects of a similar nature and scope within the past 5 years;
     G. DAS S/M/WBE Certification form(as Applicable to the bid package);
     H. CHRO Contract Compliance Regulations Notifications to Bidders form;

I. DAS Pre-qualification Certificate and Updated Statement(As Applicable);
J. Proof of Insurance in accordance with Contract Requirements;

8. Prevailing Wage Rates Apply

- Rate package contained in Downes Project Manual
- The successful bidder will be required to submit certified payrolls on a WEEKLY basis.
- Failure to do so will jeopardize the payment of monthly applications for payment.

9. DAS Pre-Qualification

- Prospective bidding Subcontractors and all lower tier subcontractors whose subcontracts (bids) exceed $500,000 must be prequalified by the State of Connecticut Department of Administrative Services (DAS).

10. Commission on Human Rights and Opportunities (CHRO)

- Certain Packages have been "set-aside" in accordance with Downes Constructions Approved CHRO Plan. Bidders on this bid packages must be registered To be eligible to bid on these packages, contractors must hold current SBE/MBE certification from the Connecticut Department of Administrative Services (DAS
- The Subcontractors who are selected to perform this State project must comply with CONN. GEN. STAT. §§ 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5. An Affirmative Action Plan must be filed with and approved by the Commission on Human Rights and Opportunities prior to the commencement of construction.

11. Insurance

- ALL Subcontractors and their lower tier Subcontractors must submit insurance certificates to Downes prior to starting work. Insurance coverage shall be in complete accordance with the sample ACCORD Form and the Specifications (whichever is higher).

12. Questions on bidding procedures?

13. CT High Performance Standards for Schools

- All Subcontractors are responsible for complying with the Specifications Section on Sustainable Design Requirements as it relates to completing their scopes of work in support of complying with Connecticut High Performance Standards for Schools (CT HPS for Schools). Review and coordinate with all related Specifications Sections and provide all submittals associated with compliance. This project is NOT seeking LEED Certification.

14. Substitution Procedures

- Please refer to General Requirements section 01 25 00.

15. Downes Supplemental Instructions

- Contained in Downes Project Manual
- Bidders should review thoroughly.
- Note insurance coverage limits required in Attachment "A"

16. Contract Agreement

- Sample A401 - 2007 Agreement Between Contractor and Subcontractor contained inside the Downes Project Manual.
- Contracts will be between Downes Construction Company and Subcontractor.

17. Jobsite Safety & Conduct

- All Subcontractors will go through a jobsite safety orientation and be issued a sticker indicating completion of the orientation.
- All employees and visitors shall wear "Safety trained hard hat label identification" at all times while on the WCSU Site. These hard hat labels will be numbered and used to identify each person on the jobsite. See Supplemental Instructions Paragraph R for additional information.
- There will be a strict policy of absolutely **NO CONTACT OR FRATERNIZATION WITH SCHOOL STUDENTS OR STAFF** and NO use of foul or offensive language on the jobsite or school property. In addition, there is NO SMOKING allowed on the jobsite or school property. Immediate and permanent dismissal will result for failure to abide by these policies. See Supplemental Instructions Paragraph QQ and RR for additional information.

18. Schedule

- See attached bar chart schedule included in Downes Project Manual (Bar Chart Schedule Not Attached.)
- There are liquidated damages in the amount of $3,105 per day.

19. Work hours

- 7am to 3:30pm - Monday through Friday

20. Construction Parking

- Primary contractor parking is available in lot at the corner of Eighth Ave. and Roberts Ave. Overflow construction parking is available at the Midtown Parking Garage located on White Street.

21. Discussion/Questions

- All formal questions must be submitted through email to Downes Construction via HigginsHallBid@downesco.com. The last date for questions is 5 calendar days prior to bid due date at 12:00 noon EST. Only answers to questions received in this format will be considered incorporated into the contract documents.

22. Walk-Through

DOWNES
CONSTRUCTION COMPANY

PRE-BID SIGN-IN SHEET

Western Connecticut State University
Renovations to Higgins Hall & Higgins Annex
Danbury, CT
Project No: BI-RD-290

INVITATION TO BID #01
DATE: MARCH 9 at 10:00am
NON-MANDATORY

ATTENDEES:

NAME	COMPANY	Present	Phone(W) / Cell (C)	Email
JEFF ANDERSON	DOWNES	✓	860-221-5703	janderson@downesco.com
Mike Dell'Accio	Downes	✓	860-539-3306	mdellaccio@downesco.com
Ray Wiley	O&G	–	203 3959027	Ray.Wiley@OGind.com
Alison Burzdak	P+D Mechanical	✓	860-933-2415	alisonb@pdmechanical.com
Richard T. Daly	Ferguson Elec	✓	860-5173221	IMCKim@Ferguson-CT.com
Richard Daly	Ferguson Mech	✓	"	"
Richard Galipeault	L+R	✓	203 879 0652	Rick@Landrpm.com
Tony DeNapoli	DAS/CS	✓	860-713-5844	anthony.denapoli@ct.gov
Ben Mezic	KR	✓	203-778-1017	BMezic@kohlerronan.com
MARK FELICIANO	KR	✓	2037335607	MFELICIANO@KOHLERRONAN.com
Scott Stewart	Stewart Mech	✓	2035750440	office@stewartmsi.com
Matt Pereira	Otis Elevator	✓	203 751-4390	Matthew.Pereira@Otis.com
Tom Jansky	West-Fair Electric	✓	(914)769-8080	TJANSKY@west-fair.com
Rob Sullivan	Bestech	✓	8608961000	rsullivan@bestech.com
Bob Rossi	Guerrera Const	✓	203-996-0697	Deds@guerreraconstruction.com

NAME	COMPANY	Present	Phone(W) / Cell (C)	Email
Sean Gilchrist	Summit Masonry		860-601-8315	SGilchrist@summitmasonry.com
Hernan Vidal	HV Contractor Corp.		203-820-7691	HERNDALE@HVcontractorcorp.com
Nic Bane	Net Services LLC		860-519-2351	NBane@netservicesllc.net
Jim Acerbo	AM Rizzo		203 731-3131	Jacerbo@rizzocompanies.com
Jim Dobush	Barrett Inc.		203-744-2780	jdobush@barretteroofing.com
Emily Weckman & William Richter	Richter & Cegan		860-678-0669	Wrichter@richterlegal.com
Brad McCoy	Earthmovers		203 743-5385	Estimator@earthmoversinc.com
Rob Hamelin	MEGA		860 338 0603	rhamelin@megamechanical.com
Kevin TERifay	MEGA Mechanical		203 893 7907	KTerifay@megamech.com
James Wall	Mizzy Construction		860 793 2284	grant@mizzyconstruction.com
Andy Wilder	Setronics Security		978 835-9571	awilder@setronics.com
Christine O'Hare	TSKP STUDIO		8605471970	Cohare@tskp.com
Mehmet Selvin	TSKP Studio		5605471476	mselvin@tskp.com
Adam Browning	Mercury Cabling		203-378-9008	Adam.Browning@mercury-group.com
John LeConche	MBI		860-289-4853	mbrandon@manafort.com
Josh Bulens	SMI		781-769-9310	jbulens@smienvironmental.com
Jacob Emanuel	New England Masonry		203-607-8875	Jake@nemasonry.com
Randy Reynolds	AEI		413-322-7190	rreynolds@aneenviro.com
Jay Herbert	General Welding & Fab		203-509-8375	JHerbert@gwf.com
Ernie Klein	Earthworks INC		203 793-5385	Fabrication.com EKlein@earthworksinc.net
DAVE MACKENZIE	STANDARD PEMO		203 380 8300	ESTIMATING@DCMUNICATIONSERVICES.com
KRIS NIGRO	JIAPALUCCIO		2037751437	KRISN@JIAPALUCCIO.com
ANDY DRAGAN	JKS-Systems		860-436-4664	ADragan@jks-systems.com

NAME	COMPANY	Present	Phone(W) / Cell (C)	Email
Zack Mecier	New England Masonry		203 729 2266	zack@nemasonry.com

NAME	COMPANY	Present	Phone(W) / Cell (C)	Email

TSKP STUDIO ARCHITECTURE | PLANNING | INTERIORS

100% CD BID PACKAGE SUPPLEMENT NO. 01

Date: March 14, 2018

Project: **WCSU Higgins Hall_BI-RD-290**

Architect: TSKP Studio

Construction Manager: Downes Construction Company, LLC

The following changes take precedence over anything to the contrary in the Drawings and Specifications:

DRAWING CHANGES

Cover

N/A

Civil

N/A

Landscape

N/A

Architectural Demo

1. Add demo note #12C -REMOVE CEILING AND SUPPORTING STRUCTURE. PROTECT GWB SOFFITS. SALVAGE / PROTECT EXISTING LIGHT FIXTURES, PROJECTION SCREEN, SPEAKERS, DIFFUSERS ETC. AND REINSTALL.

2. Change demo note #13 to - REMOVE LIGHT FIXTURES (ALL EXTERIOR FIXTURES TO BE SALVAGED AND RETURNED TO THE OWNER)

3. Change demo note #14 to - REMOVE ROOF UNIT, UNIT CURB AND ALL ASSOCIATED FLASHING, BLOCKING ETC.

4. Change demo note #15 to - REMOVE ROOF DRAIN

5. D1.21B:
   - Replace drawing with revised D1.21B.

6. D1.31A:
   - Replace drawing with revised D1.31A.

7. D1.31B:
   - Replace drawing with revised D1.31B.

Architectural

8. Replace abbreviation AWB on drawings with AVB which abbreviates Air Vapor Barrier.

9. Replace existing expansion joint and cover located on corridor walls and floors with new one at all floor levels between 1949 and 1958 addition. Refer to new spec section 079500.

10. A0.04:
    - Replace drawing with revised A0.04.

11. A0.05:
    - Replace drawing with revised A0.05.

12. A0.06:
    - Replace drawing with revised A0.06.

13. A0.07:
    - Replace drawing with revised A0.07.

14. A1.31A:
    - Replace drawing with revised A1.31A.

15. A1.31B: Refer to A1.31A for updated roofing legend and added roofing notes.

16. A2.21:
    - Replace drawing with revised A2.21.

MEP

N/A

Mechanical

N/A

Electrical

N/A

Plumbing

N/A

Fire Protection

N/A

Telecom

17. ITD1.01A:
    - Replace drawing with revised ITD1.01A.

18. ITD1.01B:
    - Replace drawing with revised ITD1.01B.

19. IT1.01:
    - Replace drawing with revised IT1.01.

Security

N/A

AV

N/A

SPECIFICATION CHANGES:

20. Table of Content (TOC)
    - Insert new spec section "072600 – Surface Applied Vapor Reduction" to the list.
    - Insert new spec section "079500 – Expansion Control" to the list

21. Section 101100, 1.8B - Change warranty on tackboards to 5 years

22. Section 017830 – Add Formed metal Wall Panels 081113 (5 year panel warranty and 20 year finish warranty – see Section 081113, 1.11)

23. Section 017830 and 142100 – Change elevator warranty to 18 month warranty.

24. Section 017830 – Change hydronic pumps warranty to 5 years

25. Section 017830 – Change plants warranty to 5 years

26. Section 044313 - Anchored Stone Masonry Veneer:
    - Add paragraph to this section as shown below:

    LIMESTONE CAP:

    A. Material Standard: Comply with ASTM C 568/C 568M.

    B. Dimension: as shown on drawings

    C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects. (limestone will match existing limestone).

27. Section 072600 – Surface Applied Vapor Reduction
    - Insert new section attached to this supplement.

28. Section 079500 – Expansion Control
    - Insert new section attached to this supplement.

LIST OF DRAWINGS ISSUED:

D1.21B, D1.31A, D1.31B, A0.04, A0.05, A0.06, A0.07, A1.31A, A2.21, IT0.01, ITD1.01A, ITD1.01B.

SPECIFICATIONS ISSUED:

076200, 079500

SECTION 072600 - SURFACE APPLIED VAPOR REDUCTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Sustainable Design Intent: Comply with project requirements intended to achieve sustainable design, measured and documented according to the CT High Performance Building Standard (CTHPS) Mandatory Requirements and minimum required sustainable strategies, as indicated on the Sustainable Matrix. Refer to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS for mandatory and targeted strategies.

1.2 SUMMARY

A. This section includes:

1. Moisture Vapor Emission Reduction Control System

2. Furnish all labor, materials, tools and equipment as necessary to perform installation of a surface applied moisture mitigation system (vapor retarder) on new and existing concrete slabs free of oil contamination or previously treated with a sealer, as shown on drawings and/or as specified in the documents.

3. Repairs and preparation of concrete floors.

4. Related Sections:

   a. See Division 01 Section “Contract Considerations”
   b. See Division 03 Section “Cast-in-Place Concrete”
   c. See Division 09 Section “Resilient Flooring”
   d. See Division 09 Section “Tile Carpeting”

1.2 REFERENCES

A. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 1998.

B. ASTM E 1907 – Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes; 1997.

C. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.

D. ASTM D 4541 B - Pull-Off Strength of Coatings; 1995, Modified.

1.3 SUBMITTALS

A. Product Data:
1. Submit manufacturer's literature and installation instructions for each product.
2. Test data: Submit independent testing laboratory data for product, evidencing:
a. up to 97% reduction of water vapor transmission (tested as per ASTM E 96-95).
b. product is insensitive to alkaline environment up to pH 14 (tested as per ASTM D 1308).
3. Submit manufacturers sample warrantee.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.

B. Installer Qualifications:
1. Acceptable to manufacturer with documented experience on at least 3 projects of similar nature in past 5 years and/or training provided by the product manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver and store in a dry, well ventilated area at minimum 50 deg F (10 deg C) and maximum 90 deg F (32 deg C).

B. Deliver materials in manufacturer's unopened containers fully identified with brand, type, grade, class and all other qualifying information. Provide Material Safety Data Sheets for each product.

1.6 SYSTEM REQUIREMENTS

A. Coordinate floor sealing installation with other trades.

B. Provide materials and accessories in timely manner so as not to delay Work.

1.7 PROJECT CONDITIONS

A. Maintain surfaces to be sealed and surrounding air temperature at not less than 50 deg F (10 deg C).

B. Exercise caution when temperatures exceed 90 deg F (32 deg C).

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form, in which manufacturer agrees to repair or replace components of the flooring system, including the finish floor covering, that fail in materials or workmanship due to vapor transmission for five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products For All Locations Indicated Unless Otherwise Specified: Basis of Design: Koster VAP I-2000 Zero VOC by Koster American Corporation.

Subject to compliance with requirements, comparable products by one of the following:
a. Aquafin, Inc.
b. Vexcon Chemicals, Inc.

2.2 MATERIALS

A. Moisture Vapor Emission Reduction Control System (concrete floor sealer) For All Locations Indicated Unless Otherwise Specified: A 100% solids, solvent free, moisture tolerant, high density, low odor, chemically enhanced epoxy based product which must reduce vapor emissions (MVER) to 3 lbs/24 hrs*1000 SF or less and be compatible with floor finishes and adhesives approved by the manufacturer. Characteristics:

1. Permeance: (ASTM E-96) <1.0 perm
2. Alkaline Resistance: (ASTM D-1308) up to pH 14

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all construction substrates and conditions under which concrete floor sealer material is to be installed. Do not proceed with the concrete floor sealer installation until unsatisfactory conditions are corrected.

B. Assure that surfaces to be treated do not contain any kind of sealer or organic compounds.

C. Anhydrous Calcium Chloride Testing as per ASTM F-1869:
1. Before installation of concrete floor sealer: use tests carried out by Architect/Engineer during study phase, and confirm by testing through installer or independent laboratory prior to installation of concrete floor sealer.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive concrete floor sealer.

B. Substrate preparation:

1. Remove existing floor coverings, coatings and adhesives down to bare concrete, curing compounds, efflorescence, dust, grease, laitance, etc. with steel shot blasting, abrasive (sand) blasting or grinding using a diamond cup blade. Acid etching is not allowed.

2. Assure that all slabs have surface profile ICRI CSP 3 - 5 (ICRI, Des Plaines, IL, Guideline No. 03732.) for mechanical bond (i.e. medium grit sandpaper). Smooth surfaces are not acceptable. They must be shot blasted.

3. Burn off reinforcing fibers and collect and vacuum remains.

4. Repair defective areas such as honeycombs, cracks or other defects with a suitable repairing or manufacturer recommended mortar.

5. Treat saw cut and expansion joints as per manufacturer's application guideline.

6. Install cementitious underlayment, leveling mortars, flash patching, on top of surface applied concrete floor sealer.

7. Carefully rinse or pre-dampen several times all the surfaces to be treated with clean water, leave no standing water.

3.3 INSTALLATION

A. Mix concrete floor sealer material in proportions recommended by manufacturer.

B. Apply concrete floor sealer material in quantities as per manufacturer's specifications and recommendations.

1. Apply in one coat at specified rate.

2. Apply using non-shed synthetic roller or notched squeegee to the still moist substrate, and carefully scrub it into the pores with a long handled scrub brush. Follow with a non-shed synthetic roller to achieve a uniform coverage.

C. Where specified install leveling course as per manufacturer's specifications and recommendations.

D. Where specified install floor covering as per manufacturer's specifications and recommendations.

3.4 ACCEPTANCE

A. Remove left over materials and any foreign material resulting from the work from the site.

B. Clean adjacent surfaces and materials.

END OF SECTION 072600

SECTION 079500 - EXPANSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Sustainable Design Intent: Comply with project requirements intended to achieve sustainable design, measured and documented according to the CT High Performance Building Standard (CTHPS) Mandatory Requirements and minimum required sustainable strategies, as indicated on the Sustainable Matrix. Refer to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS for mandatory and targeted strategies.

1.2 SUMMARY

A. This Section includes the following:

1. Architectural joint systems/covers for building interiors to replace existing joint covers.

B. Related Sections include the following:
1. Division 04 Section "Unit Masonry" for masonry wall joint systems.
2. Division 07 Section "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
3. Division 07 Section "Joint Sealants" for liquid-applied joint sealants.

1.3 DEFINITIONS

A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage (plus or minus) of nominal value of joint width.

D. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.4 SUBMITTALS

A. Shop Drawings: Provide the following for each joint system specified:

1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, block-out requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
2. Architectural Joint System Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:

a. Manufacturer and model number for each joint system.
b. Joint system location cross-referenced to Drawings.
c. Nominal joint width.
d. Movement capability.
e. Classification as thermal or seismic.
f. Materials, colors, and finishes.
g. Product options.

B. Samples for Initial Selection: For each type of joint system indicated.

1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.

C. Samples for Verification: For each type of architectural joint system indicated.

1. Full width by 6 inches long, for each system required.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for current products.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain interior architectural joint systems through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and ICC A117.1.

1.6 COORDINATION

A. Coordinate installation of exterior wall and soffit joint systems with roof expansion assemblies to ensure that wall transitions are watertight. Roof expansion assemblies are specified in Division 07.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

B. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.

C. Compression Seals: ASTM E 1612; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

D. Strip Seals: ASTM E 1783; preformed elastomeric membrane or tubular extrusions having an internal baffle system and secured in or over a joint by a metal locking rail.

E. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.

F. Moisture Barrier: Flexible elastomeric material, Santoprene.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion control systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
2. Component Importance Factor is 1.5.

2.3 ARCHITECTURAL JOINT SYSTEMS, GENERAL

A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.

1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where joint changes direction or abuts other materials.
2. Include factory-fabricated closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint systems.

B. Design architectural joint systems for the following size and movement characteristics:

1. Nominal Joint Width: As indicated on Drawings.
2. Movement Capability: Plus or minus 25 percent.
3. Type of Movement: Limited Thermal

2.4 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Architectural Art Mfg., Inc.
2. Balco, Inc.
3. Construction Specialties, Inc.
4. JointMaster/InPro Corporation.
5. Michael Rizza Company, LLC.
6. MM Systems Corporation.
7. Nystrom, Inc.
8. Watson Bowman Acme Corp.

B. Floor-to-Floor Joint Systems:

1. Basis-of-Design Product: MM Systems; Model SP
2. Type: Surface Mount Metal Cover System

a. Exposed Metal: Aluminum.

1) Finish: Manufacturer's standard finish.

3. Cover-Plate Design: Provide center plate to accommodate finish flooring.
4. Attachment Method: Mechanical anchors.
5. Moisture Barrier: Manufacturer's standard.
6. Size: Verify existing joint dimension in field

C. Floor-to-Wall Joint Systems:

1. Basis-of-Design Product: MM Systems; Model SPE
2. Type: Pan.

a. Exposed Metal: Aluminum.

1) Finish: Manufacturer's standard finish.

3. Cover-Plate Design: Provide center plate to accommodate finish flooring.
4. Attachment Method: Mechanical anchors.
5. Moisture Barrier: Manufacturer's standard.
6. Size: Verify existing joint dimension in field

D. Wall-to-Wall Drywall Joint Systems:

1. Basis-of-Design Product: MM Systems; Flushline System

2. Type: Flat Seal.

a. Seal Material: Elastoprene or sim.

1) Color: As selected by Architect from manufacturer's full range.

E. Wall-to-Wall Masonry Joint Systems:

1. Basis-of-Design Product: MM Systems; ColorJoint ESS Series.
2. Type: Preformed silicone bonded to cellular foam backer support system.

a. Foam Material: Polyurethane.

1) Color: As selected by Architect from manufacturer's full range.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to architectural joint system manufacturer's written instructions.

B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.

C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

D. Cast-In Frames: Coordinate and furnish frames to be cast into concrete. Where cast-in frames are located in existing construction, remove existing slab construction as necessary to allow for new frame block-out.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Locate in continuous contact with adjacent surfaces.
5. Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.
2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Foam Seals: Install with adhesive recommended by manufacturer.

E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion control system materials and associated work so complete assemblies comply with assembly performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION 079500

DRAWING LEGEND

- XXX — ROOM NUMBER
- USE GROUP
- B / 1950 — ROOM OCCUPANCY LOAD / OCCUFANCY LOAD FACTOR / AREA IN SQUARE FEET
- ROOM OCCUPANCY LOAD: AREA IN SQUARE FEET / ROOM OCCUPANCY LOAD / OCCUPANCY LOAD FACTOR (875 / 20 = 43P)
- 191 — MAX.. ALLOWABLE EGRESS OCCUPANCY OF STAIR
- 440 — MAX.. ALLOWABLE OCCUPANCY OF CORRIDOR
- EXIT CAPACITY: X / 165 — ACTUAL EGRESS OCCUPANCY OF DOOR OR STAIR / MAX.. ALLOWABLE EGRESS OCCUPANCY OF DOOR OR STAIR
- ACCESSIBLE AREA OR EXIT
- ACCESSIBLE AT GRADE (FLUSH CONDITION)
- R — REQUIRED EXTERIOR EXIT
- AOR — AREA OF REFUGE
- SMOKE RESISTANT CONSTRUCTION (TIGHT TO DECK ABOVE SEAL ALL PENETRATIONS TO RESIST PASSAGE OF SMOKE)
- 1 HOUR FIRE RATED WALL (TIGHT TO DECK ABOVE)
- -1 HR RATED FLOOR AND STRUCTURE. CONTRACTOR TO FIELD VERIFY EXISTING STRUCTURE AND COMPLY WITH SPRAY FIREPROOFING REQUIREMENTS BASED ON LISTED OR EQUAL UL DESIGNS . (VIF) UL DESIGN #G801, UL DESIGN #N823, UL DESIGN #X829
- LINE OF LUMINESCENT WALL BASE

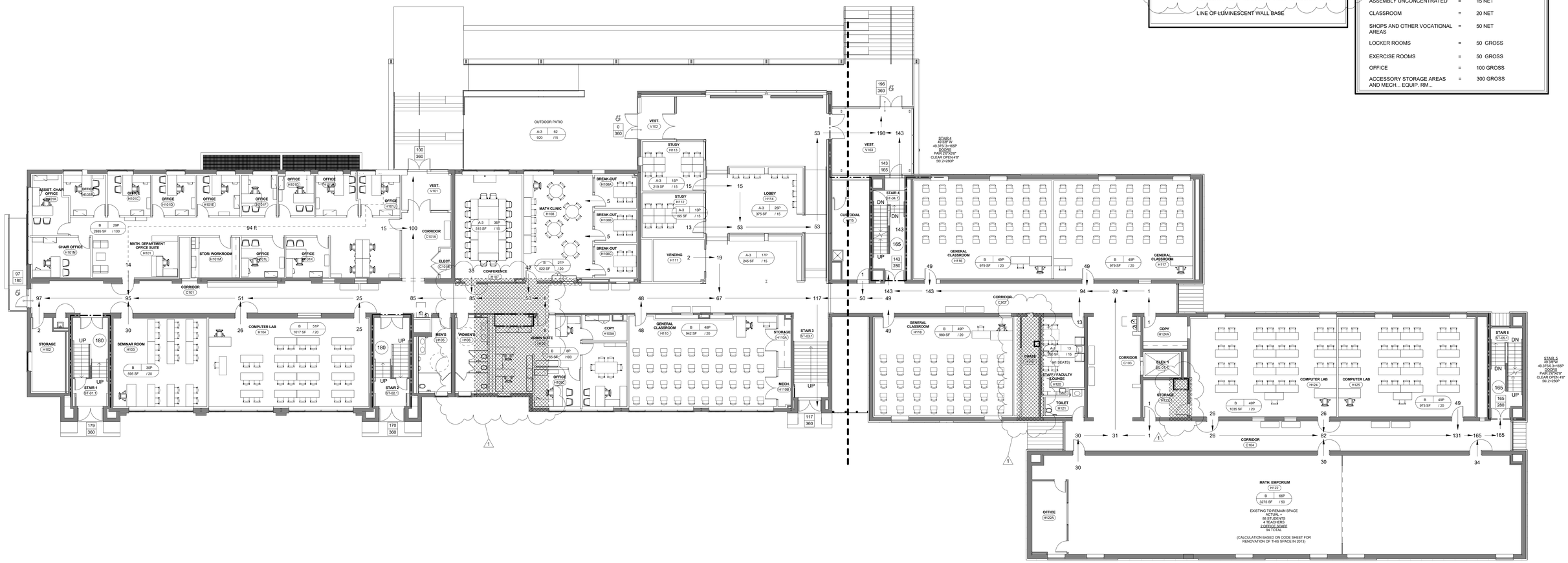
DOOR CLEAR EGRESS WIDTHS

GENERAL SPACES: 2 FACTOR

X / 145	2'-8" DOOR (29" CLR.)
X / 155	2'-10" DOOR (31" CLR.)
X / 165	3'-0" DOOR (33" CLR.)
X / 175	3'-2" DOOR (35" CLR.)
X / 190	3'-5" DOOR (38" CLR.)
X / 225	4'-0" DOOR (45" CLR.)
X / 330	6'-0" DOOR (66" CLR.)
X / 350	6'-4" DOOR (70" CLR.)
X / 355	6'-5" DOOR (71" CLR.)
X / 360	6'-6" DOOR (72" CLR.)
X / 370	6'-8" DOOR (74" CLR.)
X / 390	7'-0" DOOR (78" CLR.)
X / 395	7'-1" DOOR (79" CLR.)
X / 400	7'-2" DOOR (80" CLR.)
X / 405	7'-3" DOOR (81" CLR.)

TABLE 1004.1.2
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

ASSEMBLY UNCONCENTRATED	=	15 NET
CLASSROOM	=	20 NET
SHOPS AND OTHER VOCATIONAL AREAS	=	50 NET
LOCKER ROOMS	=	50 GROSS
EXERCISE ROOMS	=	50 GROSS
OFFICE	=	100 GROSS
ACCESSORY STORAGE AREAS AND MECH.. EQUIP. RM...	=	300 GROSS



1 FIRST FLOOR EGRESS PLAN
3/32" = 1'-0"

drawing title: EGRESS PLAN - FIRST FLOOR

SUBMISSIONS

mark	date	description
	01/29/2018	100% CD BID PACKAGE

REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:
TSKP STUDIO
ARCHITECTURE | PLANNING | INTERIORS
One Hartford Square West
146 Wyllys Street, Bldg 1-203
Hartford, CT 06106
860.547.1970 | www.tskp.com

project: WCSU, RENOVATIONS TO HIGGINS HALL AND ANNEX
DANBURY, CT
state project no.: BI-RD-290
office project no.: 150501

date:
scale: As indicated
drawn by: Author
approved by: Approver
drawing no.: A0.04

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DRAWING LEGEND

- XXX — ROOM NUMBER
- USE GROUP / ROOM OCCUPANCY LOAD / OCCUFANCY LOAD FACTOR / AREA IN SQUARE FEET (B | 20 | 1950 | /100)
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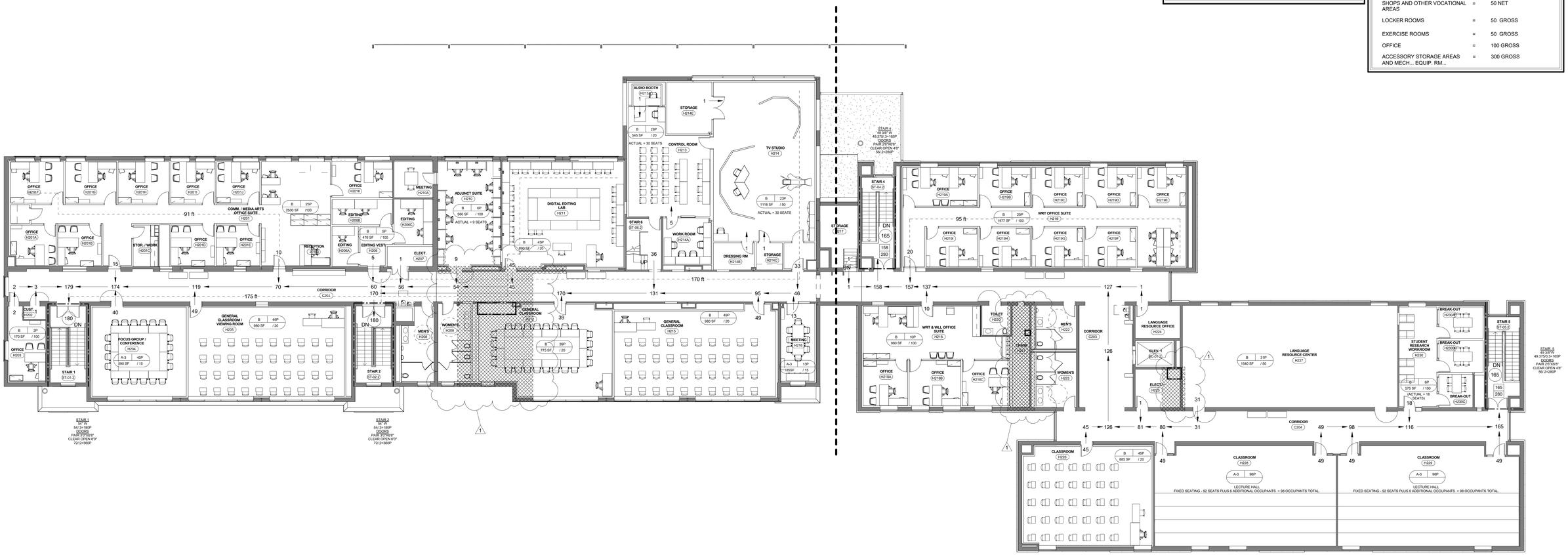

1 SECOND FLOOR EGRESS PLAN
3/32" = 1'-0"

drawing title: EGRESS PLAN - SECOND FLOOR

SUBMISSIONS

mark	date	description
	01/29/2018	100% CD BID PACKAGE

REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

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One Hartford Square West
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project: WCSU, RENOVATIONS TO HIGGINS HALL AND ANNEX
DANBURY, CT
state project no.: BI-RD-290
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date:
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drawn by: Author
approved by: Approver
drawing no.: A0.05

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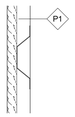
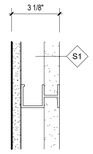


PLYWOOD FURRING

STC NA

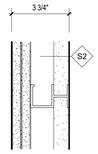
1 LAYER 5/8" FIRE RETARDANT TREATED PLYWOOD
7/8" MTL FURRING



1 HOUR RATING SHAFT WALL

STC NA

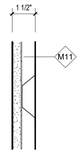
1 LAYER 5/8" GYP BD
2 1/2" CH STUDS @ 24" OC
1" GYPSIUM LINER PANEL



2 HOUR RATING SHAFT WALL

STC NA

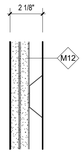
1 LAYER 5/8" GYP BD
2 1/2" CH STUDS @ 24" OC
1" GYPSIUM LINER PANEL



1/3 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC NA

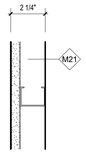
1 LAYER 5/8" GYP BD
7/8" MET FURRING
@ 16" OC



1 HOUR FINISH RATING
UL DES U301

STC NA

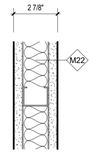
2 LAYERS 5/8" GYP BD
7/8" MET FURRING
@ 16" OC



1/3 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC NA

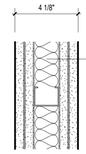
1 LAYER 5/8" GYP BD
1-5/8" MET STUD
@ 16" OC



1 HOUR RATING
OSU T-3296

STC 39

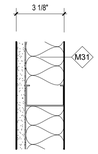
2 LAYER 5/8" GYP BD
1-5/8" MET STUD
@ 16" OC
1-1/2" MINERAL FIBER
INSULATION



1/3 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC NA

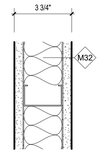
2 LAYERS 5/8" GYP BD
BOTH SIDES ON 1-5/8"
MET STUD @ 16" OC
1-1/2" MINERAL FIBER
INSULATION



1/3 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC NA

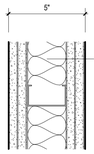
1 LAYER 5/8" GYP BD
2-1/2" MET STUD
@ 16" OC



1 HOUR RATING
UL DES U419

STC 45

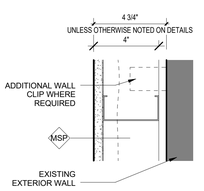
2 LAYERS 5/8" GYP BD
2-1/2" MET STUD
@ 16" OC
2-1/2" SOUND
ATTENUATION BATTS



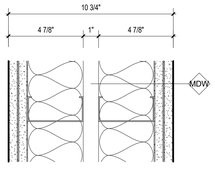
2 HOUR RATING
UL DES U419

STC 50

2 LAYERS 5/8" GYP BD
BOTH SIDES ON 2-1/2"
MET STUD @ 16" OC
2-1/2" SOUND
ATTENUATION BATTS



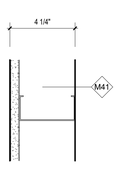
1 LAYER 5/8" GYP BD
3-5/8" MET STUD @ 16" OC
(UNLESS OTHERWISE NOTED
ON DETAILS)
3" SPRAY FOAM INSULATION
ON EXISTING WALL SURFACE



2 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC 60

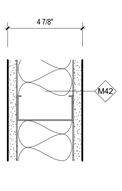
2 LAYER 5/8" GYP BD
3-5/8" MET STUD @ 16" OC
SPACE
3-5/8" MET STUD @ 16" OC
2 LAYER 5/8" GYP BD



1/3 HOUR RATING
IBC TABLE 721.2.1.4(2)

STC NA

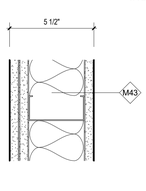
1 LAYER 5/8" GYP BD
(@TILE WALLS 1 LAYER
5/8" CEMENT BD)
3-5/8" MET STUD
@ 16" OC



1 HOUR RATING
UL DES U419

STC 45

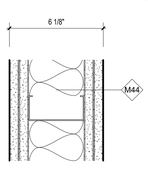
2 LAYERS 5/8" GYP BD
3-5/8" MET STUD
@ 16" OC
3-1/2" SOUND
ATTENUATION BATTS



1 HOUR RATING
UL DES U419

STC 50

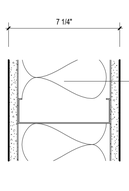
3 LAYERS 5/8" GYP BD
3-5/8" MET STUD
@ 16" OC
3-1/2" SOUND
ATTENUATION BATTS



2 HOUR RATING
UL DES U419

STC 55

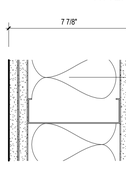
2 LAYERS 5/8" GYP BD
BOTH SIDES ON 3-5/8"
MET STUD @ 16" OC
3-1/2" SOUND
ATTENUATION BATTS



1 HOUR RATING
UL DES U419

STC 49 (EST)

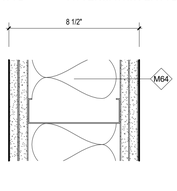
2 LAYERS 5/8" GYP BD
6" MET STUD
@ 16" OC
5-1/2" SOUND
ATTENUATION BATTS



1 HOUR RATING
UL DES U419

STC 54 (EST)

3 LAYERS 5/8" GYP BD
6" MET STUD
@ 16" OC
5-1/2" SOUND
ATTENUATION BATTS



1 HOUR RATING
UL DES U419

STC 54 (EST)

3 LAYERS 5/8" GYP BD
6" MET STUD
@ 16" OC
5-1/2" SOUND
ATTENUATION BATTS

GENERAL PARTITION NOTES:

1. ALL PARTITIONS SHALL BE PARTITION TYPE M42 UNLESS OTHERWISE NOTED.

2. ALL PARTITIONS SHALL RUN TO THE UNDERSIDE OF DECK OR BEAM ABOVE.

2A. WHERE THERE IS AN OBSTRUCTION, SUCH AS BEAM RUNNING PERPENDICULAR TO THE PARTITION, BOX AROUND THE OBSTRUCTION, COMPLETELY FILL ALL VOIDS WITH CONSTRUCTION EQUAL TO THAT OF THE PARTITION.

2B. WHERE A NON- FIRE RATED PARTITION RUNS PARALLEL TO AND TERMINATES AT AN OPEN WEB JOIST OR TRUSS, PROVIDE METAL FRAMING AND ONE LAYER OF GWB, WITH SOUND BATTS, FROM THE BOTTOM OF THE JOIST OR TRUSS TO THE UNDERSIDE OF DECK, FOR A CONTINUOUS ACOUSTICAL SEPARATION.

2C. WHERE A FIRE RATED PARTITION RUNS PARALLEL TO AND TERMINATES AT AN OPEN WEB JOIST OR TRUSS, PROVIDE FIRE RATED CONSTRUCTION TO THE UNDERSIDE OF DECK, WITH RATING EQUAL TO THAT OF THE WALL.

3. PROVIDE MINERAL WOOL BATTS WITH 60% OVERCUT AROUND ALL PENETRATIONS, PIPING, CONDUITS, DUCTS, CABLES, WIRES AND ALL STAIR AND HAZARDOUS AREA WALLS TO ALLOW FOR COMPLETE SMOKE TIGHT CONSTRUCTION IN ACCORDANCE WITH THE CT. STATE FIRE SAFETY CODE.

4. TOILET ROOM PARTITIONS:
PROVIDE CEMENTITIOUS BACKER BOARD AT SAME THICKNESS IN LIEU OF GWB SHOWN IN WALL TYPES. CERAMIC TILE WHERE INDICATED BY ROOM FINISH SCHEDULE AND ELEVATION.

5. CMU PARTITION TYPES:
REFER TO SPECIFICATIONS FOR TYPE OF CMU. REFER TO STRUCTURAL DRAWINGS FOR SPECIFICATIONS FOR REINFORCMENT.

6.FIRE AND SMOKE RATED PARTITION TYPES:
FIRE STOP PERIMETER ANS ALL PENETRATIONS WITH FIRESAFING AND FIRESTOP SEALANT IN ACCORDANCE WITH A SPECIFIED UL APPROVED SYSTEM.

7.STAIR ENCLOSURES:
FIRE STOP PERIMETER AND ALL PENETRATIONS WITH FIRESAFING AND FIRESTOP SEALANT IN ACCORDANCE WITH A SPECIFIED UL APPROVED SYSTEM. PENETRATIONS INTO AND OPENINGS THROUGH AN EXIT ENCLOSURE ASSEMBLY ARE PROHIBITED EXCEPT FOR REQUIRED EXIT DOORS, SPRINKLER PIPING, STANDPIPES AND ELECTRICAL CONDUIT SERVING THE STAIRWAY AND TERMINATING AT A STEEL BOX NOT TO EXCEED 16 SQ. INCHES IN TOTAL AREA.

8. GYPSUM WALL BOARD TYPES:
REFER TO SPECS FOR ABUSE RESISTANT TYPE LOCATIONS.

9. ALL GYPSUM BOARD AT PLUMBING CHASES SHALL BE MOISTURE RESISTANT.

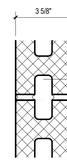
10. ALL GWB IN FIRE RATED PARTITIONS SHALL BE TYPE "X".

11. PROVIDE BLOCKING WITHIN PARTITIONS FOR INSTALLATION OF WAINSCOTS, BUMPERS, CORNER GUARDS, SHELVING, MILWORK, EQUIPMENT AND FIXTURES.

12.REFERENCE PLAN DETAILS AND WALL SECTIONS FOR ADDITIONAL INFORMATION INVOLVING PARTITION CONFIGURATION.

13. REFER TO CODE AND EGGRESS SHEETS FOR LOCATION OF FIRE RATED WALL ASSEMBLIES INDICATED ON THIS DRAWING.

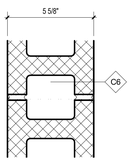
14. ALL WALL TYPES STARTING WITH M AND C ARE ACOUSTICAL PARTITIONS (TYPICAL). PROVIDE 1 OR 2 HOURS RATING ONLY WHERE INDICATED IN CODE AND EGGRESS SHEETS.



1 TO 2 HR RATING
IBC TABLE 721.3.2

STC 44

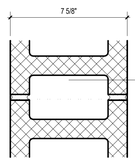
4" CONC MASONRY



1 TO 4 HR RATING
IBC TABLE 721.3.2

STC 46

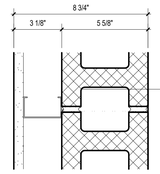
6" CONC MASONRY



1 TO 4 HR RATING
IBC TABLE 721.3.2

STC 48

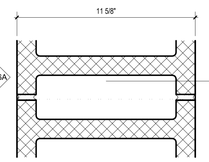
8" CONC MASONRY



1 TO 4 HR RATING
IBC TABLE 721.3.2

STC 53

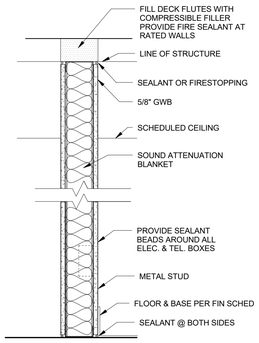
6" CONC MASONRY
2 1/2" MTL STUD
5/8" GWB



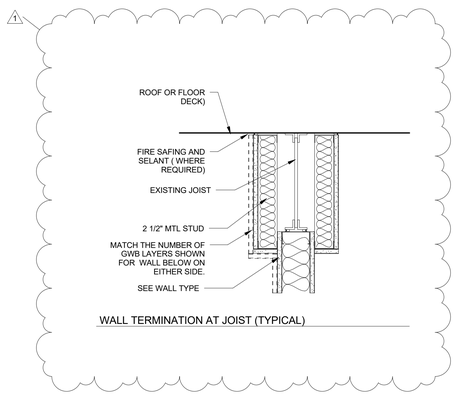
1 TO 4 HR RATING
IBC TABLE 721.3.2

STC 52

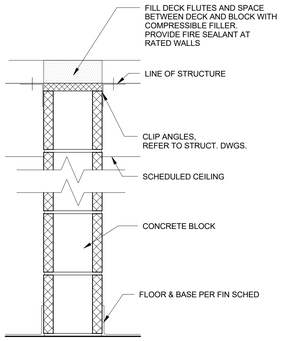
12" CONC MASONRY



NOTE
SEE CODE PLANS FOR LOCATIONS OF
SMOKE RESISTANT AND FIRE RATES PARTITIONS
FOR 1 OR 2 HR RATED PARTITIONS
COMPLY WITH UL# U419



WALL TERMINATION AT JOIST (TYPICAL)



NOTE
SEE CODE PLANS FOR LOCATIONS OF
SMOKE RESISTANT AND FIRE RATED PARTITIONS
FOR 1 OR 2 HR RATED PARTITIONS
COMPLY WITH UL# U906

drawing title
WALL TYPES

SUBMISSIONS

mark	date	description
	01/29/2018	100% CD BID PACKAGE

REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:
TSKP STUDIO
ARCHITECTURE | PLANNING | INTERIORS
One Hartford Square West
146 Wyllys Street, Bldg 1-203
Hartford, CT 06106
860.547.1970 | www.tskp.com

project
WCSU, RENOVATIONS TO HIGGINS HALL AND ANNEX

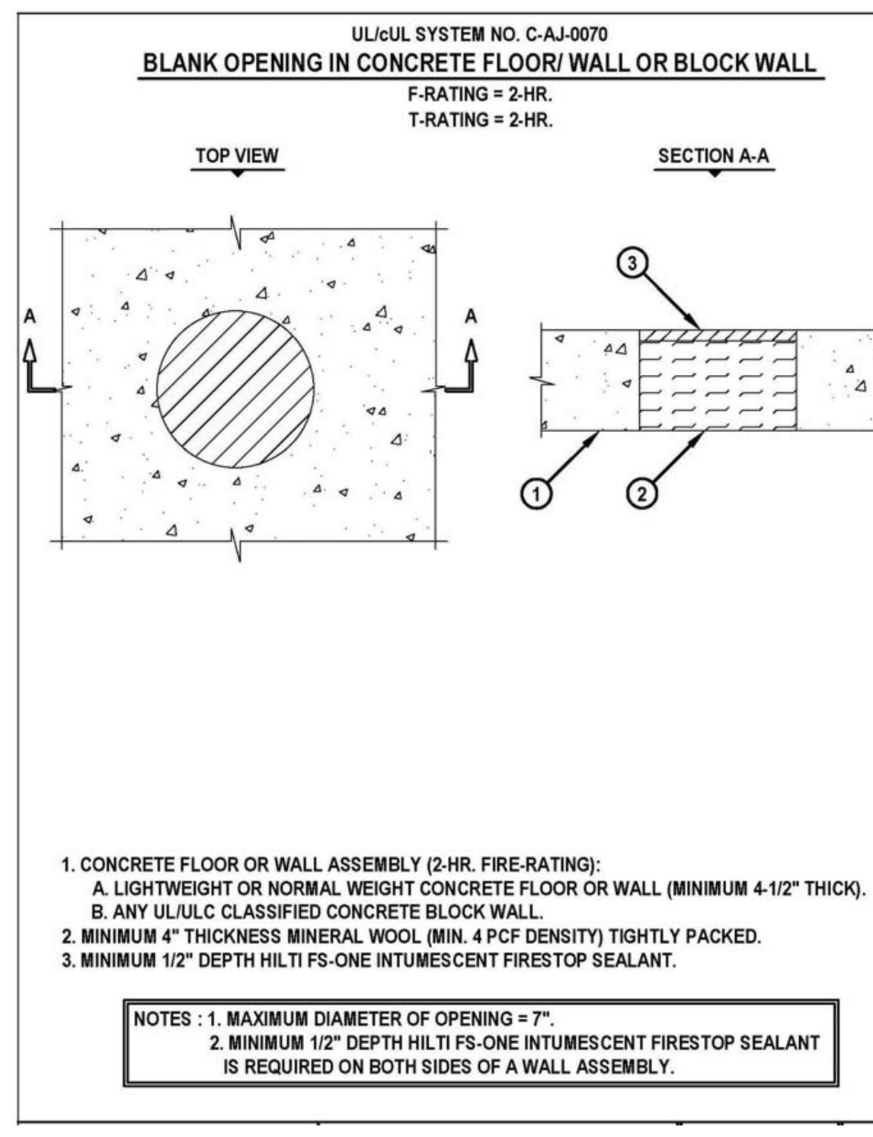
DANBURY, CT

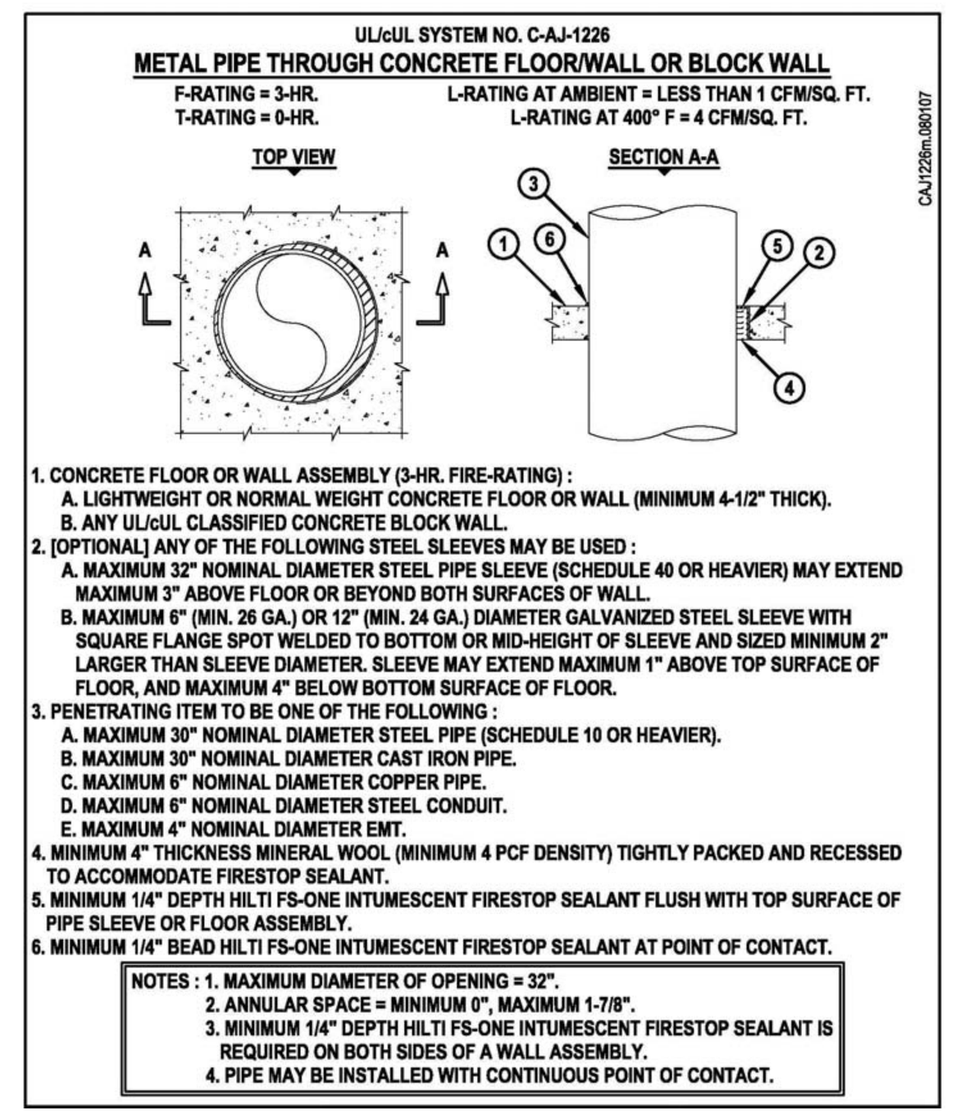
state project no. BI-RD-290
office project no. 150501

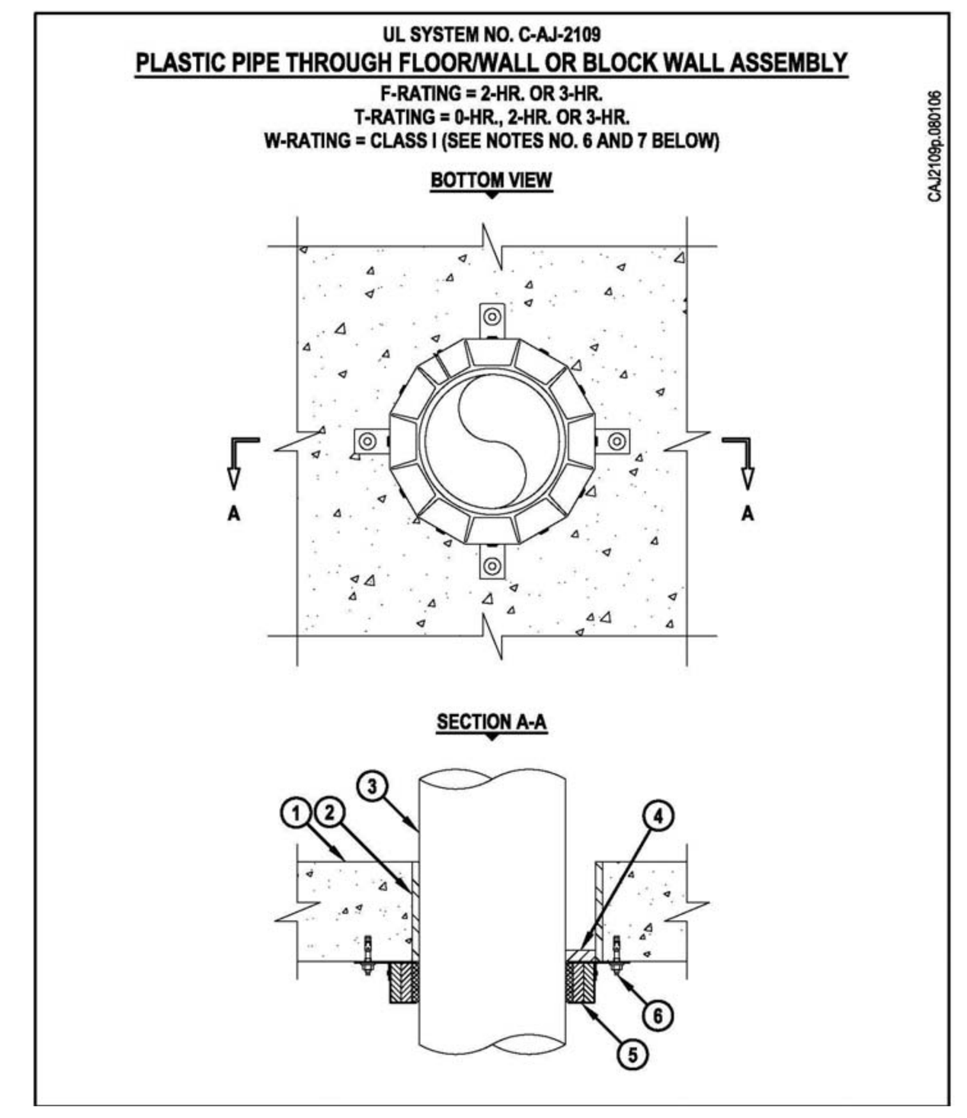
date
scale As indicated
drawn by Author
approved by Approver
drawing no. A0.06

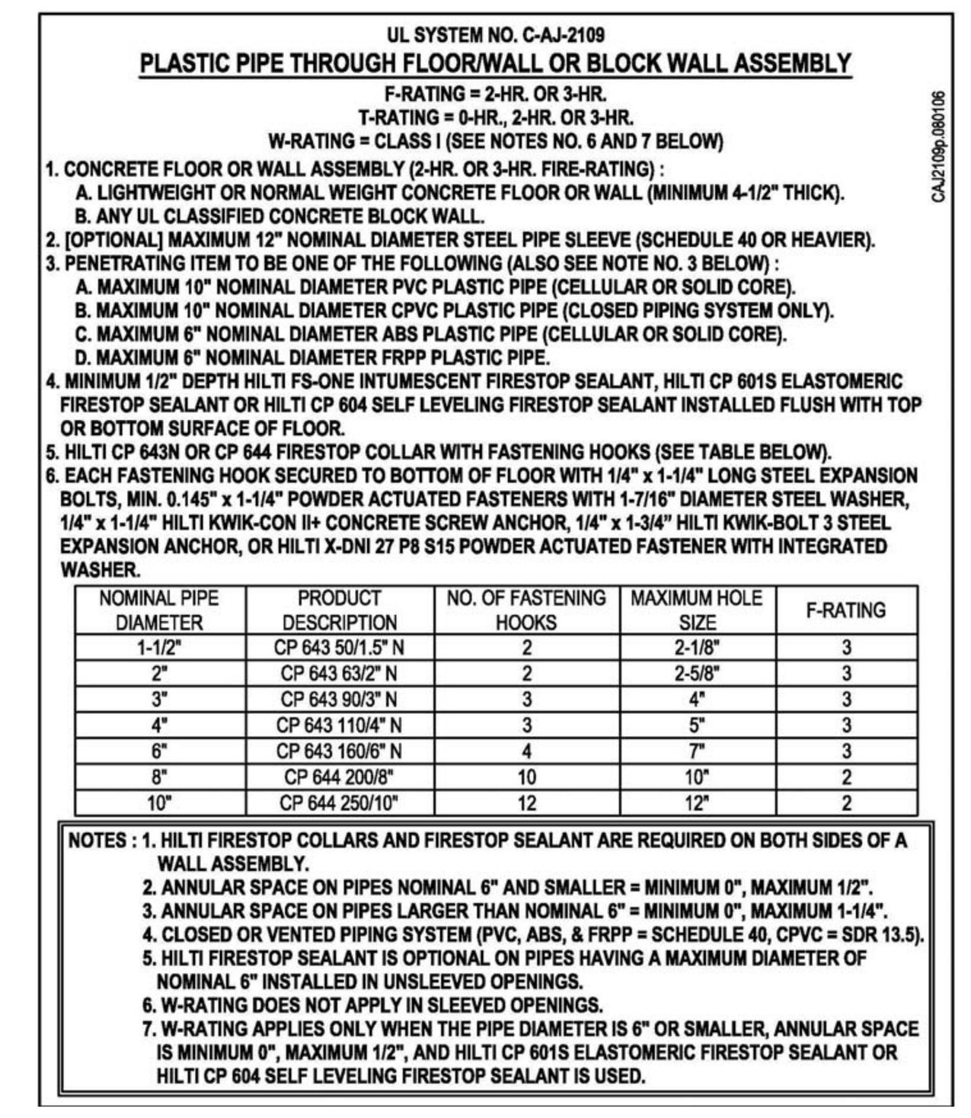
STATE OF CONNECTICUT THOMAS W. IGLEHART 27141 REGISTERED ARCHITECT

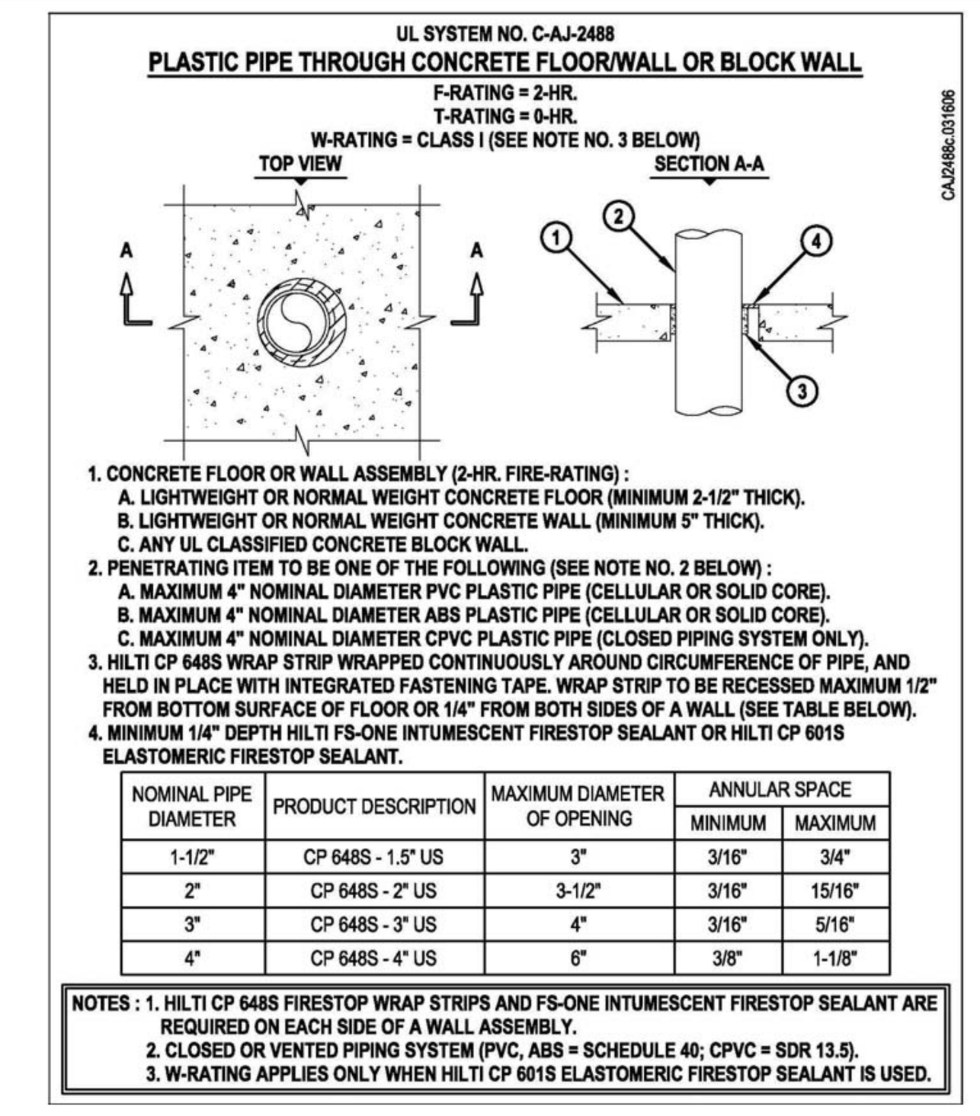
3/13/2018 2:39:56 PM C:\Users\msahin\Documents\150501 WCSU-Higgins Hall-Central-2016_msahin@tskp.com.rvt

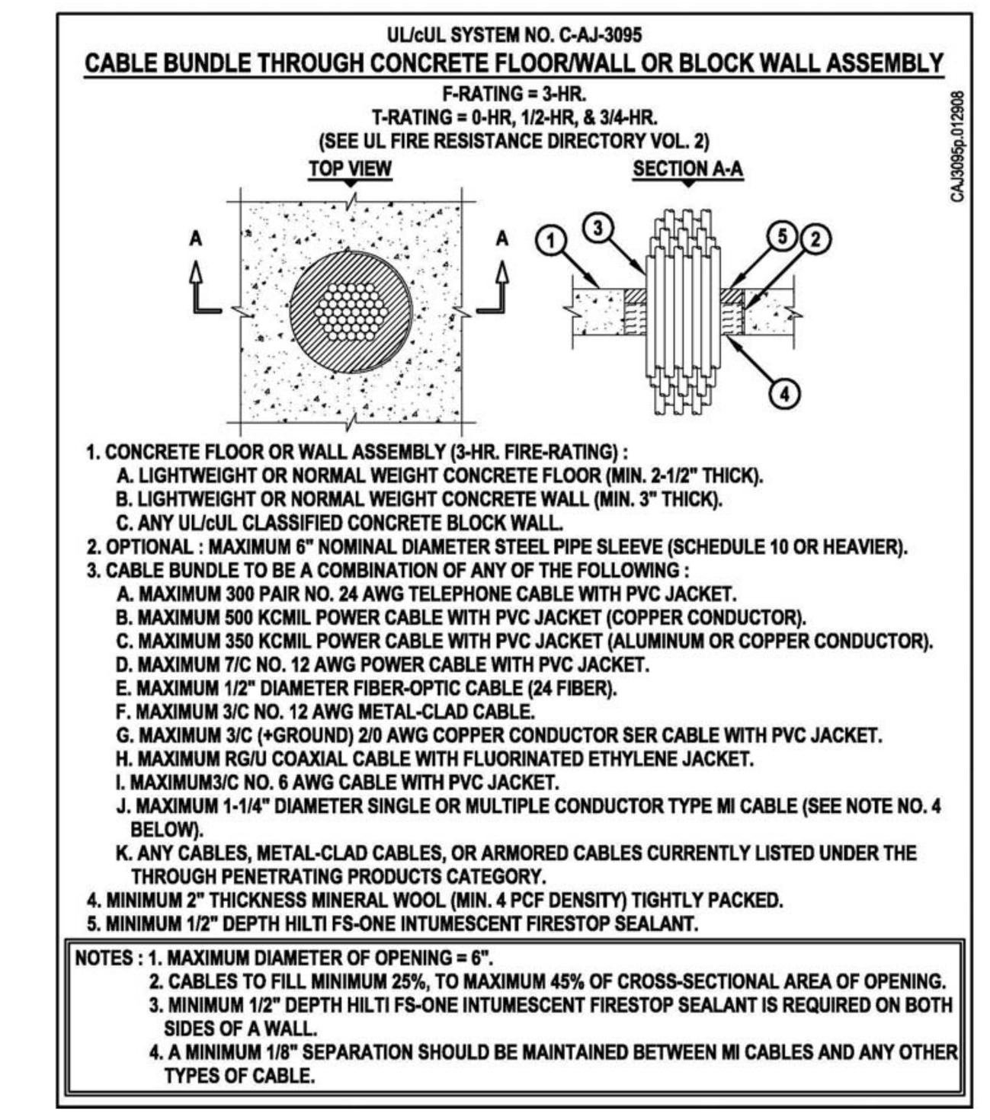


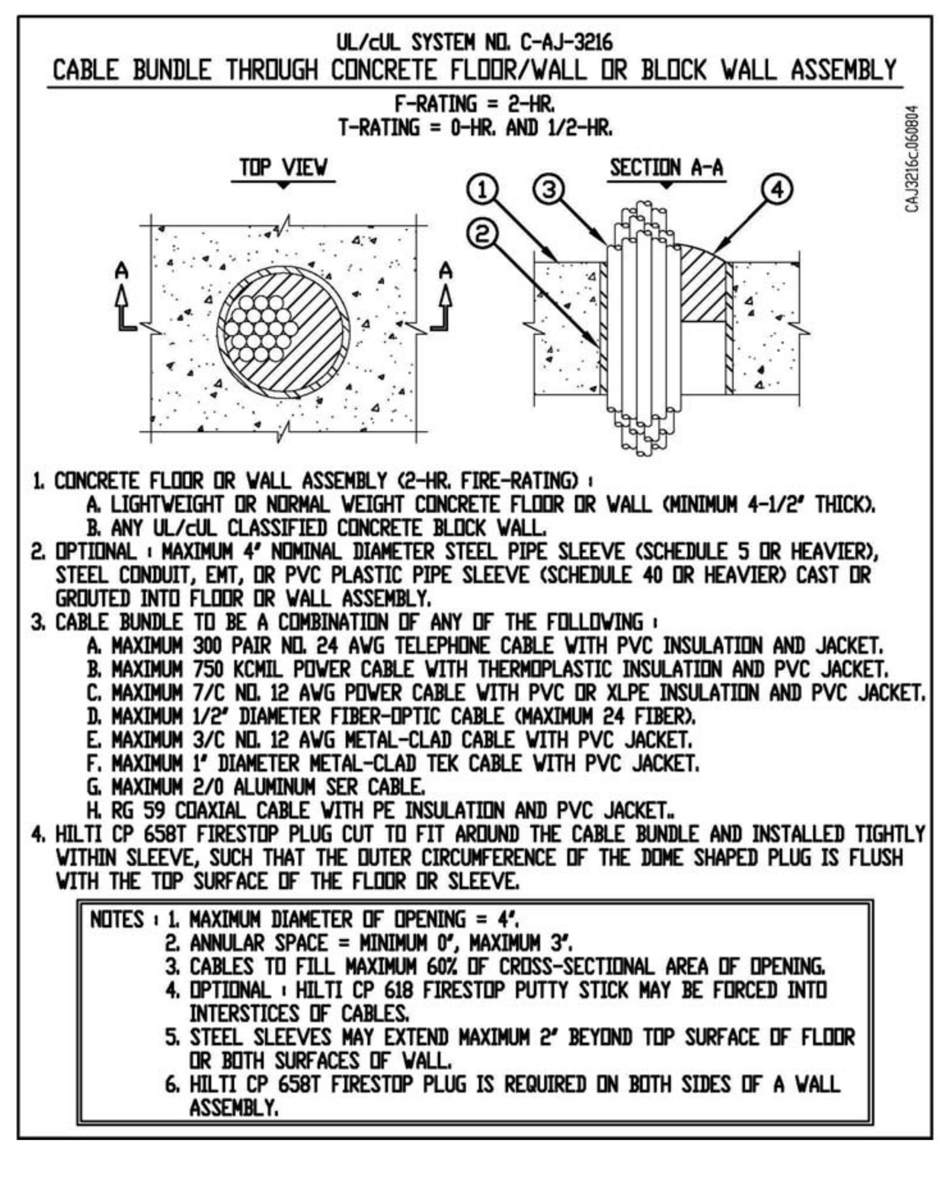


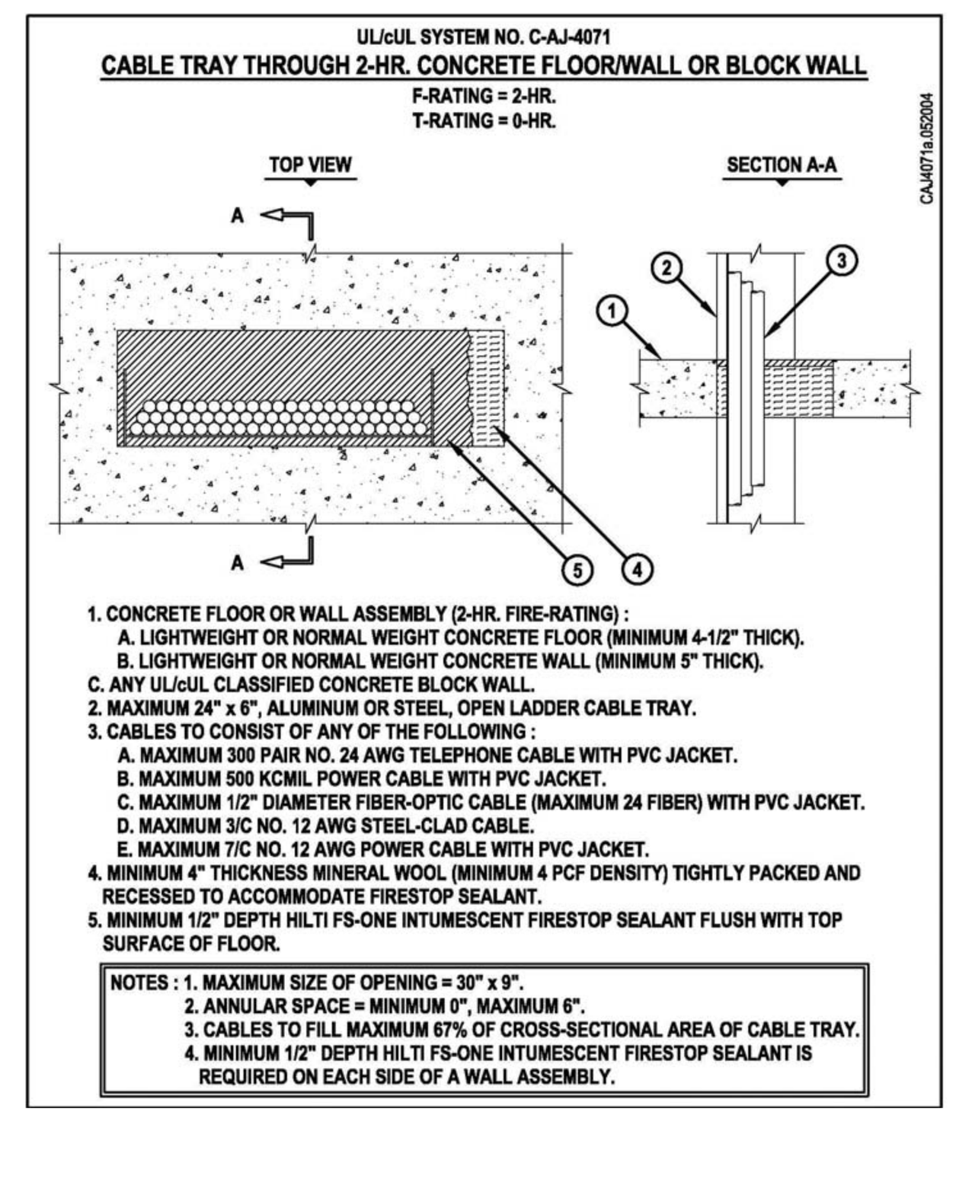


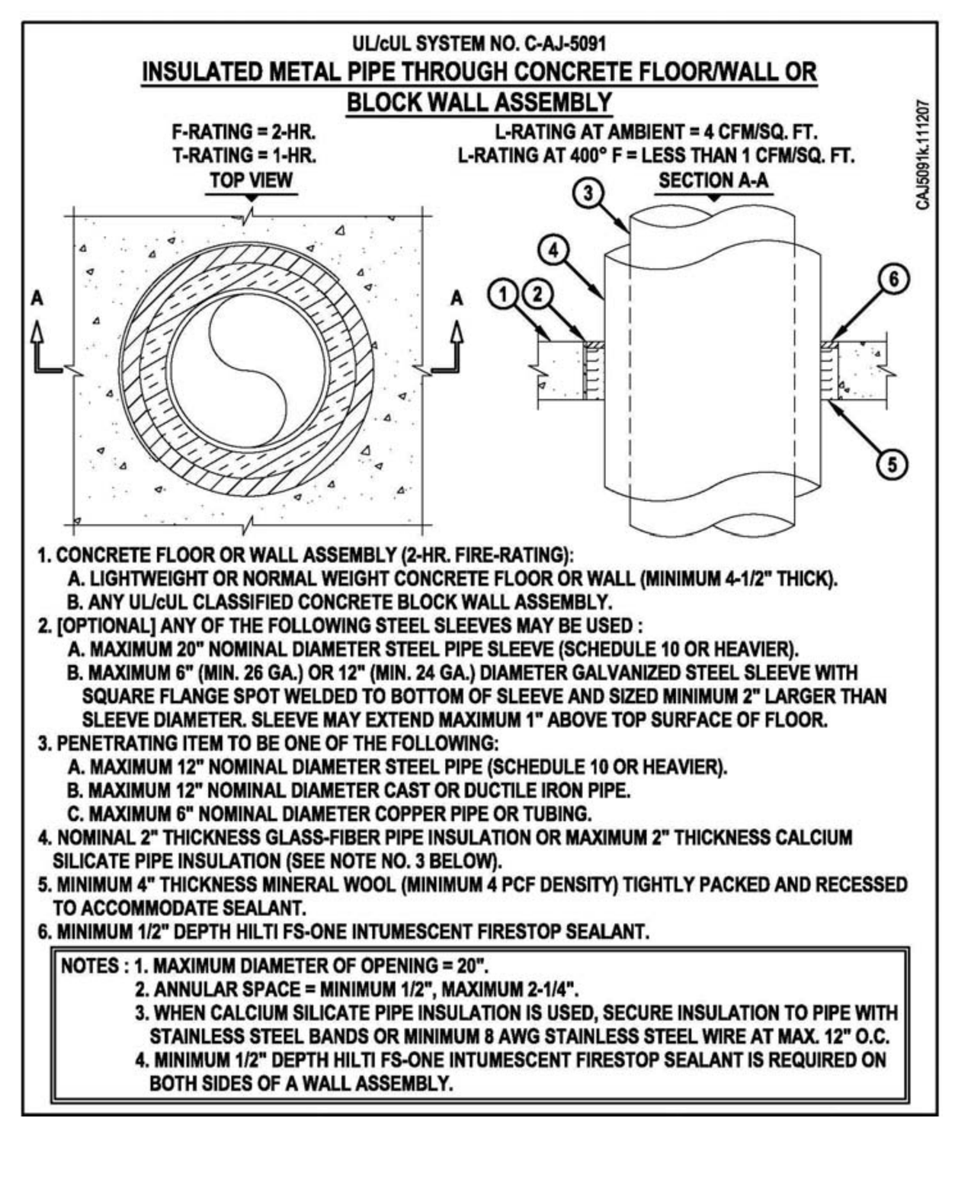


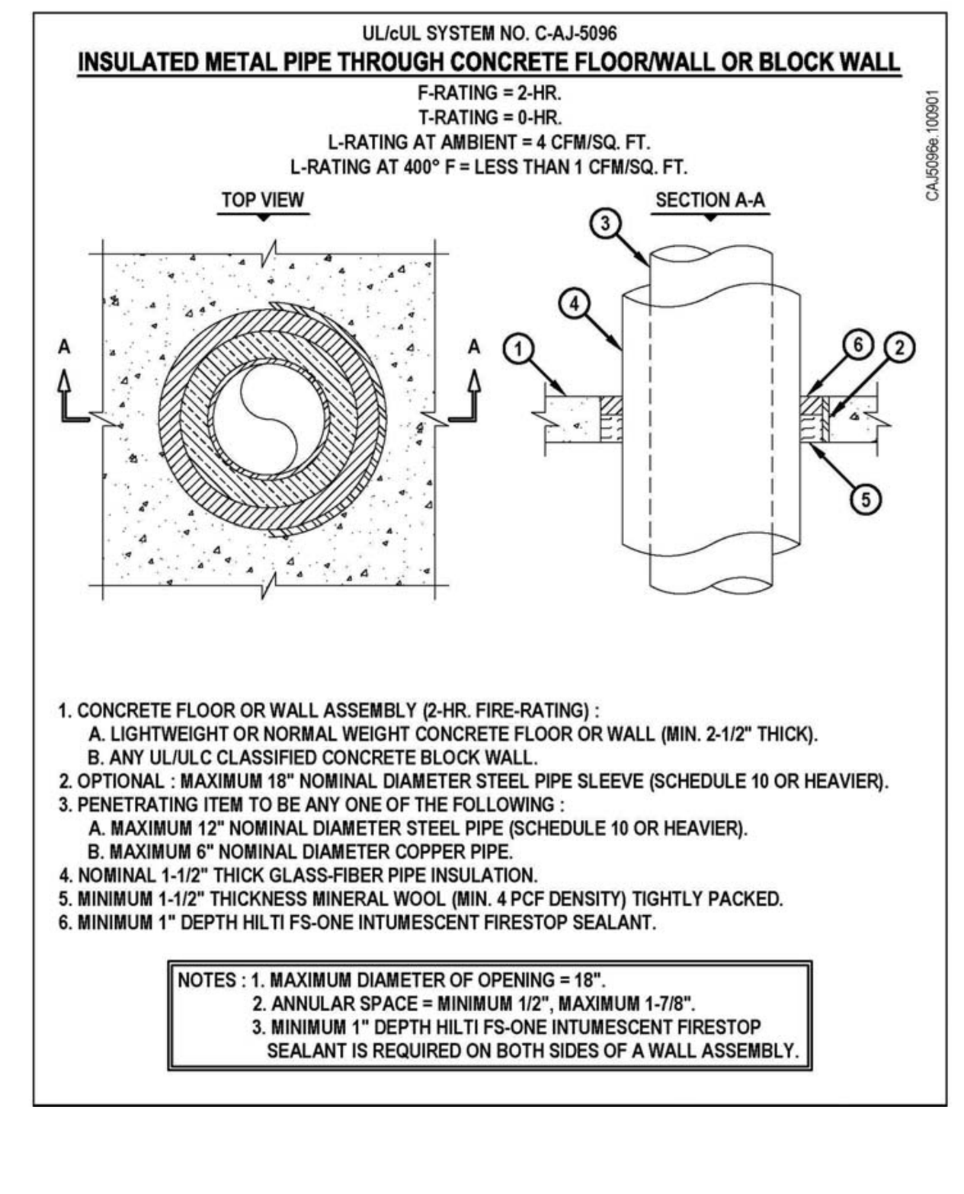


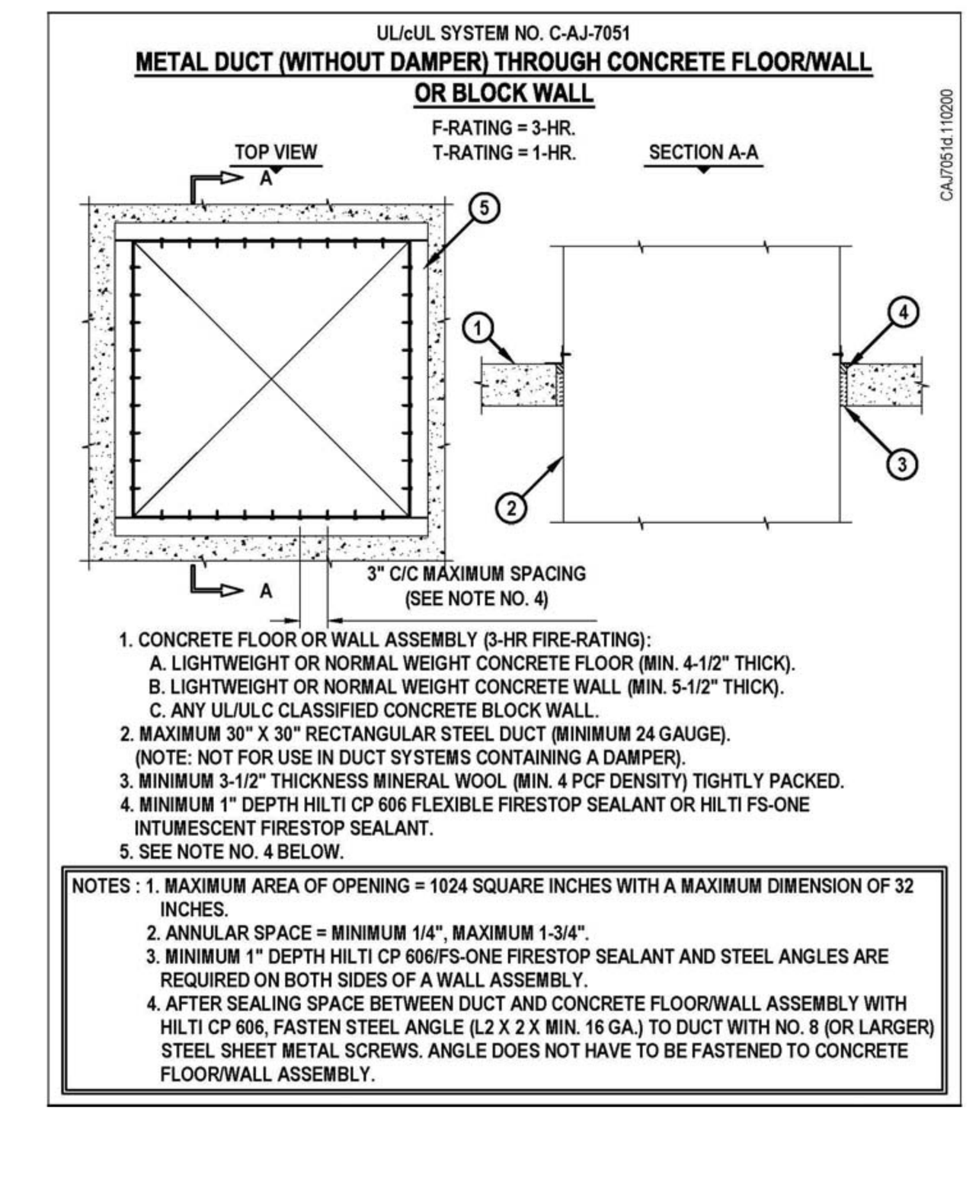


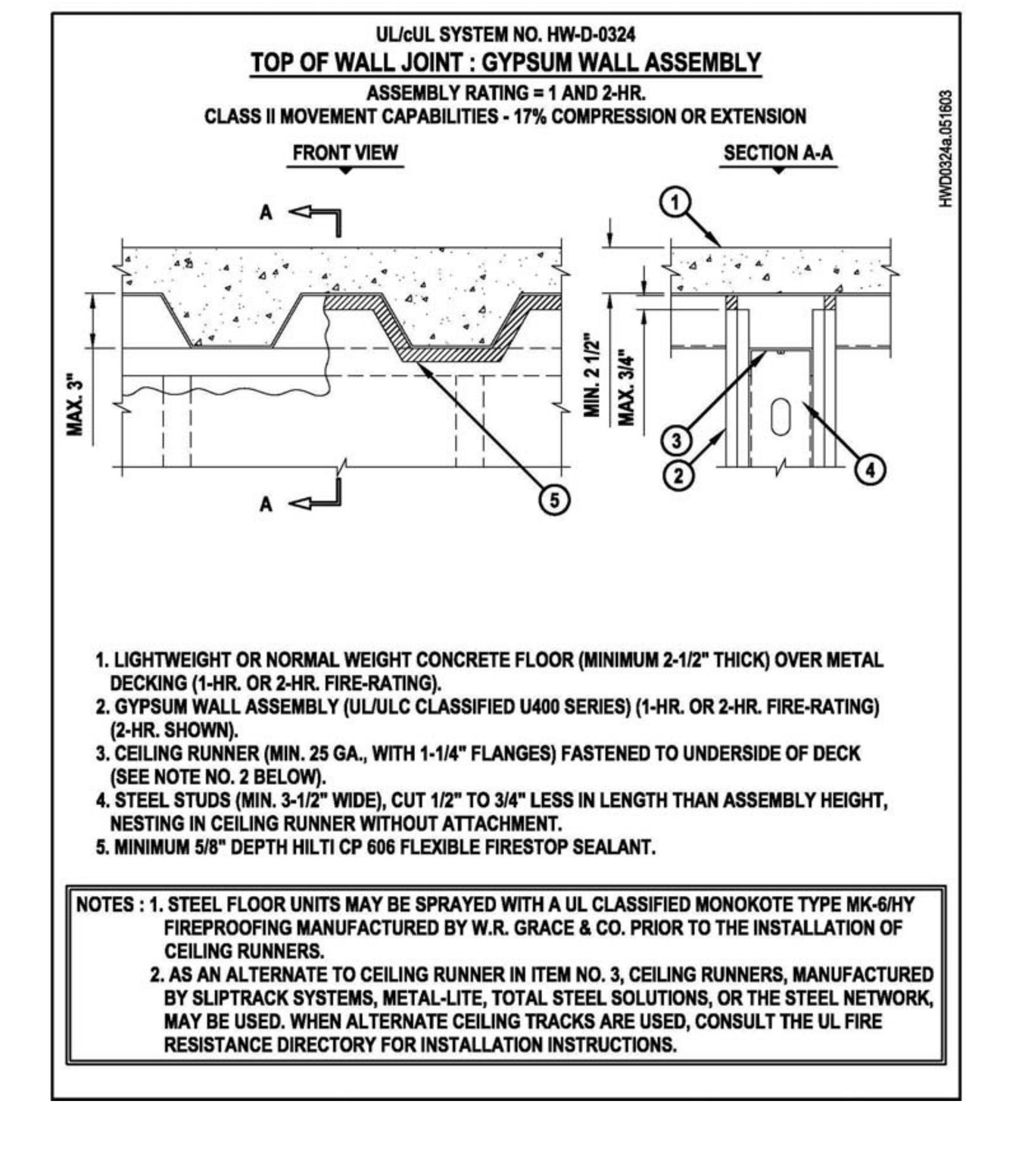


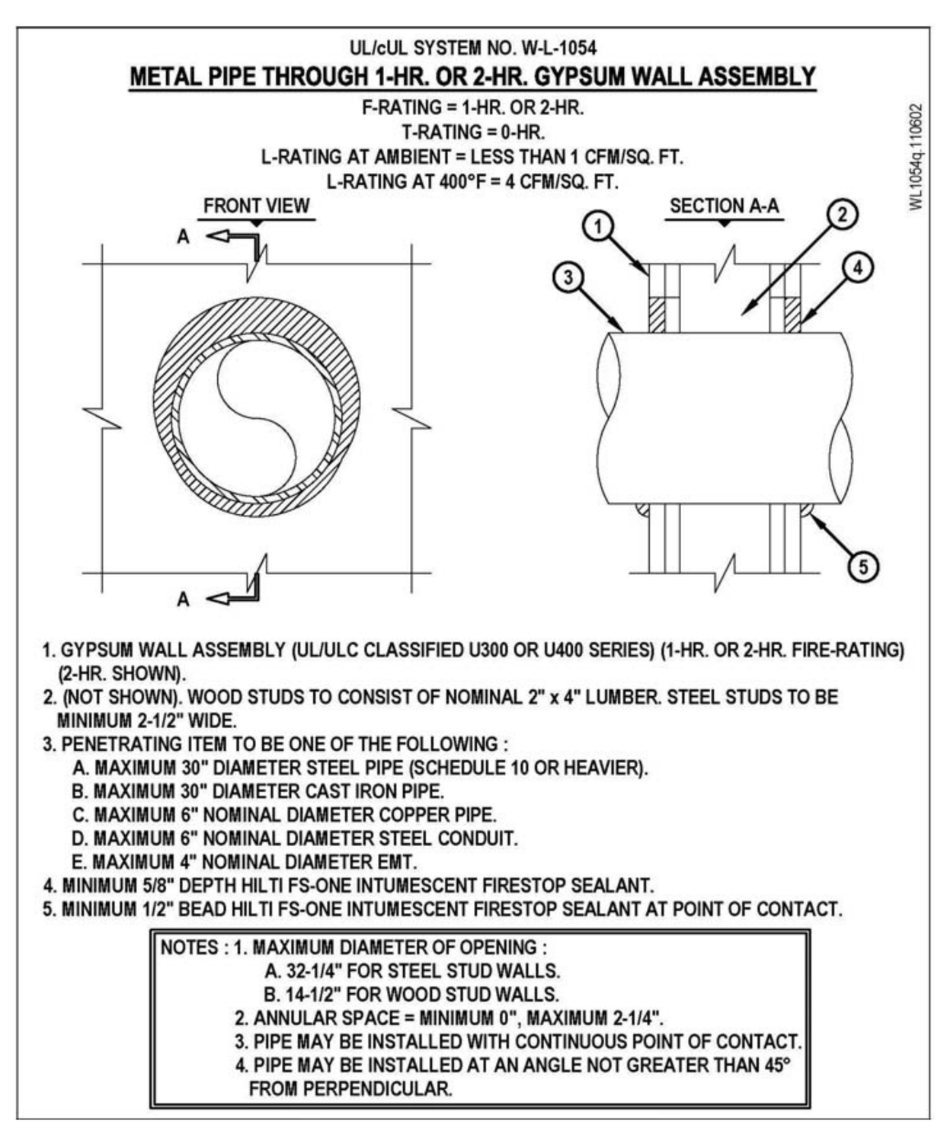


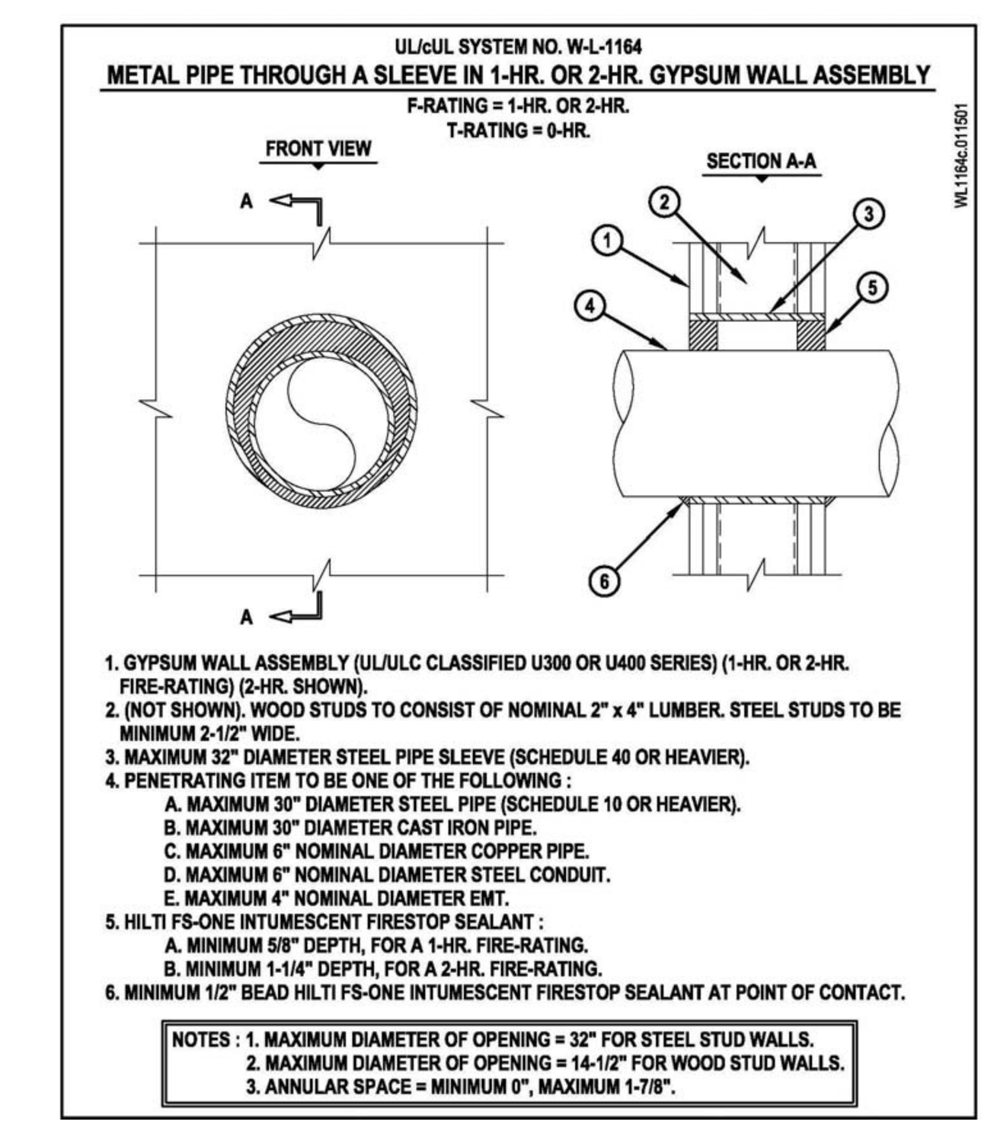


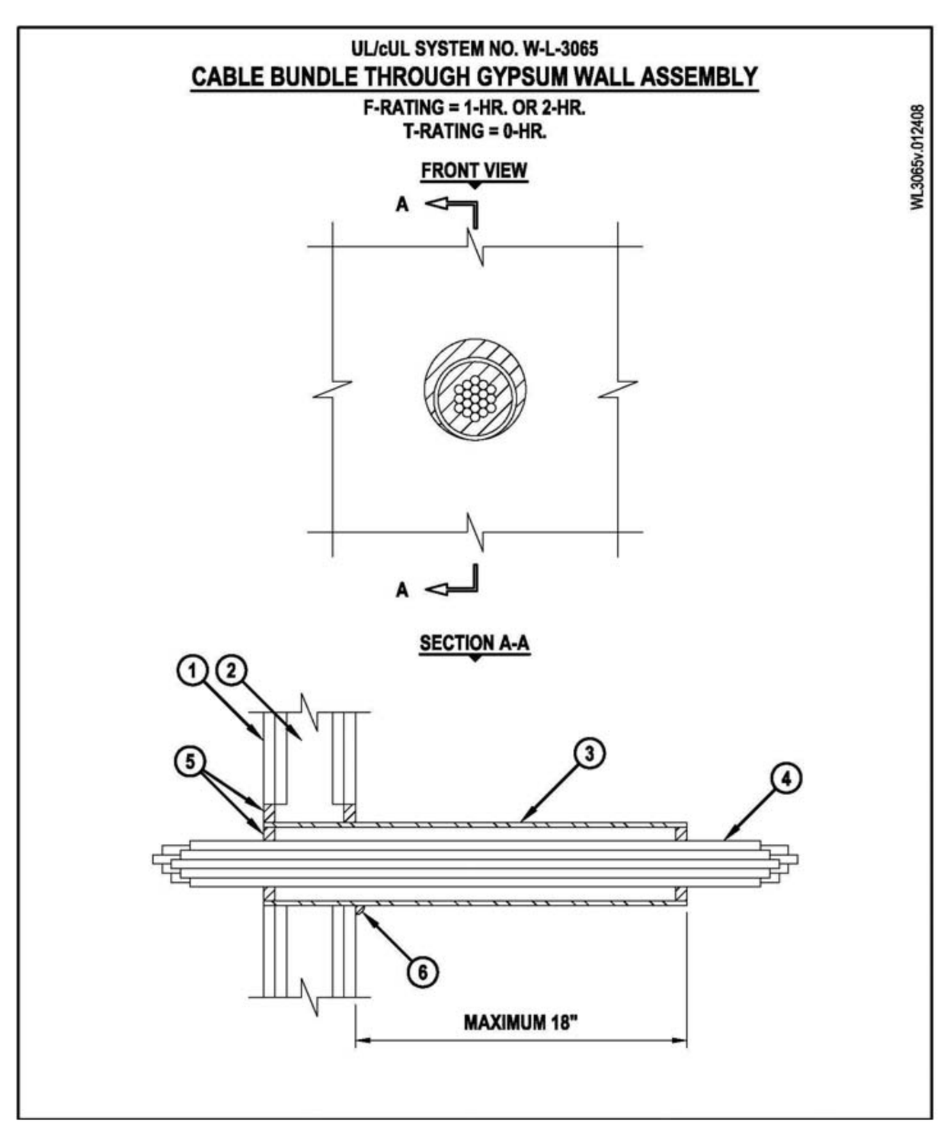


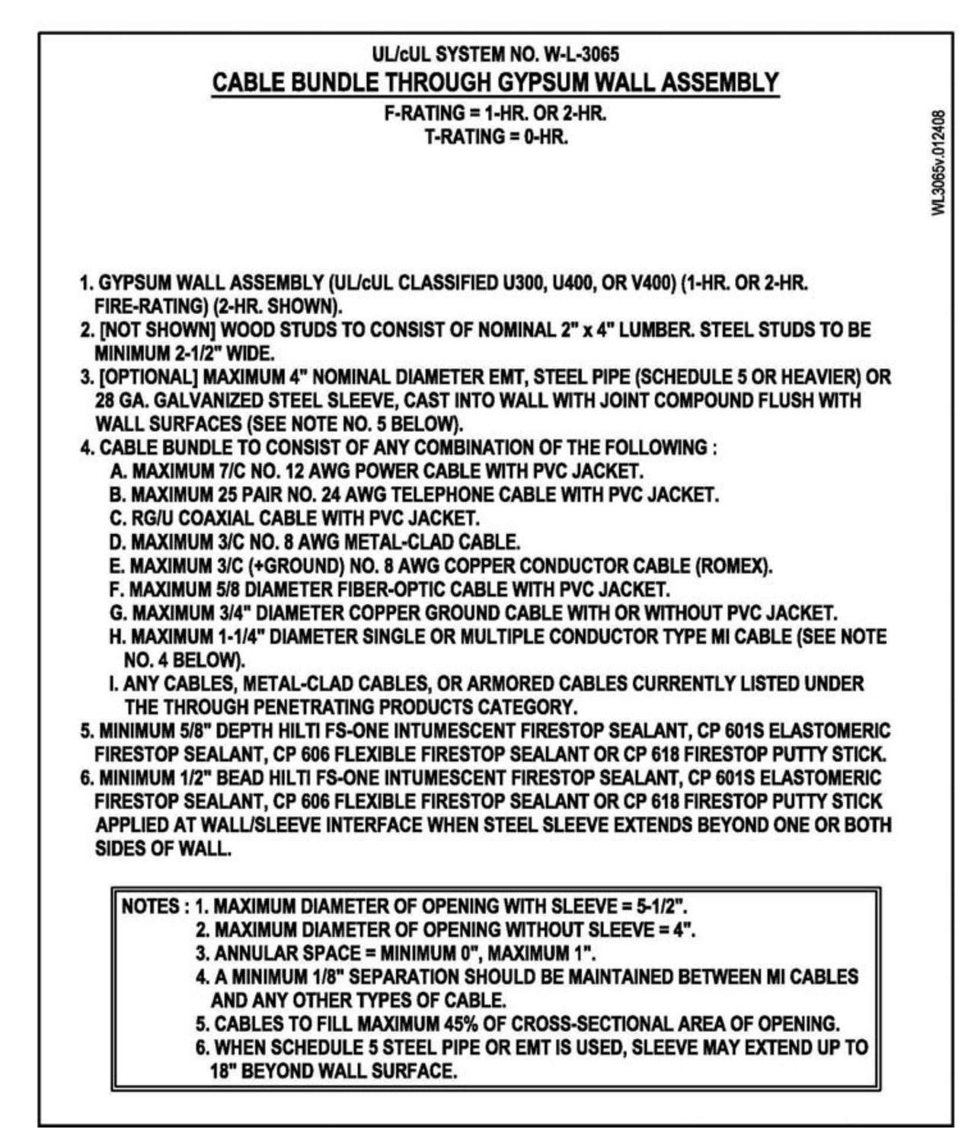


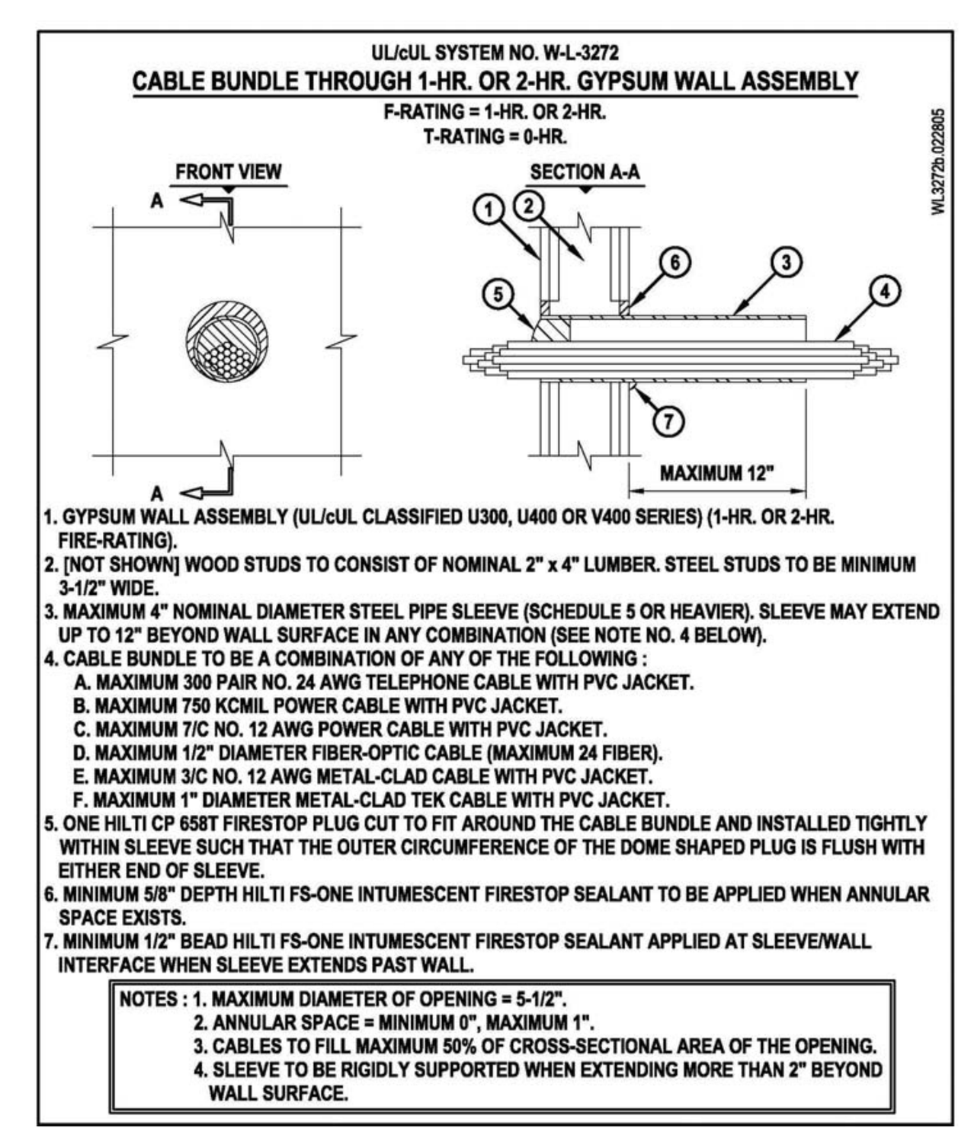


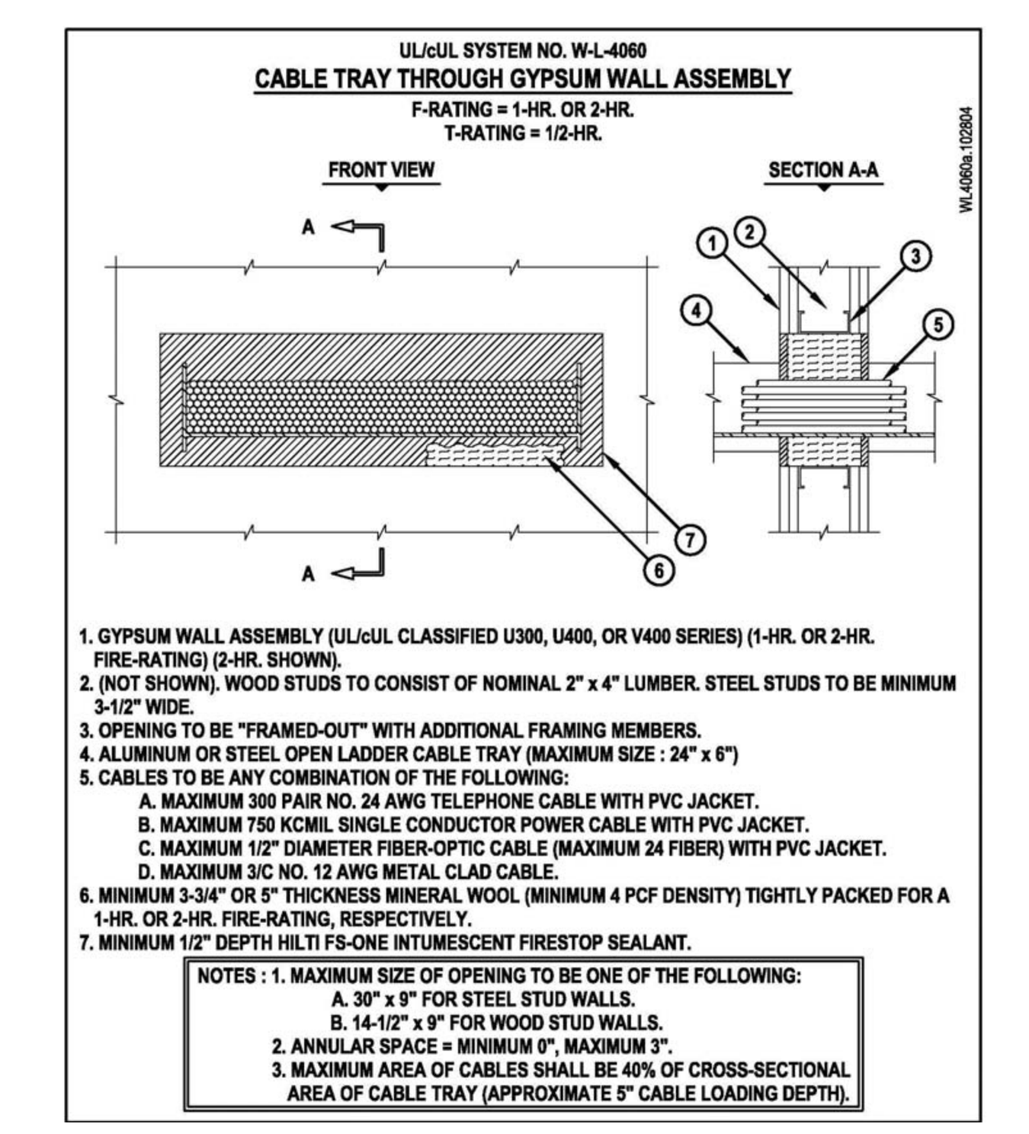


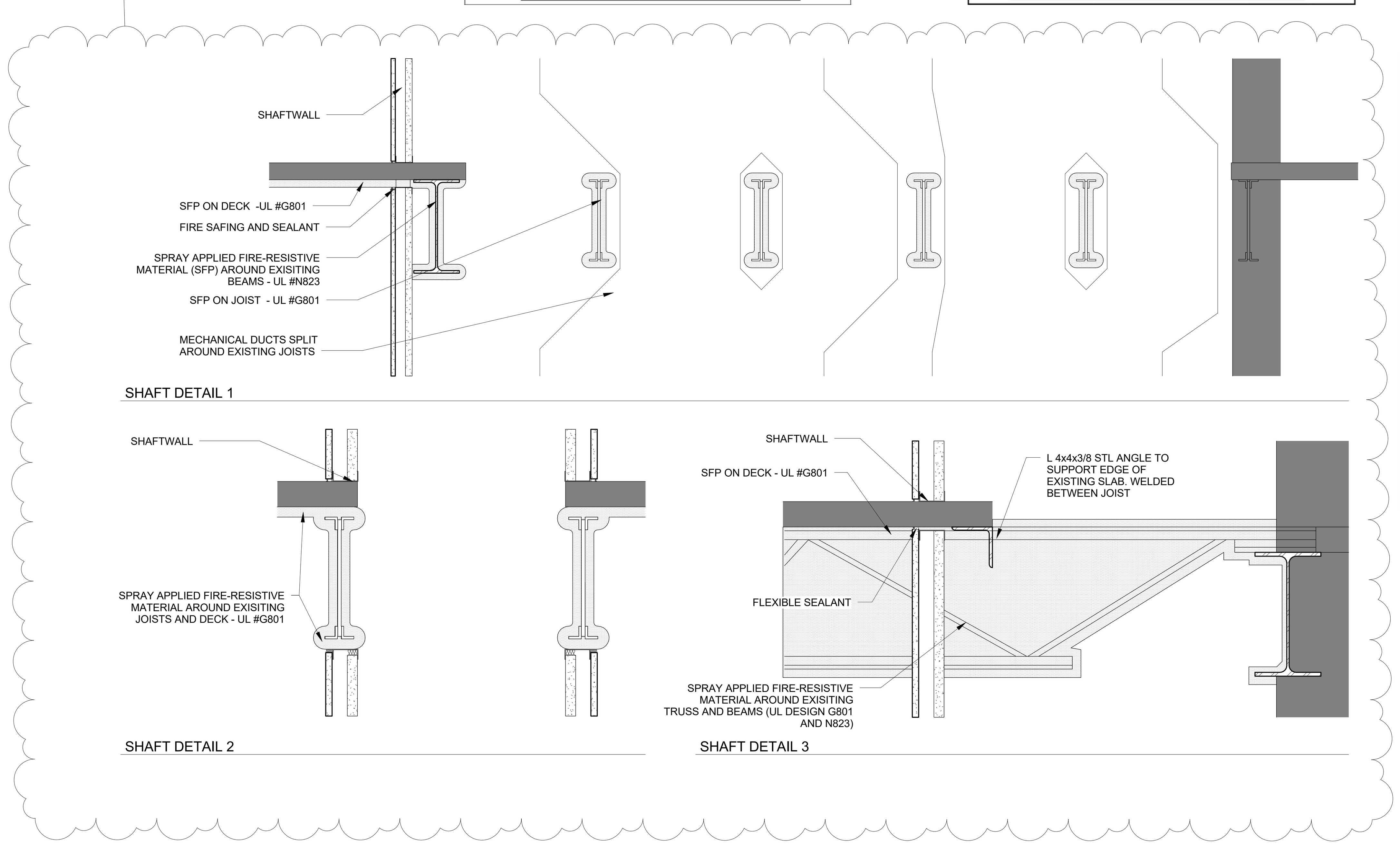


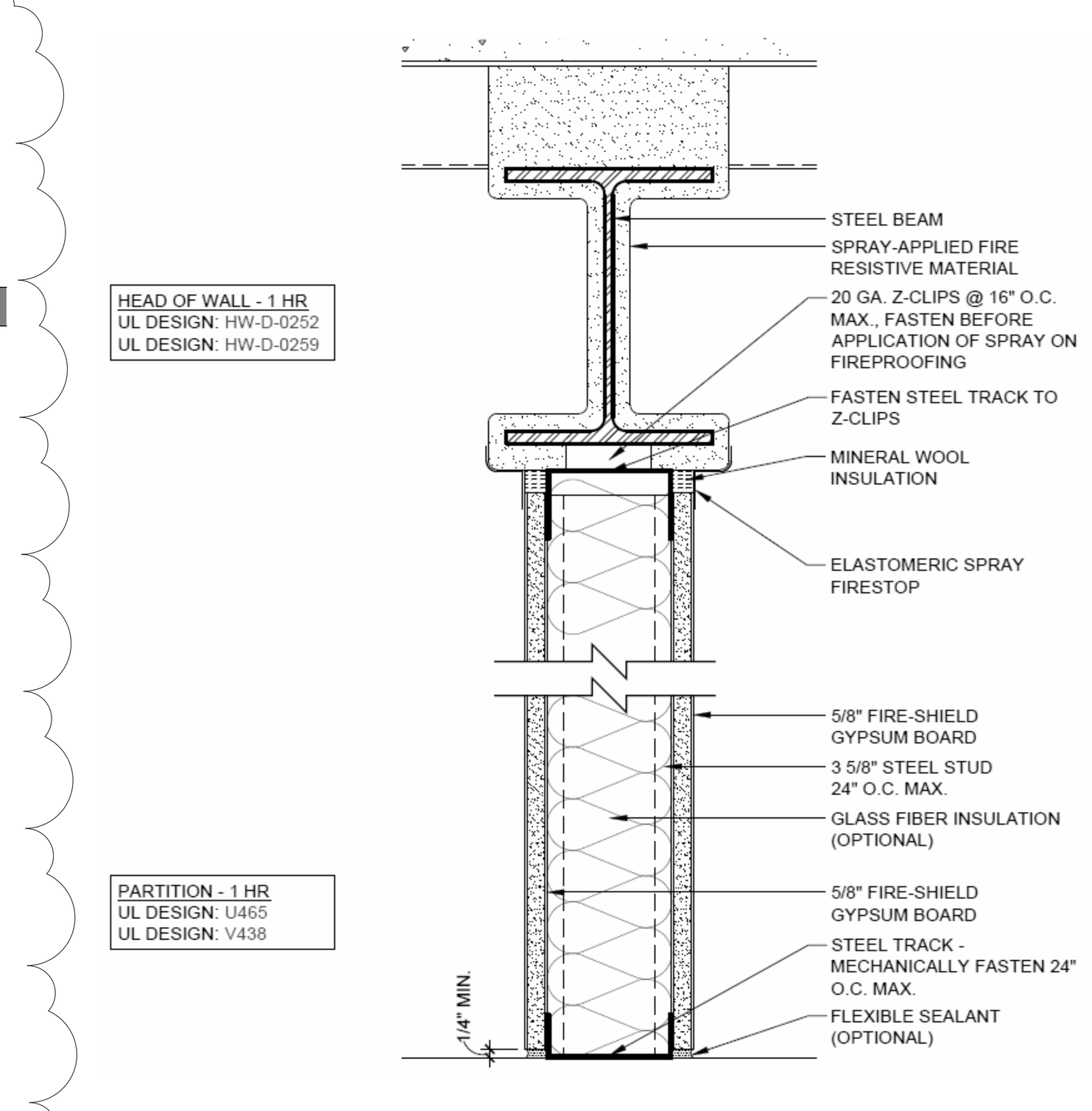




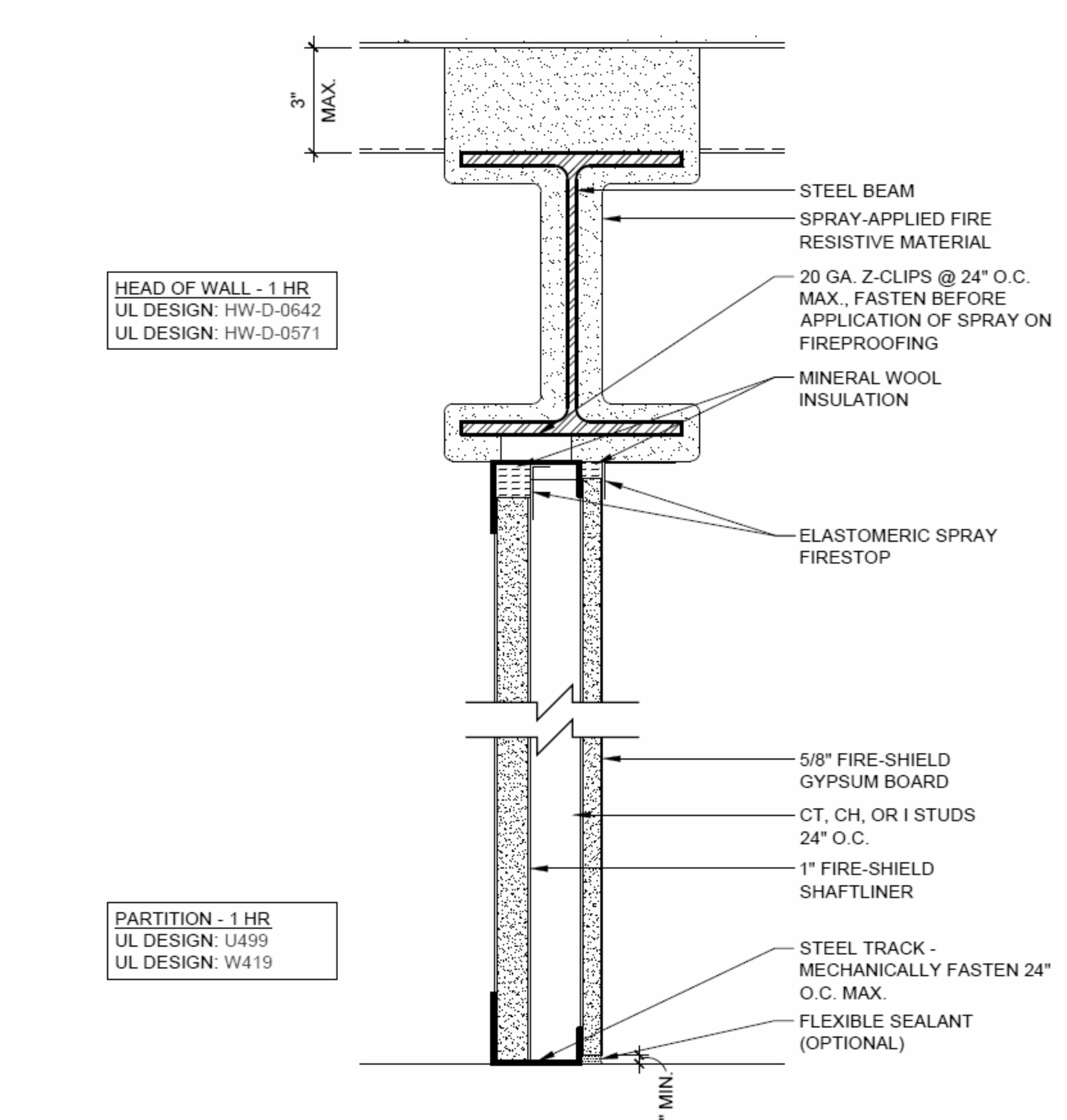




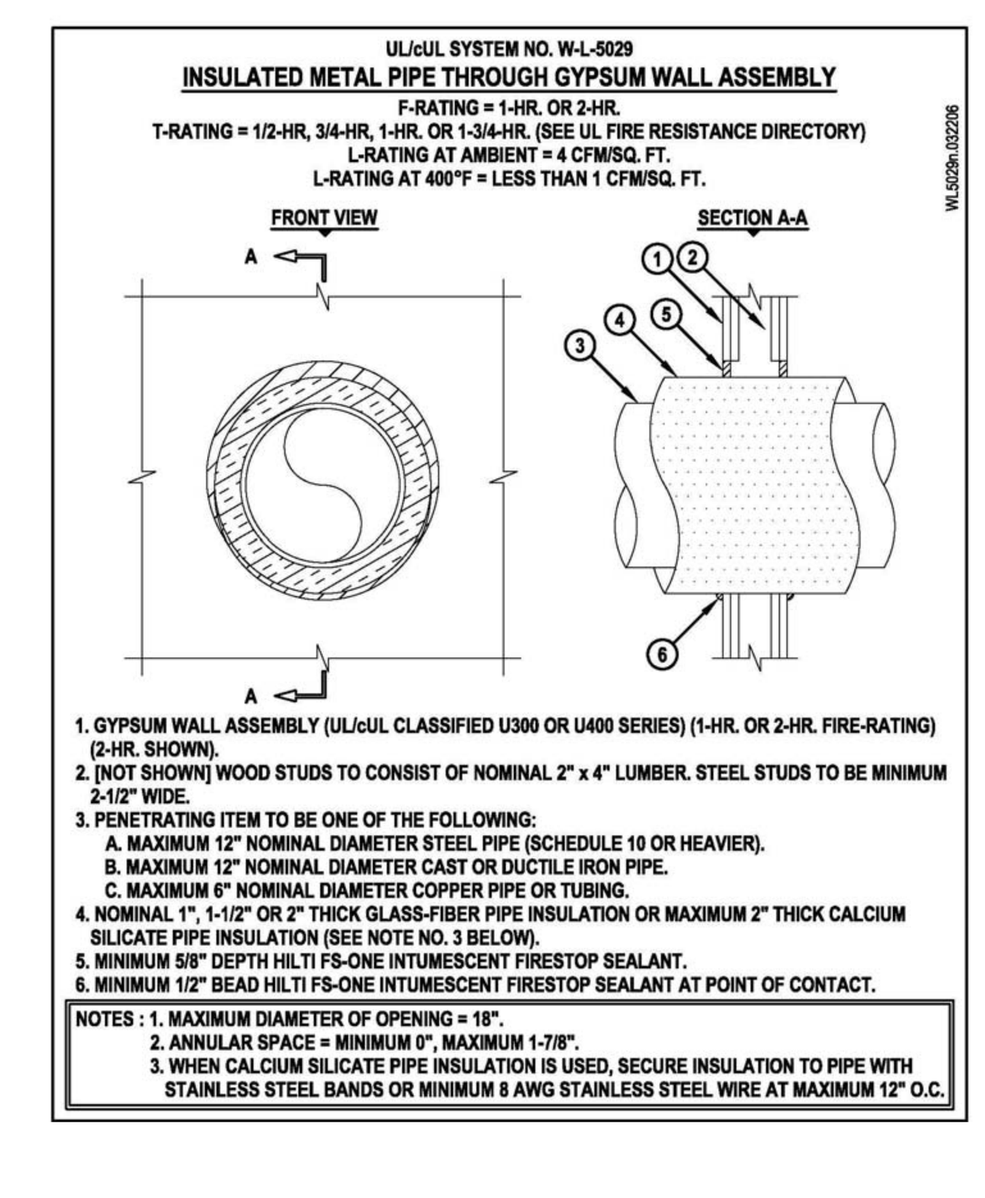


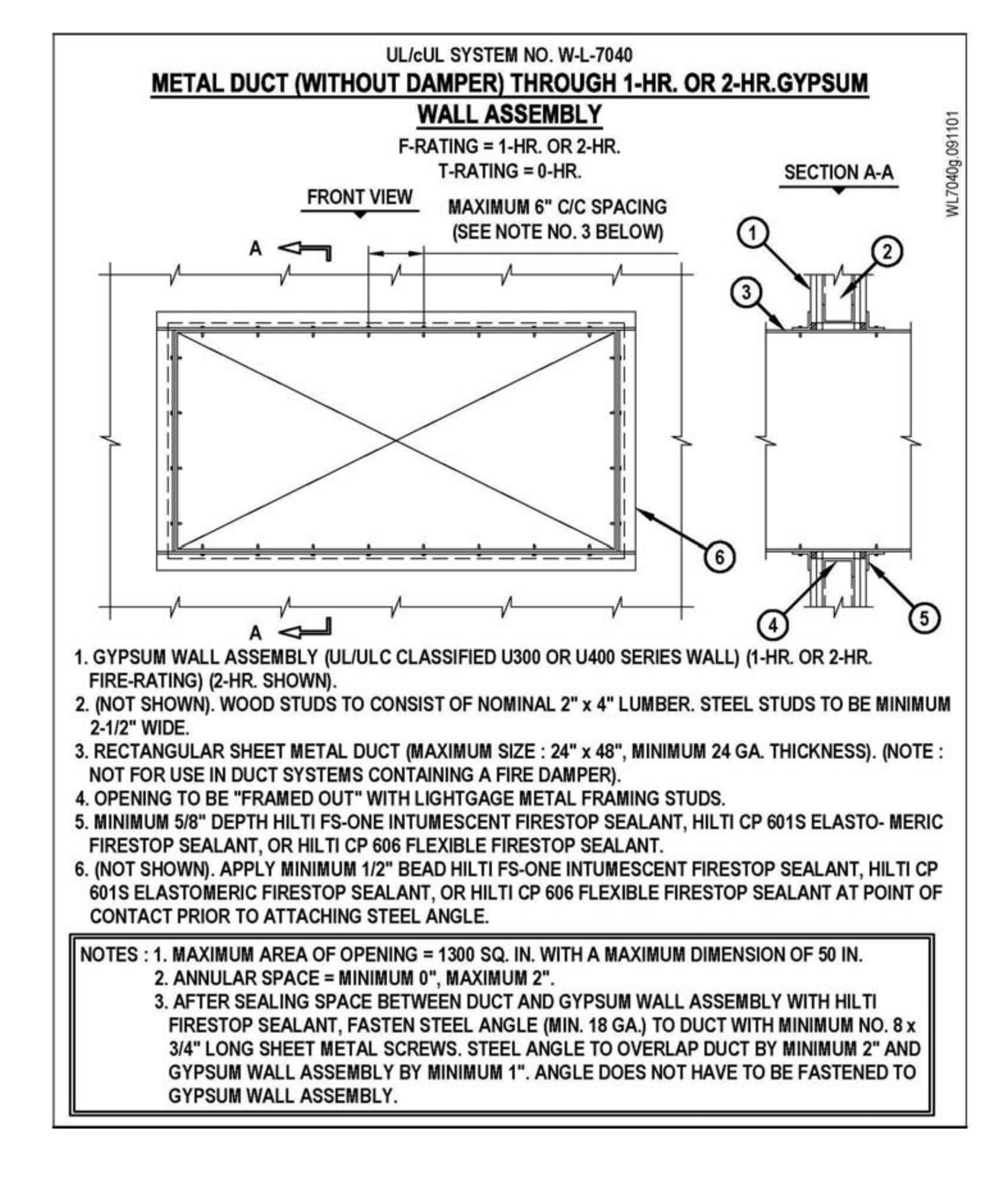


NOTE: DETAIL IS PORVIDED FOR REFERENCE. SIMILAR DETAIL CAN BE APPLIED TO WALL ATTACHMENT TO SPRAYED DECK. (VIF)



NOTE: DETAIL IS PORVIDED FOR REFERENCE. SIMILAR DETAIL CAN BE APPLIED TO WALL ATTACHMENT TO SPRAYED DECK. (VIF)





drawing title	
FIRE STOPPING DETAILS	STATE OF CONNECTICUT DEPARTMENT OF ADMINISTRATIVE SERVICES DIVISION OF CONSTRUCTION SERVICES

SUBMISSIONS

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drawing prepared by:
TSKP STUDIO — ARCHITECTURE | PLANNING | INTERIORS
One Hartford Square West
146 Wyllys Street, Bldg 1-203
Hartford, CT 06106
860.547.1970 | www.tskp.com

project: WCSU, RENOVATIONS TO HIGGINS HALL AND ANNEX
DANBURY, CT

state project no.: BI-RD-290
office project no.: 150501

date:
scale: As indicated
drawn by: Author
approved by: Approver
drawing no.: A0.07

STATE OF CONNECTICUT — THOMAS W. IGLEHART — No. 3711 — LICENSED ARCHITECT

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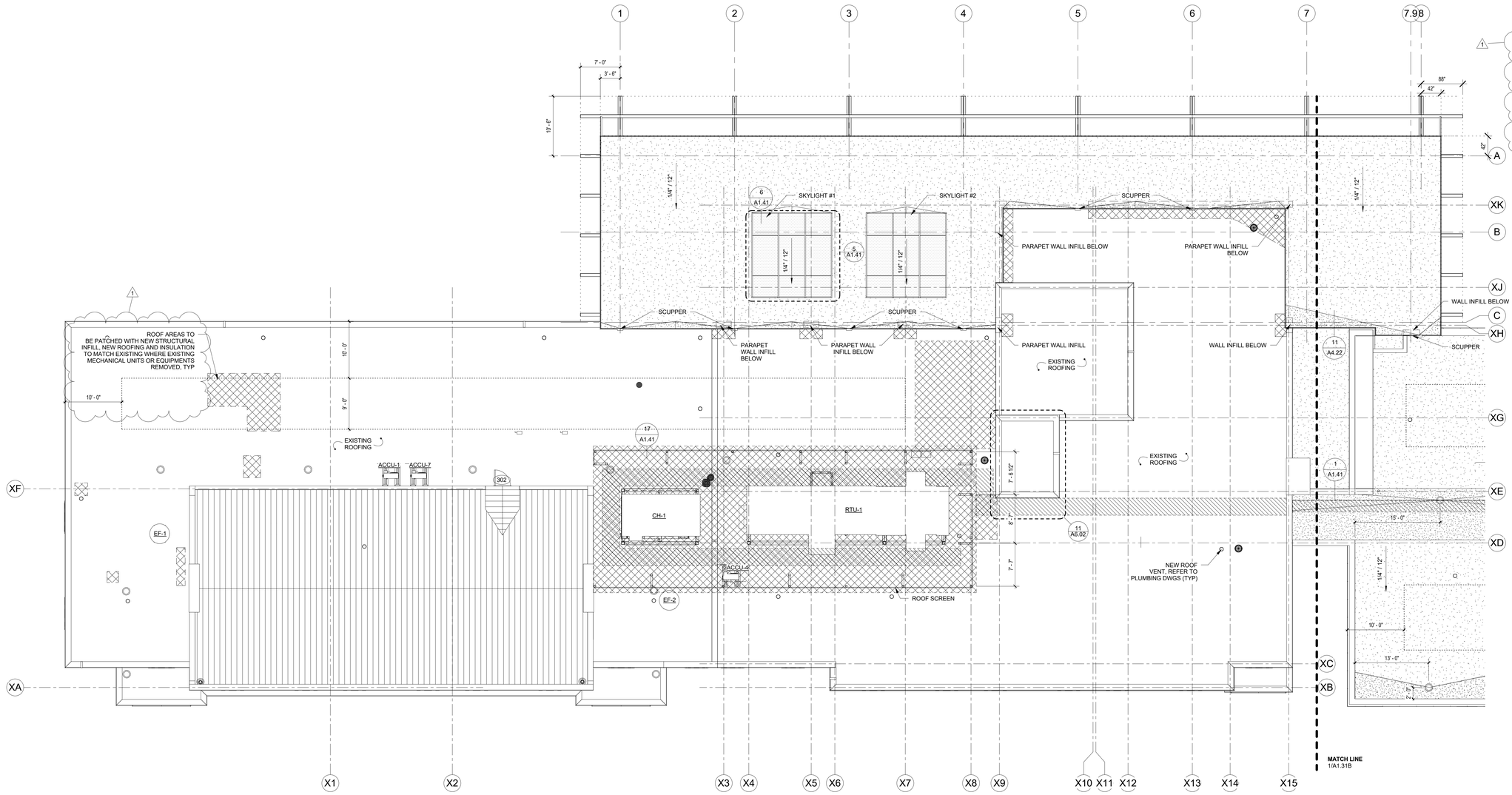

1 ROOF PLAN - AREA A
1/8" = 1'-0"

AREA A

NORTH

drawing title
ROOF PLAN - AREA A

SUBMISSIONS

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state project no. BI-RD-290
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approved by Approver
drawing no. A1.31A

THOMAS W. LOUBSKY No. 9711 REGISTERED ARCHITECT STATE OF CONNECTICUT

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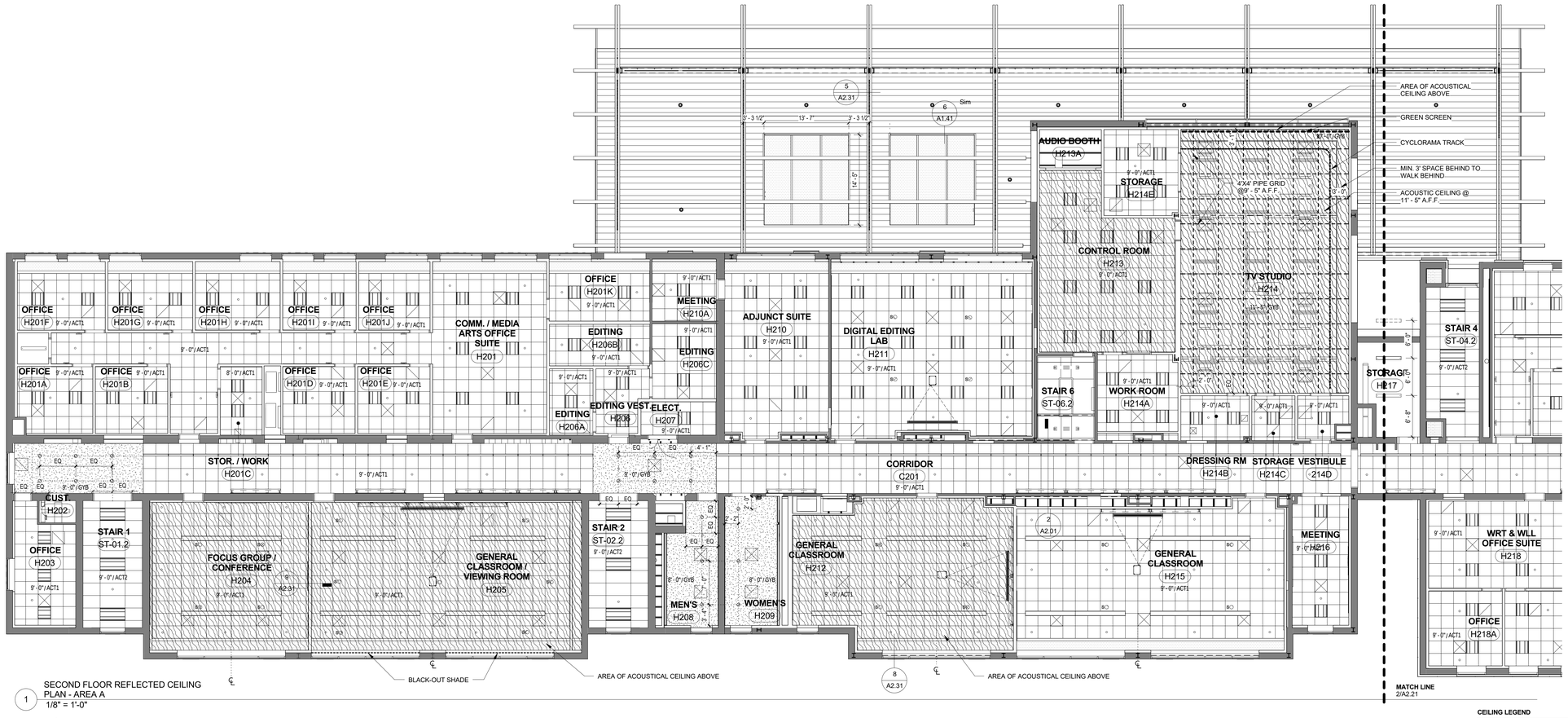
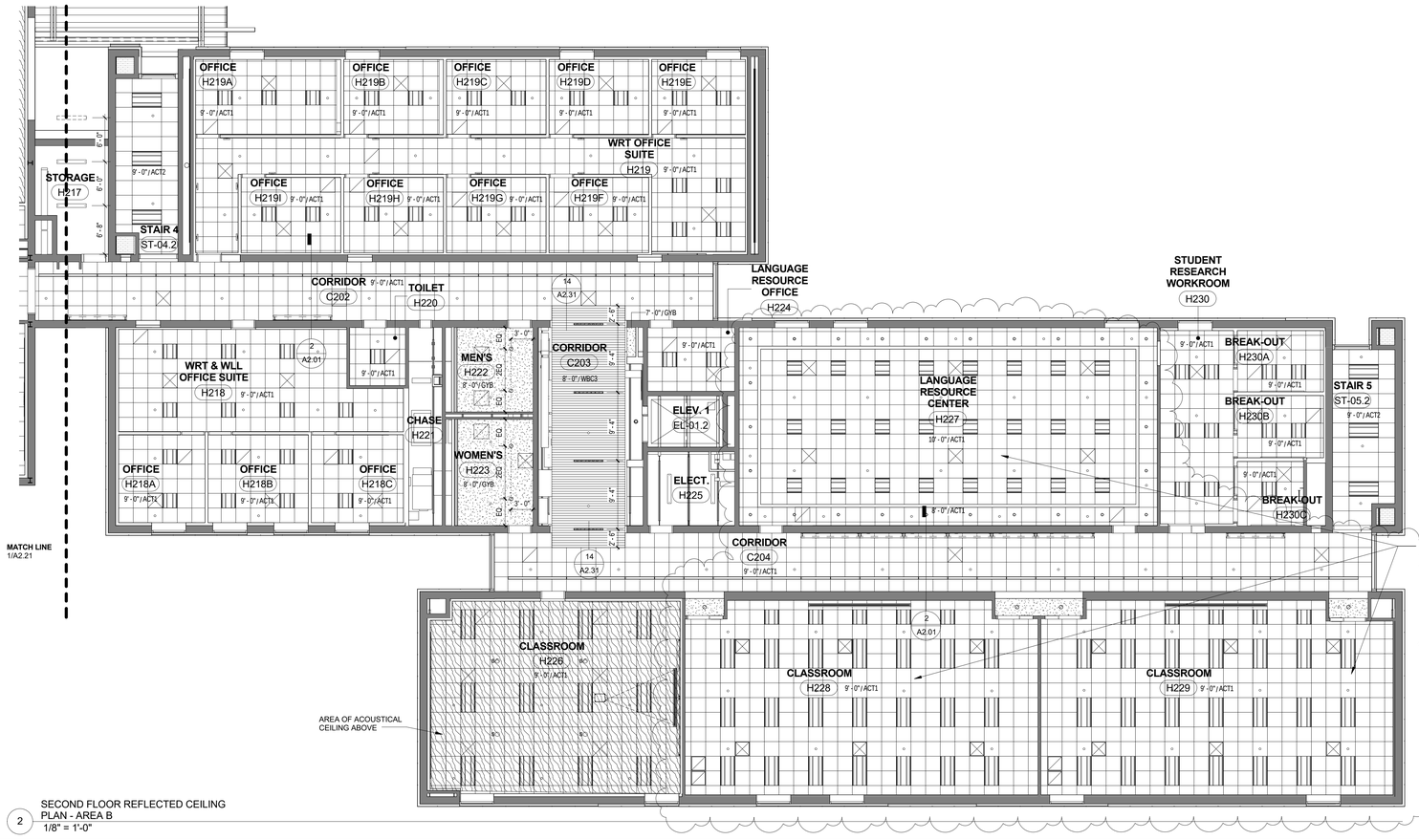


1 SECOND FLOOR REFLECTED CEILING PLAN - AREA A
1/8" = 1'-0"



2 SECOND FLOOR REFLECTED CEILING PLAN - AREA B
1/8" = 1'-0"

CEILING LEGEND

- EXISTING AREAS TO REMAIN (EXISTING TILES TO BE REMOVED AND NEW TILES TO BE PROVIDED, EXISTING CEILING GRID TO REMAIN AND BE ADJUSTED AS NEEDED FOR NEW MEP WORK, EXISTING LIGHT FIXTURES TO BE REINSTALLED, EXISTING GWB SOFFITS TO BE PATCHED AND ENTIRE SOFFIT IN ROOM TO BE PAINTED AFTER NEW MEP LAYOUT IS COMPLETED) TYP. VIF
- ACT 1- 2 x 2
- ACT 2- 2 x 4
- GWB
- PRECAST CONCRETE LINTEL
- RADIANT PANEL
- ACOUSTICAL CEILING (REFER TO 7/ A2.31)
- RATED GWB CEILING (1 HR) (REFER TO 3/A2.31)
- RETURN DIFFUSER
- SUPPLY DIFFUSER
- WOOD CEILING - 1
- WOOD CEILING - 2
- WOOD CEILING - 3
- METAL BAFFLE CEILING
- PENDANT LIGHTING
- PENDANT WALL WASHER
- WALL MOUNTED WALL WASHER
- SPRINKLER
- CIRCLE CEILING MOUNTED SPEAKER

drawing title
SECOND FLOOR REFLECTED CEILING PLAN

SUBMISSIONS

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STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
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project
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DANBURY, CT

state project no. BI-RD-290
office project no. 150501

date
scale As indicated
drawn by Author
approved by Approver
drawing no. A2.21

STATE OF CONNECTICUT THOMAS W. TOLENBERG 9711 LICENSED ARCHITECT

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GENERAL NOTES

1. CUT OUT AND REMOVE EXISTING EXPANSION JOINT SEALANT AND BACKER ROD FULL HEIGHT OF WALL, RESEAL WITH NEW SEALANT AND BACKER ROD PER SPECIFICATION. SEE 5/A4.41.

2. COORDINATE REPOINTING AND EXTERIOR BRICK WORK WITH EXTERIOR ELEVATIONS FOR ADDITIONAL INFORMATION.

3. CLEAN ALL MASONRY UNITS TO BE REMOVED AND REINSTALLED FREE FROM ALL ORGANIC GROWTH, MORTAR ETC. - ALL UNIT SURFACES.

4. REMOVE ALL EXISTING EXTERIOR LIGHT FIXTURES.

5. REFER TO MEP DRAWINGS FOR AREAS WHERE SLAB DEMOLITION REQUIRED TO INSTALL NEW PIPING OR REMOVE EXISTING, AND COORDINATE IN FIELD.

6. REMOVE FLOORING TO CONCRETE SLAB ON ENTIRE AREA OF ROOM OR CORRIDOR WHERE FLOORING IS DEMOLISHED DUE TO NEW MEP PIPING INSTALLATION ON LOWER LEVEL AREA A.

7. SEE ABATEMENT DRAWINGS FOR ADDITIONAL REMOVAL INFORMATION.

8. COORDINATE WITH MEP DRAWINGS FOR VENT REMOVAL AND ADDITIONAL REMOVAL INFORMATION.

9. REFER TO MEP AND STRUCTURAL DRAWINGS FOR ADDITIONAL DEMO SCOPE.

10. EXISTING SALVAGED BRICK ON EXISTING BUILDING SHALL BE SORTED BASED ON DIFFERENT BUILDING SECTIONS BUILT IN DIFFERENT YEARS. NOTE THAT EACH SECTION HAS DIFFERENT COLOR AND TYPE OF BRICK. CONTRACTOR IS RESPONSIBLE TO PROVIDE ENOUGH SALVAGED BRICK FOR INFILLS OR NEW WALLS REQUIRING SALVAGED BRICK PER EACH SECTION. DESIGN TEAM ANTICIPATE THAT THERE SHOULD BE ENOUGH SALVAGED BRICK FOR HIGGINS 1958 AND ANNEX 1967. NEW BRICK CAN BE PROVIDED IN ADDITION TO SALVAGED BRICK FOR HIGGINS 1948. A MOCK-UP SHALL BE PROVIDED FOR REVIEW OF ARCHITECT BEFORE INSTALLATION OF NEW AND EXISITNG BRICK. MORTAR COLORS TO MATCH EXISTING.

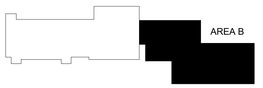
DEMOLITION PLAN LEGEND

- (1) KEYED DEMOLITION NOTE SYMBOL
- EXISTING CONSTRUCTION TO BE REMOVED
- EXISTING CONSTRUCTION TO REMAIN (ETR)
- EXISTING ROOFING & INSULATION TO BE REMOVED
- EXISTING WALL PORTION TO BE REMOVED, SEE 2/A4.21 AND STRUCTURAL DWGS

DEMOLITION KEYNOTES

1 REMOVE WALL/PARTITION AS INDICATED
1A REMOVE FURRING WALL
1B REMOVE TILE AND GROUT FROM WALL, GRIND AND SMOOTH SURFACE
1C REMOVE PORTION OF STAIR WALL TO MEET CODE REQUIRED LANDING DIMENSIONS
2 REMOVE DOOR AND FRAME
2A REMOVE DOOR PANEL AND HARDWARE, SALVAGE AND TURN OVER TO OWNER, FRAME TO REMAIN
2B REMOVE PORTION OF WALL TO ACCOMODATE NEW DOOR
2C REMOVE DOOR PANEL AND DOOR HARDWARE, EXISTING FRAME TO REMAIN
2D REMOVE DOOR AND FRAME, LINTEL AND OPENING SUPPORT TO REMAIN FOR NEW DOOR AND FRAME.
2E REMOVE DOOR AND FRAME, LINTEL AND OPENING SUPPORT TO REMAIN FOR NEW FRAME
3 REMOVE WINDOW/ WALL AND ASSOCIATED BLOCKING (VIF), EXISTING LINTEL TO REMAIN
3A REMOVE PORTION OF WALL TO ACCOMODATE FOR NEW WINDOW
3B REMOVE EXTRUDED WINDOW/ WALL, SEE ELEVATION DETAIL NOTED ON DEMO PLAN
4 REMOVE CASEWORK
5 REMOVE FLOORING DOWN TO CONCRETE SLAB, REMOVE BASE
5A FLOORING DEMOED IN ABATEMENT PHASE. REMOVE ANY REMAINING FLOORING DOWN TO CONCRETE BASE.
6 REMOVE STAIR
6A REMOVE EXTERIOR STAIR
6B REMOVE EXISTING HANDRAIL
7 REMOVE PLUMBING FIXTURE, SEE PLUMBING DEMO DWGS
7A REMOVE DRINKING FOUNTAIN
8 REMOVE SLAB WHERE REQUIRED FOR PLUMBING WORK OR OTHER UNDERSLAB WORK, COORDINATE WITH PLUMBING AND STRUCTURAL DRAWINGS. REFER TO MEP DWGS FOR ADDITIONAL SCOPE OF WORK
9 REMOVE MARKER/ CHALK/ TACK BOARD
9A REMOVE PROJECTOR AND TURN OVER TO OWNER
9B REMOVE TV AND MOUNT, TURN OVER TO OWNER
10 REMOVE DISPLAY CASE
10A REMOVE LOCKERS AND CONCRETE BASE
10B REMOVE CONCRETE BASE
11 REMOVE EQUIPMENT
12 REMOVE CEILING AND SUPPORTING CONSTRUCTION, DEMO TO EXPOSE BOTTOM OF FLOOR SLAB AND EXISTING STRUCTURE.
12A REMOVE EXISTING CEILING TILES. EXISTING GRID TO REMAIN. SALVAGE LIGHT FIXTURES TO BE REPLACED IN SAME LOCATION.
12B REMOVE TWO LAYERS OF CEILING AND SUPPORTING CONSTRUCTION, DEMO TO EXPOSE BOTTOM OF FLOOR SLAB AND EXISTING STRUCTURE.
12C REMOVE CEILING AND SUPPORTING STRUCTURE. PROTECT GWB SOFFITS. SALVAGE / PROTECT EXISTING LIGHT FIXTURES, PROJECTION SCREEN, SPEAKERS, DIFFUSERS ETC. AND REINSTALL.
13 REMOVE LIGHT FIXTURES (ALL EXTERIOR FIXTURES TO BE SALVAGED AND RETURNED TO THE OWNER)
13A CEILING DEMOED IN ABATEMENT PHASE. REMOVE ANY REMAINING SUPPORTING CONSTRUCTION AND LIGHT FIXTURES.
13B DOUBLE CEILING DEMOED IN ABATEMENT PHASE. REMOVE ANY REMAINING SUPPORT CONSTRUCTION AND LIGHT FIXTURES.
14 REMOVE ROOF UNIT, UNIT CURB AND ALL ASSOCIATED FLASHING, BLOCKING, ETC.
15 REMOVE ROOF DRAIN
16 REMOVE EXISTING HEATER
17 NOT USED
18 REMOVE FLOOR ACCESS PANEL. SLAB TO BE INFILLED AT THAT LOCATION.
19 REMOVE FIRE EXTINGUISHER/ ELECTRICAL CABINET
20 SALVAGE ELECTRICAL KEY CASE
21 REMOVE EXISTING METAL ROOF
22 REMOVE ELEVATOR CAB, LEVELS, AND EQUIPMENT, CLEAN OUT RESIDUE AT BOTTOM OF SHAFT
22A REMOVE 8" CMU UNITS IN ELEVATOR FOR RAIL MOUNT BRACKETS PER MANUFACTURER'S RECOMMENDATIONS , TO BE REPLACED WITH REINFORCED BOND BEAM UNITS
23 REMOVE EXISTING WALL PORTION TO PREPARE FOR NEW STRUCTURAL COLUMNS, SEE DETAIL 2/A4.21 AND STRUCTURAL DWGS
24 REMOVE PORTION OF WALL TO ACCOMODATE FOR NEW LOUVER
24A REMOVE EXISTING LOUVER

1 SECOND FLOOR DEMO PLAN- AREA B
1/8" = 1'-0"



drawing title
SECOND FLOOR DEMOLITION PLAN- AREA B

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STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:
TSKP STUDIO
ARCHITECTURE | PLANNING | INTERIORS
One Hartford Square West
146 Wyllys Street, Bldg 1-203
Hartford, CT 06106
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scale As indicated
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approved by Approver
drawing no. D1.21B

project
WCSU, RENOVATIONS TO HIGGINS HALL AND ANNEX
DANBURY, CT

state project no. BI-RD-290
office project no. 150501

STATE OF CONNECTICUT THOMAS W. IGLEHART NO. 27171 LICENSED ARCHITECT

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GENERAL NOTES

1. CUT OUT AND REMOVE EXISTING EXPANSION JOINT SEALANT AND BACKER ROD FULL HEIGHT OF WALL, RESEAL WITH NEW SEALANT AND BACKER ROD PER SPECIFICATION. SEE 5/A4.41.

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3. CLEAN ALL MASONRY UNITS TO BE REMOVED AND REINSTALLED FREE FROM ALL ORGANIC GROWTH, MORTAR ETC. - ALL UNIT SURFACES.

4. REMOVE ALL EXISTING EXTERIOR LIGHT FIXTURES.

5. REFER TO MEP DRAWINGS FOR AREAS WHERE SLAB DEMOLITION REQUIRED TO INSTALL NEW PIPING OR REMOVE EXISTING, AND COORDINATE IN FIELD.

6. REMOVE FLOORING TO CONCRETE SLAB ON ENTIRE AREA OF ROOM OR CORRIDOR WHERE FLOORING IS DEMOLISHED DUE TO NEW MEP PIPING INSTALLATION ON LOWER LEVEL AREA A.

7. SEE ABATEMENT DRAWINGS FOR ADDITIONAL REMOVAL INFORMATION.

8. COORDINATE WITH MEP DRAWINGS FOR VENT REMOVAL AND ADDITIONAL REMOVAL INFORMATION.

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- EXISTING CONSTRUCTION TO BE REMOVED
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2D. REMOVE DOOR AND FRAME. LINTEL AND OPENING SUPPORT TO REMAIN FOR NEW DOOR AND FRAME.
2E. REMOVE DOOR AND FRAME. LINTEL AND OPENING SUPPORT TO REMAIN FOR NEW FRAME
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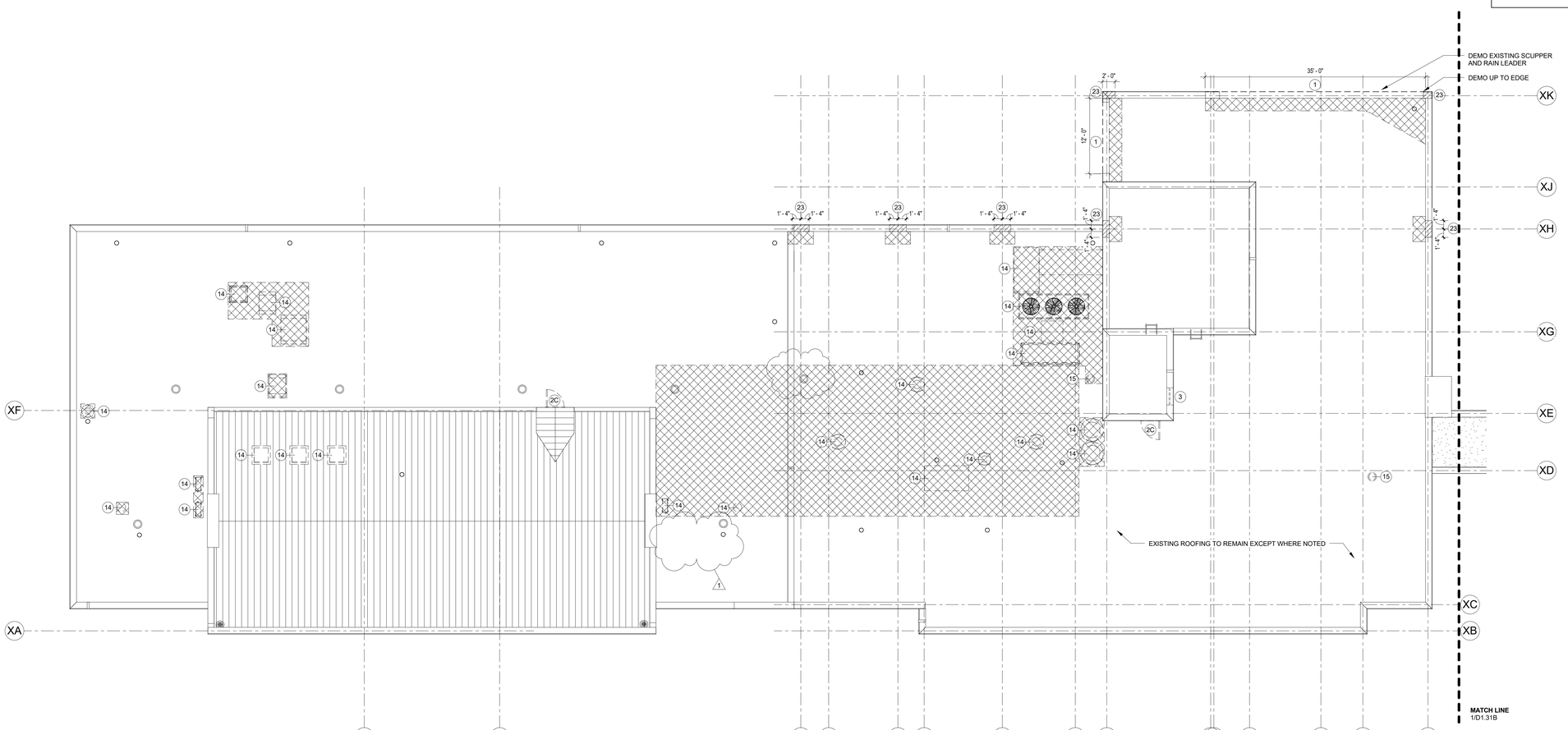

1 ROOF DEMO PLAN- AREA A
1/8" = 1'-0"

drawing title: ROOF DEMOLITION PLAN- AREA A

SUBMISSIONS

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state project no. BI-RD-290
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date
scale: As indicated
drawn by: Author
approved by: Approver
drawing no. D1.31A

THOMAS W. IGLEHART 9711 REGISTERED ARCHITECT STATE OF CONNECTICUT

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DEMOLITION PLAN LEGEND

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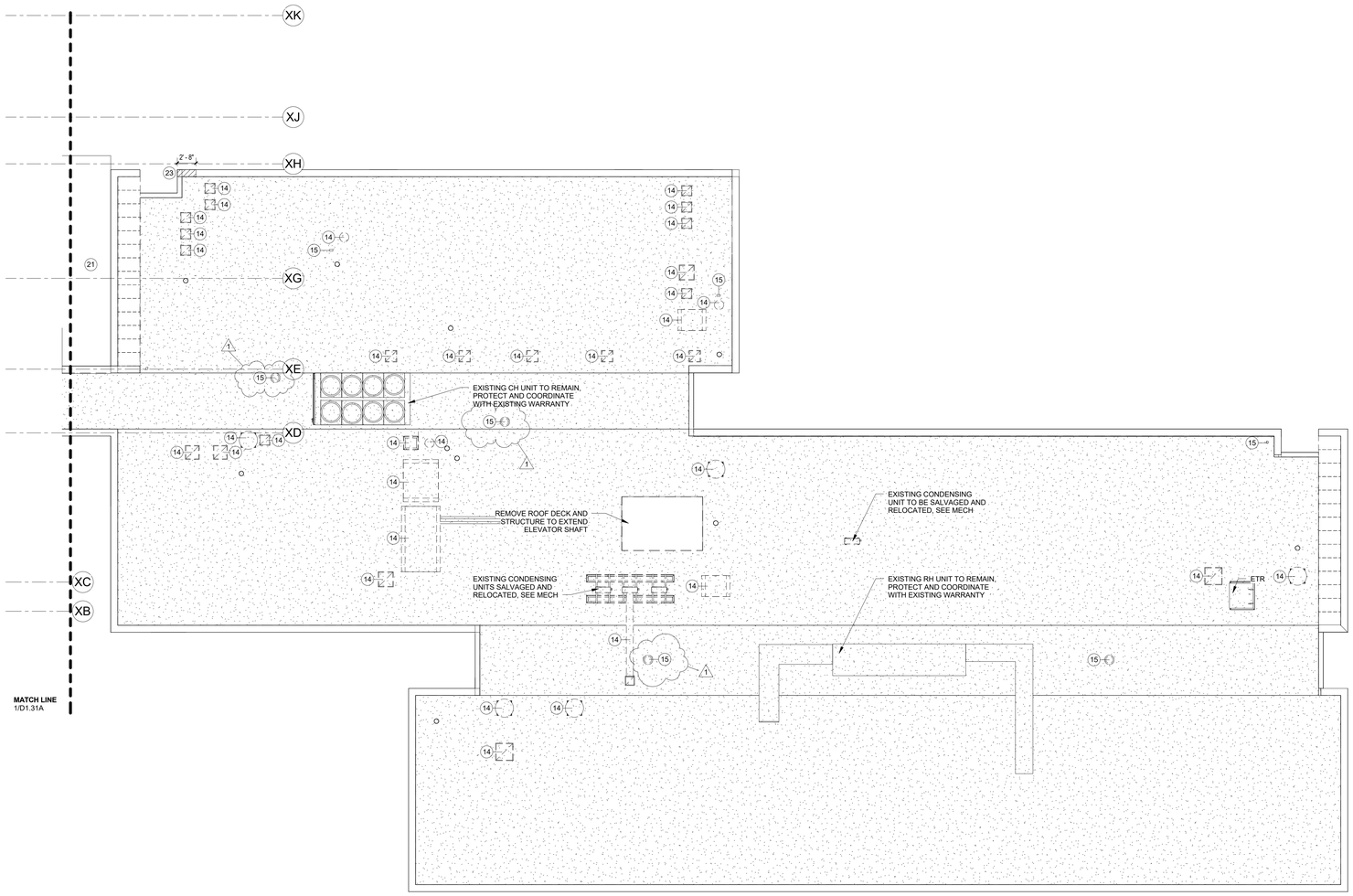
6A. REMOVE EXTERIOR STAIR
6B. REMOVE EXISTING HANDRAIL
7. REMOVE PLUMBING FIXTURE, SEE PLUMBING DEMO DWGS
7A. REMOVE DRINKING FOUNTAIN
8. REMOVE SLAB WHERE REQUIRED FOR PLUMBING WORK OR OTHER UNDERSLAB WORK. COORDINATE WITH PLUMBING AND STRUCTURAL DRAWINGS. REFER TO MEP DWGS FOR ADDITIONAL SCOPE OF WORK
9. REMOVE MARKER/ CHALK/ TACK BOARD
9A. REMOVE PROJECTOR AND TURN OVER TO OWNER
9B. REMOVE TV AND MOUNT, TURN OVER TO OWNER
10. REMOVE DISPLAY CASE
10A. REMOVE LOCKERS AND CONCRETE BASE
10B. REMOVE CONCRETE BASE
11. REMOVE EQUIPMENT
12. REMOVE CEILING AND SUPPORTING CONSTRUCTION, DEMO TO EXPOSE BOTTOM OF FLOOR SLAB AND EXISTING STRUCTURE.
12A. REMOVE EXISTING CEILING TILES. EXISTING GRID TO REMAIN. SALVAGE LIGHT FIXTURES TO BE REPLACED IN SAME LOCATION.
12B. REMOVE TWO LAYERS OF CEILING AND SUPPORTING CONSTRUCTION. DEMO TO EXPOSE BOTTOM OF FLOOR SLAB AND EXISTING STRUCTURE.
12C. REMOVE CEILING AND SUPPORTING STRUCTURE. PROTECT GWB SOFFITS. SALVAGE / PROTECT EXISTING LIGHT FIXTURES, PROJECTION SCREEN, SPEAKERS, DIFFUSERS ETC. AND REINSTALL.
13. REMOVE LIGHT FIXTURES (ALL EXTERIOR FIXTURES TO BE SALVAGED AND RETURNED TO THE OWNER)
13A. CEILING DEMOED IN ABATEMENT PHASE. REMOVE ANY REMAINING SUPPORTING CONSTRUCTION AND LIGHT FIXTURES.
13B. DOUBLE CEILING DEMOED IN ABATEMENT PHASE. REMOVE ANY REMAINING SUPPORT CONSTRUCTION AND LIGHT FIXTURES.
14. REMOVE ROOF UNIT, UNIT CURB AND ALL ASSICIATED FLASHING, BLOCKING, ETC.
15. REMOVE ROOF DRAIN
16. REMOVE EXISTING HEATER
17. NOT USED
18. REMOVE FLOOR ACCESS PANEL. SLAB TO BE INFILLED AT THAT LOCATION.
19. REMOVE FIRE EXTINGUISHER/ ELECTRICAL CABINET
20. SALVAGE ELECTRICAL KEY CASE
21. REMOVE EXISTING METAL ROOF
22. REMOVE ELEVATOR CAB, LEVELS, AND EQUIPMENT, CLEAN OUT RESIDUE AT BOTTOM OF SHAFT
22A. REMOVE 8" CMU UNITS IN ELEVATOR FOR RAIL MOUNT BRACKETS PER MANUFACTURER'S RECOMMENDATIONS , TO BE REPLACED WITH REINFORCED BOND BEAM UNITS
23. REMOVE EXISTING WALL PORTION TO PREPARE FOR NEW STRUCTURAL COLUMNS, SEE DETAIL 2/A4.21 AND STRUCTURAL DWGS
24. REMOVE PORTION OF WALL TO ACCOMODATE FOR NEW LOUVER
24A. REMOVE EXISTING LOUVER



1 ROOF DEMO PLAN- AREA B
1/8" = 1'-0"

drawing title
ROOF DEMOLITION PLAN- AREA B

SUBMISSIONS

mark	date	description
	01/29/2018	100% CD BID PACKAGE

REVISIONS

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drawing prepared by:
TSKP STUDIO
ARCHITECTURE | PLANNING | INTERIORS
One Hartford Square West
146 Wyllys Street, Bldg 1-203
Hartford, CT 06106
860.547.1970 | www.tskp.com

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THOMAS W. IGLEHART 27711 REGISTERED ARCHITECT

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IT DRAWING LIST

DRAWING NUMBER	DRAWING DESCRIPTION
IT0.01	COVER SHEET - IT
IT0.02	RESPONSIBILITY MATRIX - IT
IT0.10	SITE PLAN - IT
ITD1.01A	LOWER LEVEL DEMOLITION PLAN - AREA A - IT
ITD1.01B	LOWER LEVEL DEMOLITION PLAN - AREA B - IT
ITD1.11A	FIRST FLOOR DEMOLITION PLAN - AREA A - IT
ITD1.11B	FIRST FLOOR DEMOLITION PLAN - AREA B - IT
ITD1.21A	SECOND FLOOR DEMOLITION PLAN - AREA A - IT
ITD1.21B	SECOND FLOOR DEMOLITION PLAN - AREA B - IT
IT1.01A	LOWER LEVEL FLOOR PLAN - AREA A - IT
IT1.01B	LOWER LEVEL FLOOR PLAN - AREA B - IT
IT1.11A	FIRST FLOOR PLAN - AREA A - IT
IT1.11B	FIRST FLOOR PLAN - AREA B - IT
IT1.21A	SECOND FLOOR PLAN - AREA A - IT
IT1.21B	SECOND FLOOR PLAN - AREA B - IT
IT1.31A	ROOF PLAN - AREA A - IT
IT1.31B	ROOF PLAN - AREA B - IT
IT3.00	PART PLANS - IT
IT3.01	PART PLANS - IT
IT3.02	PART PLANS - IT
IT4.00	CONDUIT RISER AND FIRE ALRM. NTWK. DIAGRAMS - IT
IT6.01	DETAILS - IT
IT6.02	DETAILS - IT

IT NOTES

IT GENERAL NOTES

REFER TO ELECTRICAL SPECIFICATIONS (CSI SPECIFICATIONS DIVISION 26 - ELECTRICAL) FOR INSTALLATION INSTRUCTIONS OF FLOORBOXES, JUNCTION BOXES, GROUNDING CONDUCTORS, BUSBARS, CONDUITS, METAL ENCLOSURES, ELECTRICAL PANELBOARDS AND CIRCUITING.

INSTALL FIRESTOP TO ALL SLAB AND WALL PENETRATIONS PROVIDED FOR THE INSTALLATION OF IT CABLE AS REQUIRED TO MAINTAIN FIRE RATING OF SLAB OR WALL. REVIEW ARCHITECTS PLANS FOR PARTITION TYPES AND RATINGS.

CABLING NOTES

PROVIDE TYPED IDENTIFICATION LABELS FOR ALL IT CABLES AT BOTH ENDS.

PROVIDE TYPED DESIGNATION LABELS FOR ALL TERMINATION BLOCKS, PATCH PANELS, AND WORKSTATION OUTLET FACEPLATES.

COORDINATE WALL PLATE LOCATIONS AND DIMENSIONS WITH ARCHITECTURAL AND ELECTRICAL PLANS.

INSTALL CONDUIT AND LADDER RACK FOR IT CABLING TO MAINTAIN A MINIMUM OF 5" SEPARATION FROM FLUORESCENT LIGHTING.

INSTALL EACH CABLE SET INDICATED BY THE SYMBOLS LIST FROM THE OUTLET LOCATION BACK TO THE RESPECTIVE SERVING TELECOM ROOM (TR).

IF CONFLICTS ARE FOUND BETWEEN THE IT DRAWINGS AND ANY OTHER DRAWINGS ASSOCIATED WITH THE PROJECT, NOTIFY THE CM AT ONCE AND HAVE THE LOCATION VERIFIED BEFORE OUTLETS ARE INSTALLED. ANY REASONABLE CHANGE IN LOCATION OF OUTLETS PRIOR TO ROUGHING SHALL NOT INVOLVE ADDITIONAL EXPENSE TO THE OWNER. THE TERM "REASONABLE" SHALL BE INTERPRETED AS MOVING OUTLET LOCATIONS A MAXIMUM OF 6'-0" IN ANY DIRECTION FROM THE LOCATION INDICATED ON THE DRAWINGS.

FOLLOW MANUFACTURERS GUIDELINES FOR BEND RADIUS AND PULLING TENSIONS FOR ALL CABLE.

PATHWAY NOTES

COORDINATE INSTALLATION OF CONDUITS AND CABLE PATHWAYS WITH THE OTHER COMPONENTS INSTALLED WITHIN THE CEILING. PREPARE SHOP DRAWINGS TO DEMONSTRATE AND ENSURE PROPER INSTALLATION OF ALL COMPONENTS.

COORDINATE CONDUIT TYPE AND INSTALLATION REQUIREMENTS WITH CSI DIVISION 26.

MAINTAIN MINIMUM BEND RADIUS OF 10X O.D. FOR CONDUITS GREATER THAN 2" DIAMETER. MAINTAIN MINIMUM BEND RADIUS OF 6X O.D. FOR CONDUITS EQUAL TO OR LESS THAN 2" DIAMETER.

PROVIDE PULL BOXES (SIZE AS NOTED) AFTER EVERY 100' OF CONDUIT RUN OR AFTER EVERY 180-DEGREES OF BEND OR AFTER EVERY 50' OF VERTICAL RUN.

DO NOT INSTALL PULL BOXES IN LIEU OF A BEND.

REAM AND BUSH THE ENDS OF ALL CONDUITS.

PROVIDE AND LEAVE IN PLACE A PULL STRING IN EACH EMPTY CONDUIT.

STUB UP CONDUIT SLEEVES THROUGH SLABS 3" ABOVE FINISHED FLOORS.

PROVIDE HANGERS, ANCHORS, MOUNTING HARDWARE, GROUND LUGS AND STRAPS AS REQUIRED TO ENSURE PROPER INSTALLATION OF PATHWAY COMPONENTS. INSTALL ALL COMPONENTS AS PER MANUFACTURERS RECOMMENDATIONS AND PER ALL APPLICABLE CODES.

GROUND ALL CONDUITS, SLEEVES, CABLE TRAY, AND LADDER RACK AS PER MANUFACTURERS RECOMMENDATIONS AND PER ALL APPLICABLE CODES.

PROVIDE AT ALL LADDER RACK AND CABLE TRAY LOCATIONS: RUNWAY DROPOFFS, SPLICE HARDWARE, GROUND STRAPS, THERMAL EXPANSION PLATES, TERMINATION KITS, END SUPPORT KITS AND CEILING SUPPORT HARDWARE.

REFER TO DISTRIBUTION PLANS FOR REQUIREMENTS OF JUNCTION BOXES AND CONDUITS TO SUPPORT WORKSTATION OUTLETS.

PROVIDE J-HOOKS AND CABLE STRAPS TO SUPPORT CABLE ABOVE ACCESSIBLE CEILING CONSTRUCTION. EXCEPT IN AREAS WHERE CABLE TRAY OR CONDUIT IS INDICATED.

CABLE BUNDLES FOR VARIOUS LV SYSTEMS (UTP, STP, FIBER, A/V, CONTROL WIRING, ETC), TO BE BUNDLED USING VELCRO (PLENUM RATED AS REQUIRED). PLASTIC TIE-WRAPS ARE NOT PERMITTED. PROVIDE SEPARATION ON CABLE TRAY BETWEEN CABLE BUNDLES.

WHERE CABLE IS RUN ABOVE NON-ACCESSIBLE (I.E. GYPSUM BOARD, WOOD SLAT) CEILING CONSTRUCTION, CONDUIT AND PULLBOXES MUST BE INSTALLED TO PROPERLY ROUTE CABLE. PULLBOXES MUST BE LOCATED SO THAT THEY ARE ACCESSIBLE. PROVIDE ACCESS PANEL(S) IN CEILING AS REQUIRED.

WHERE CABLE IS RUN THROUGH EXPOSED AREAS (NOT SUBJECT TO PHYSICAL DAMAGE) EMT CONDUIT SHALL BE USED AS THE APPROVED PATHWAY.

WHERE CABLE IS RUN THROUGH EXPOSED AREAS (AND SUBJECT TO SEVERE PHYSICAL DAMAGE) RIGID STEEL CONDUIT SHALL BE USED AS THE APPROVED PATHWAY. LOCATIONS SUCH AS LOADING DOCKS, MECHANICAL ROOMS, ELECTRICAL ROOMS, FIRE PROTECTION EQUIPMENT ROOMS, AND SIMILAR MEP SYSTEM BACK-OF-HOUSE SUPPORT SPACES SHALL USE RIGID STEEL CONDUIT.

LABELING NOTES

REFER TO SPECIFICATION SECTION 270553 FOR COMPLETE LABELING REQUIREMENTS. THE FINAL LABELING SCHEME FOR HORIZONTAL WORK AREA OUTLET LOCATIONS SHALL BE COORDINATED AND CONFIRMED WITH THE OWNER.

ADDITIONAL REQUIREMENTS

ALL WIRELESS ACCESS POINT DROPS TO RECEIVE TWO CATEGORY-6A STP CABLES, TERMINATED IN A SURFACE MOUNT OUTLET BOX. EACH WAP DROP TO HAVE 30' OF EXTRA CABLE COILED AT THE WAP LOCATION TO ALLOW FOR RELOCATION OF THE WAP AS REQUIRED TO OPTIMIZE SIGNAL.

CONTRACTOR TO FURNISH ALL CATEGORY 6 UTP AND CATEGORY 6A STP PATCH CORDS AS LISTED IN SPEC SECTION 271619. CONFIRM ALL QUANTITIES, COLORS AND LENGTHS WITH OWNER PRIOR TO ORDERING. CONTRACTOR IS RESPONSIBLE FOR PERFORMING ALL PATCHING BETWEEN PATCH PANELS AND OWNER-FURNISHED NETWORK SWITCHES IN ALL TELECOM ROOMS. CONTRACTOR TO FURNISH TO OWNER COMPLETE DOCUMENTATION OF MAPPED PORT-TO-PORT ASSIGNMENTS IN AN ELECTRONIC FORMAT TO BE PROVIDED BY THE OWNER. ALL OPTICAL FIBER PATCH CORDS WILL BE FURNISHED AND INSTALLED BY CONTRACTOR.

ALL ANALOG LINES AS SHOWN ON THE DRAWINGS ARE TO BE TERMINATED TO A WALL-MOUNTED 110-BLOCK IN THE NEAREST TR. WITHIN THE TR, PROVIDE EXTRA COILED CABLE TO ALLOW CABLES TO BE RELOCATED TO EQUIPMENT RACKS IN THE FUTURE. ALL ANALOG LINES FOR LIFE SAFETY (FACP, ELEVATORS, ETC) ARE TO HAVE RED JACKET.

COORDINATE WAP INSTALLATION WITH WCSU. CONTRACTOR TO F&I ALL OBERON WAP ENCLOSURES, ALONG WITH INSTALLATION OF WAPs FURNISHED BY WCSU. COORDINATE EXACT WAP MODEL NUMBERS WITH WCSU

COMPLIANCE WITH CONNECTICUT STATE COLLEGES & UNIVERSITIES (CSCU) STANDARDS

THE COMMUNICATIONS INFRASTRUCTURE INSTALLATION MUST COMPLY WITH CSCU BOARD OF REGENTS FOR HIGHER EDUCATION - TELECOMMUNICATIONS INFRASTRUCTURE STANDARDS DOCUMENT, VERSION 4.0. CONTRACTOR MUST PROVIDE A COMPLIANCE REVIEW OF THIS DOCUMENT DURING THE BID PROCESS. ALL EXCEPTIONS MUST BE MADE IN WRITING PRIOR TO BID SUBMISSION.

IT ABBREVIATIONS

AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
APPROX	APPROXIMATE
A/V	AUDIO VISUAL
BDF	BUILDING DISTRIBUTION FRAME
BET	BUILDING ENTRANCE TERMINAL
C	CONDUIT(S)
CAT3	TIA CATEGORY 3 RATED
CAT5	TIA CATEGORY 5 RATED
CAT5E	TIA CATERORY 5E RATED
CAT6	TIA CATEGORY 6 RATED
CAT6A	TIA CATEGORY 6A RATED
CLG	CEILING
CM	CONSTRUCTION MANAGER
CP	CONSOLIDATION POINT
D	DEEP
DAS	DISTRIBUTED ANTENNA SYSTEM
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRIC/ELECTRICAL
EQ	EQUAL
EQPT	EQUIPMENT
ER	EQUIPMENT ROOM
ETR	EXISTING TO REMAIN
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
F&I	FURNISH AND INSTALL
FO	FIBER OPTIC
FT	FOOT/FEET
FTP	FOIL TWISTED PAIR
GC	GENERAL CONTRACTOR
GND	GROUND
GWB	GYPSUM WALL BOARD
H	HIGH
I.D.	INSIDE DIAMETER
IMC	INTERMEDIATE METAL CONDUIT
IT	INFORMATION TECHNOLOGY
LAN	LOCAL AREA NETWORK
LOMMF	LAZER OPTIMIZED MULTIMODE FIBER OPTIC
MC	MAIN CROSS CONNECT
MDF	MAIN DISTRIBUTION FRAME
MECH	MECHANICAL
MH	MANHOLE
MM	MULTIMODE
MMF	MULTIMODE FIBER OPTIC
MPO	MULTI FIBER PUSH-ON
MTD	MOUNTED
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
O.D.	OUTSIDE DIAMETER
OFE	OWNER FURNISHED EQUIPMENT
OSP	OUTSIDE PLANT
PB	PULLBOX
PBX	PRIVATE BRANCH EXCHANGE
POE	POINT OF ENTRY
PoE	POWER OVER ETHERNET
PR	PAIR
RGB	RACK GROUNDING BUSBAR
RMU	RACK MOUNTING UNIT (1 RMU = 1.75 INCHES)
RW	RACEWAY
SM	SINGLEMODE
SMF	SINGLEMODE FIBER OPTIC
STP	SHIELDED TWISTED PAIR
TEMP	TEMPORARY
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TR	TELECOMMUNICATIONS ROOM
TSER	TELECOMMUNICATIONS SERVICE ENTRANCE ROOM
TYP	TYPICAL
U	RACK UNIT (1U = 1.75 INCHES)
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
VOIP	VOICE OVER INTERNET PROTOCOL
W	WIDE
W/	WITH
W/O	WITHOUT
WAN	WIDE AREA NETWORK
WAP	WIRELESS ACCESS POINT
WP	WATERPROOF
WS	WORKSTATION
WW	WIREWAY

IT LEGEND

SYMBOLS & ABBREVIATIONS	DESCRIPTION	CABLE	ELECTRICAL INFRASTRUCTURE	REMARKS
(X)	FLOOR MOUNTED OUTLET	(X) CAT 6 UTP TO DESIGNATED TR; (X) DENOTES CABLE QUANTITY.	(1) 1-1/4" C. TO FLOOR BOX/POKE-THRU	INSTALL OSP-RATED CABLE FOR ALL SLAB-ON-GRADE LOCATIONS
(X)	CEILING MOUNTED OUTLET	(X) CAT 6 UTP TO DESIGNATED TR; (X) DENOTES CABLE QUANTITY.	ERICO BACKBOX PART NO. 512HD	-
(X)	WALL MOUNTED OUTLET (+18" AFF)	(X) CAT 6 UTP TO DESIGNATED TR; (X) DENOTES CABLE QUANTITY.	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
A	ANALOG/POTS LINE OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR; TERMINATE ON 110 BLOCK WITH C4 CLIPS	(1) 3/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	TERMINATE ON 110 BLOCK IN TR WITH C4 CLIPS ADJACENT BACKBONE CABLE 110 BLOCK(S)
AVC	A/V CONTROL PANEL OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
AVD	A/V DISPLAY OUTLET (+60" AFF UON)	(2) CAT 6 UTP AND (1) RG6 QUAD-SHIELD COAXIAL TO DESIGNATED TR	(2) 1-1/4" C. STUB-UPS TO IN-WALL STORAGE BOX (BEHIND DISPLAY)	SEE AV DRAWINGS FOR IN-WALL BOX SPECS. USE RG11 QUAD SHIELD FOR RUNS >150'
AVI	A/V INTERFACE OUTLET (+18" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
AVR	A/V EQUIPMENT RACK OUTLET (+18" AFF)	(6) CAT 6 UTP TO DESIGNATED TR	(2) 1-1/2" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
BMS	BUILDING MANAGEMENT SYSTEM OUTLET (+48" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	COORDINATE EXACT LOCATION WITH BMS EQUIPMENT
CAM	IP CCTV CAMERA OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 3/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	INSTALL OSP-RATED CABLE FOR ALL OUTDOOR LOCATIONS. TRANSITION TO ISP CABLE INDOORS
CAM	IP CCTV CAMERA CEILING MOUNTED OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 3/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
CL	IP CLOCK OUTLET (+84" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
DCP	DOOR CONTROLLER PANEL OUTLET	(6) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
DAS	DAS OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	ERICO BACKBOX PART NO. 512HD	-
DL	DOOR LOCK OUTLET (+5'-0" AFF ABOVE DOOR HINGE)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
DS	DIGITAL SIGNAGE DISPLAY OUTLET (+60" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO IN-WALL STORAGE BOX (BEHIND DISPLAY)	SEE AV DRAWINGS FOR IN-WALL BOX SPECS.
F	FURNITURE MOUNTED OUTLET (+18" AFF)	(3) CAT 6 UTP TO DESIGNATED TR	N/A	-
FA	FIRE ALARM PANEL OUTLET (+18" AFF)	2-STRANDS MMF CABLE	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	CABLE SPLICED TO EXISTING FO CABLE IN IDF "BA."
FO	FIBER OPTIC OUTLET	(1) 2-STRAND (MMF/SMF) TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
IC	INTERCOM DOOR STATION OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	CUSTOM BACKBOX FROM MANUFACTURER	BASIS OF DESIGN = AIPHONE GT-DM
IDS	INTRUSION DETECTION SYSTEM OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
IWB	INTERACTIVE WHITE BOARD OUTLET	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
KP	ALARM SYSTEM KEYPAD OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
LCP	LIGHTING CONTROL PANEL OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
MS	INTERCOM MASTER STATION OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
P	PROJECTOR OUTLET - CEILING MOUNTED	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
P	PROJECTOR OUTLET - WALL MOUNTED (+96" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	SEE AV DRAWINGS FOR MOUNTING HEIGHTS AND LOCATIONS.
PLC	PROCESS LOGIC CONTROL OUTLET	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
POS	POINT-OF-SALE OUTLET (+18" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
R	RACEWAY MOUNTED OUTLET	(2) CAT 6 UTP TO DESIGNATED TR	(1) 2" C. STUB-UP ELECTRIFIED RACEWAY (DUAL CHANNEL)	-
RFID	RADIO FREQUENCY IDENTIFICATION SYSTEM OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
RS	ROOM SCHEDULING DISPLAY OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
SB	SMARTBOARD PROJECTOR OUTLET (+96" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	SEE AV DRAWINGS FOR MOUNTING HEIGHTS AND LOCATIONS.
TC	TIME CLOCK OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
TCP	TEMPERATURE CONTROL PANEL OUTLET	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
TS	TEACHER STATION OUTLET (+18" AFF)	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
TV	TELEVISION OUTLET (+18" AFF)	(2) CAT-6 UTP AND (1) RG6 COAXIAL CABLE TO DESIGNATED TR	(2) 1-1/4" C. STUB-UP FROM IN-WALL A/V BOX (SEE REMARKS)	SEE AV DRAWINGS FOR IN-WALL BOX SPECS. USE RG11 QUAD SHIELD FOR RUNS >150'
VC	VIDEO CONFERENCE WEBCAM OUTLET (+96" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
VW	VIDEO WALL OUTLET	(2) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/2" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
W	WALL-MOUNTED TELEPHONE OUTLET (+48" AFF)	(1) CAT 6 UTP TO DESIGNATED TR	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	INSTALL OSP-RATED CABLE FOR ALL OUTDOOR LOCATIONS. TRANSITION TO ISP CABLE INDOORS
WAP	WIRELESS ACCESS POINT OUTLET	**(2) CAT 6A STP** TO DESIGNATED TR. LEAVE 30' SERVICE COIL AT OUTLET END.	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	F&I OBERON WIRELESS ENCLOSURE #1011-00 AT EACH WALL-MOUNTED WAP LOCATION UON.
WAP	WIRELESS ACCESS POINT CEILING OUTLET	**(2) CAT 6A STP** TO DESIGNATED TR. LEAVE 30' SERVICE COIL AT OUTLET END.	-	F&I OBERON WIRELESS ENCLOSURE #1064-00 AT EACH CEILING-MOUNTED WAP LOCATION UON.
WP	WEATHER PROOF OUTLET	(2) CAT 6 UTP TO DESIGNATED TR.	(1) 1" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH SINGLE-GANG TRIM RING.	-
A/V	COMBINATION OUTLET (FLOOR MOUNTED)	(X) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO MULTI-SERVICE FLOOR BOX	-
A/V	COMBINATION OUTLET (WALL MOUNTED)	(X) CAT 6 UTP TO DESIGNATED TR	(1) 1-1/4" C. STUB-UP TO MULTI-SERVICE WALL BOX	-
J	FURNITURE SYSTEM INFEED - WALL MOUNTED	PROVIDE SPLIT-LOOM FOR CABLE BUNDLE	(1) 2" C. STUB-UP TO DOUBLE-GANG ELEC. BACKBOX WITH GROMMETED OPENING	-
J	FURNITURE SYSTEM INFEED - FLOOR MOUNTED	PROVIDE SPLIT-LOOM FOR CABLE BUNDLE	(1) 2" C. STUB-UP TO FLOOR BOX WITH GROMMETED OPENING	-
SP1	SPEAKER - WALL MOUNTED	16 AWG 2C SHIELDED	-	-
SP1	SPEAKER - CEILING MOUNTED	16 AWG 2C SHIELDED	-	-
	CONDUIT/SLEEVE DOWN THROUGH SLAB	SIZE AS INDICATED		
	CONDUIT/SLEEVE UP THROUGH SLAB	SIZE AS INDICATED	-	-
	CONDUIT STUB WITH BUSHING	SIZE AS INDICATED	-	-
	CONDUIT TURNING DOWN THROUGH SLAB	SIZE AS INDICATED	-	-
	CONDUIT TURNING UP THROUGH SLAB	SIZE AS INDICATED	-	-
(#)	CONDUIT SLEEVE WITH SLEEVE QUANITY - 4" U.O.N.	SIZE AS INDICATED	-	-
E E E E E	EXISTING CONDUIT/CABLE TO REMAIN	-	-	-
X X X X X	EXISTING CONDUIT/CABLE TO BE DEMOLISHED	-	-	-
	NEW CONDUIT IN FLOOR SLAB	SIZE AS INDICATED	-	-
C C C C C	CABLE PATHWAY IN CEILING	-	-	SUPPORTED BY J-HOOKS AND/OR CABLE STRAPS
R R R	EXISTING CABLE TO BE RELOCATED	-	-	-
	CABLE TRAY	SIZE AS INDICATED	N/A	-
	LADDER RACK	SIZE AS INDICATED	N/A	-
	RACK/CABINET MOUNTED POWER STRIP	N/A	N/A	N/A
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR	N/A	N/A	N/A
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR	N/A	N/A	N/A
VIEW # / SHEET #	DETAIL CALLOUT	N/A	N/A	N/A
VIEW # / SHEET #	ELEVATION CALLOUT	N/A	N/A	N/A

1

drawing title: COVER SHEET - IT

SUBMISSIONS

mark	date	description
	01/29/2018	100% CD BID PACKAGE

REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:

93 Lake Avenue Extension, CT 06810
203.416.1610 F 203.778.7618
111 Wallace Avenue
New York, NY 10550
212.695.2422 F 212.695.2423
www.kriloncorp.com
E-mail kriloc@kriloncorp.com

project: WESTERN CONNECTICUT STATE UNIVERSITY, RENOVATIONS TO HIGGINS HALL AND HIGGINS ANNEX
DANBURY, CT

state project no.: BI-RD-290
office project no.: 16092

date: 02/16/2018
scale: N.T.S.
drawn by: RS
approved by: EK
drawing no.: IT0.01

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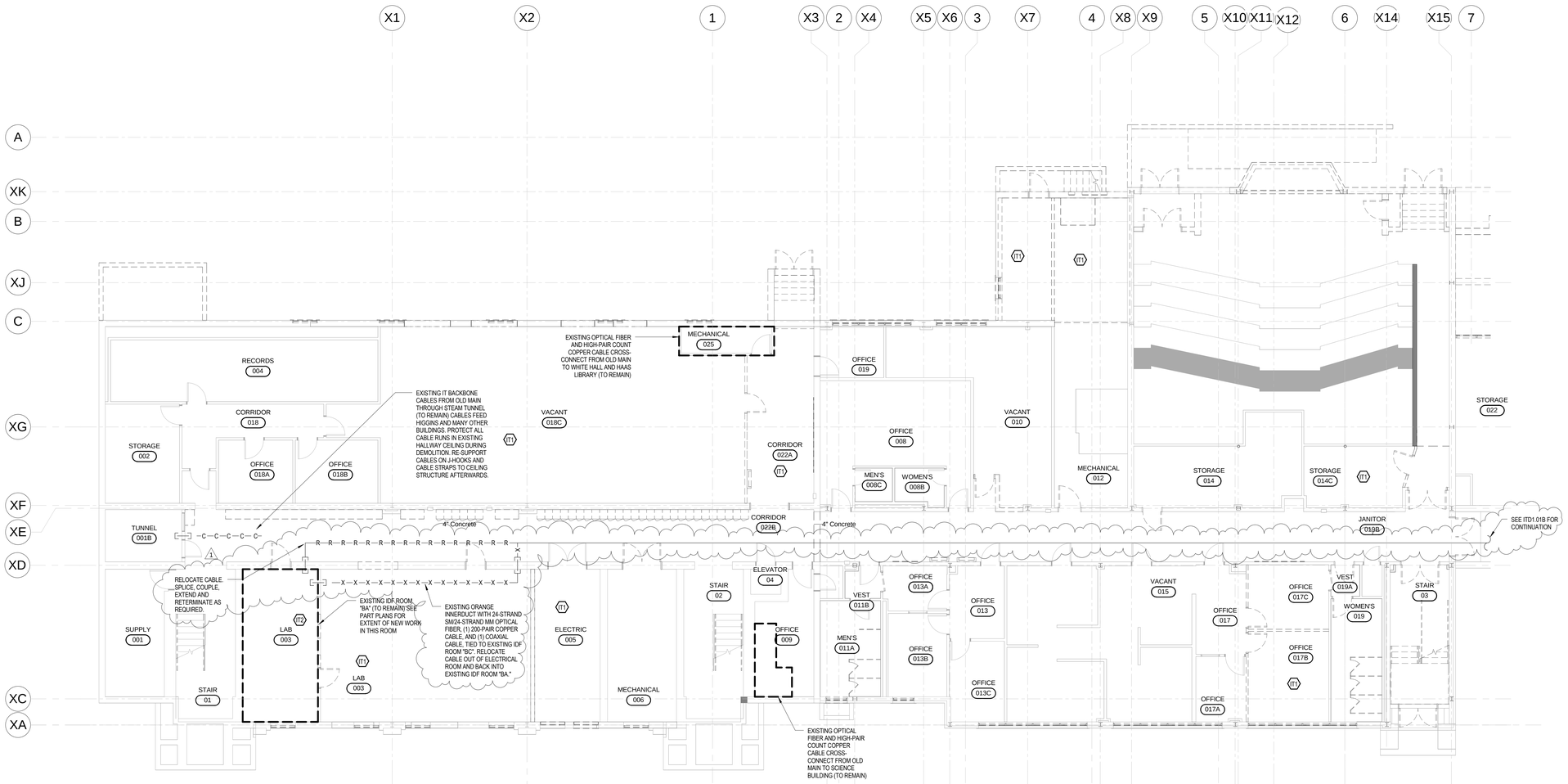
BASEMENT FLOOR A IT DEMOLITION KEYNOTES	
IT1	ALL EXISTING DATA OUTLETS WITHIN ROOM SHALL BE REMOVED. REMOVE ALL ASSOCIATED CABLES AND ALL TERMINATION HARDWARE INCLUDING JACKS, FACEPLATES AND BACKBOXES BETWEEN OUTLET AND PATCH PANEL WITHIN EXISTING TELECOM ROOM.
IT2	SEE DETAIL PLAN 1/IT3.00 FOR DEMOLITION SCOPE WITHIN EXISTING IDF ROOM



1 ITD1.01A BASEMENT DEMOLITION PLAN AREA A

SCALE: 1/8" = 1'-0"

drawing title
LOWER LEVEL DEMOLITION PLAN - AREA A - IT

SUBMISSIONS

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REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:

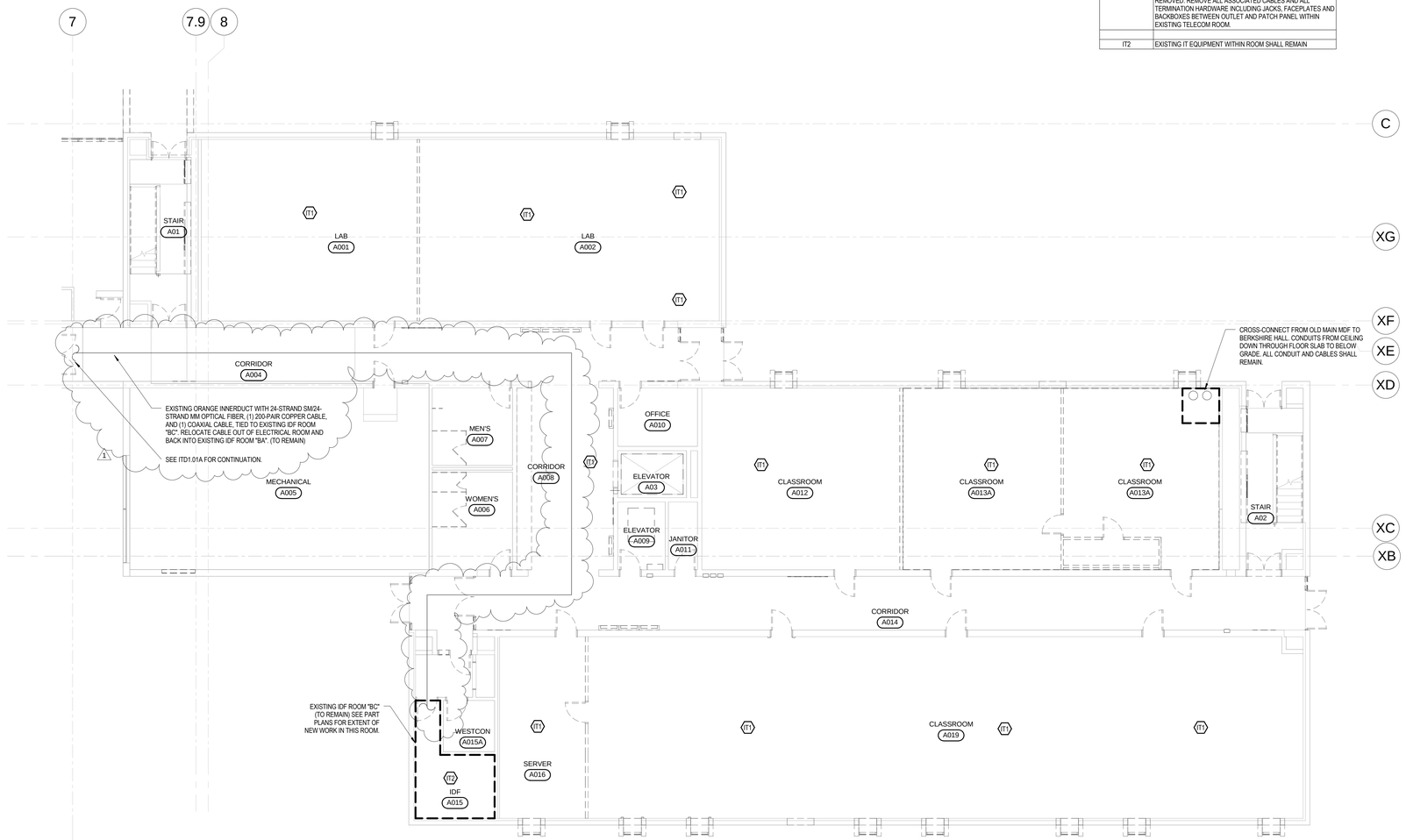
KEKLER SEXSAL, LLC
Architects and Engineers
50 Lake Avenue, Danbury, CT 06810
(P) 203.778.1077 F 203.778.7630
171 Madison Avenue
New York, NY 10016
(P) 646.845.8422 F 212.645.2623
www.kekler.com
E-mail:info@kekler.com

date 02/16/2018
scale 1/8" = 1'-0"
drawn by RE
approved by ER
drawing no. ITD1.01A

project
WESTERN CONNECTICUT STATE UNIVERSITY, RENOVATIONS TO HIGGINS HALL AND HIGGINS ANNEX
DANBURY, CT

state project no. BI-RD-290
office project no. 16092

BASEMENT FLOOR B IT DEMOLITION KEY NOTES	
IT1	ALL EXISTING DATA OUTLETS WITHIN ROOM SHALL BE REMOVED. REMOVE ALL ASSOCIATED CABLES AND ALL TERMINATION HARDWARE INCLUDING JACKS, FACEPLATES AND BACKBOXES BETWEEN OUTLET AND PATCH PANEL WITHIN EXISTING TELECOM ROOM.
IT2	EXISTING IT EQUIPMENT WITHIN ROOM SHALL REMAIN



1 ITD1.01B — BASEMENT DEMOLITION PLAN AREA B

SCALE: 1/8" = 1'-0"

drawing title
LOWER LEVEL DEMOLITION PLAN - AREA B - IT

SUBMISSIONS

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	01/29/2018	100% CD BID PACKAGE

REVISIONS

mark	date	description
1	03/14/2018	100% CD BID PKG Suppl. #1

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:

10 Lake Avenue, Danbury, CT 06810
203.778.1017 F 203.778.1021
171 Middle Street
Portland, ME 04101
207.899.2422 F 212.695.2623
KEGLER BROWN, Inc.
www.kblmanual.com
E-mail: kmail@kblmanual.com

date 02/16/2018
scale 1/8" = 1'-0"
drawn by RS
approved by ER
drawing no. ITD1.01B

project
WESTERN CONNECTICUT STATE UNIVERSITY, RENOVATIONS TO HIGGINS HALL AND HIGGINS ANNEX
DANBURY, CT

state project no. BI-RD-290
office project no. 16092

STATE OF CONNECTICUT — DONALD R. KNOX — No. 19881 — LICENSED PROFESSIONAL ENGINEER

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Dwg. No.	Title	100% CD Bid Package	Add. #02
	Volume 1 of 2		
General			
	Cover	1/29/18	
A0.01	General Information	1/29/18	
A0.02	Code Summary	1/29/18	
A0.03	Egress Plan - Lower Level	1/29/18	
A0.04	Egress Plan - First Floor	1/29/18	3/14/18
A0.05	Egress Plan - Second Floor	1/29/18	3/14/18
A0.06	Wall Types	1/29/18	3/14/18
A0.07	Fire Stopping Details	1/29/18	3/14/18
Survey			
T0.01	Topographic Survey	1/29/18	
T0.02	Topographic Survey	1/29/18	
Civil			
C1.0	E&S Control and Utility Demolition Plan	1/29/18	
C1.1	Storm Water & Pollution Control Plan (SWPCP) Notes & Details	1/29/18	
C2.0	Site Utility Plan	1/29/18	
C3.02	Site Utility Details	1/29/18	
C3.1	Site Utility Details	1/29/18	
C3.2	Site Utility Details	1/29/18	
Landscape			
L0.00	Illustrative Plan	1/29/18	
L1.00	Surface Demolition	1/29/18	
L1.10	Egress Plan	1/29/18	
L1.20	Overall Site Improvements	1/29/18	
L1.21	Site Improvements	1/29/18	
L1.22	Site Improvements	1/29/18	
L1.30	Overall Site Layout	1/29/18	
L1.31	Site Layout	1/29/18	
L1.32	Site Layout	1/29/18	
L1.40	Overall Site Grading	1/29/18	
L1.41	Site Grading	1/29/18	
L1.42	Site Grading	1/29/18	
L1.50	Overall Site Planting	1/29/18	
L1.51	Site Planting	1/29/18	
L1.52	Site Planting	1/29/18	
L1.60	Overall Paver Enlargement	1/29/18	
L1.61	East Paver Enlargement	1/29/18	
L1.62	West Paver Enlargement	1/29/18	
L5.00	Site Details	1/29/18	
L5.01	Site Details	1/29/18	
L5.02	Site Details	1/29/18	
L5.03	Site Details	1/29/18	
Phasing			
IPL-1	Interior Phasing and Logistics	2/19/18	

	Dwg. No.	Title	100% CD Bid Package	Add. #02
	SL-1	Site Logistics Plan	2/19/18	
Temporary Classrooms				
	A1.01BT	Lower Level Temporary Classroom Floor Plan & RCP	1/29/18	
	D1.01BT	Lower Level Temporary Classroom Demolition Plan	1/29/18	
	E1.01BT	Lower Level Temporary Classroom Floor Plan & RCP - Electrical	1/29/18	
	Abatement			
	HM1-01A	Lower Level Abatement Plan - Area A	1/29/18	
	HM1-01B	Lower Level Abatement Plan - Area B	1/29/18	
	HM1-11A	First Floor Abatement Plan - Area A	1/29/18	
	HM1-11B	First Floor Abatement Plan - Area B	1/29/18	
	HM1-21A	Second Floor Abatement Plan - Area A	1/29/18	
	HM1-21B	Second Floor Abatement Plan - Area B	1/29/18	
	HM1-31A	Roof Abatement Plan - Area A	1/29/18	
	HM1-31B	Roof Abatement Plan - Area B	1/29/18	
Architectural Demo				
	D1.01A	Lower Level Demolition Plan - Area A	1/29/18	
	D1.01B	Lower Level Demolition Plan - Area B	1/29/18	
	D1.11A	First Floor Demolitio Plan - Area A	1/29/18	
	D1.11B	First Floor Demolitio Plan - Area B	1/29/18	
	D1.21A	Second Floor Demolition Plan - Area A	1/29/18	
	D1.21B	Second Floor Demolition Plan - Area B	1/29/18	3/14/18
	D1.31A	Roof Demolition Plan - Area A	1/29/18	3/14/18
	D1.31B	Roof Demolition Plan - Area B	1/29/18	3/14/18
	D1.41	Demolition Details	1/29/18	
	Architectural			
	A1.01A	Lower Level Floor Plan - Area A	1/29/18	
	A1.01B	Lower Level Floor Plan - Area B	1/29/18	
	A1.11A	First Floor Plan - Area A	1/29/18	
	A1.11B	First Floor Plan - Area B	1/29/18	
	A1.21A	Second Floor Plan - Area A	1/29/18	
	A1.21B	Second Floor Plan - Area B	1/29/18	
	A1.31A	Roof Plan - Area A	1/29/18	3/14/18
	A1.31B	Roof Plan - Area B	1/29/18	
	A1.41	Roof Details	1/29/18	
	A2.01	Lower Level Reflected Ceiling Plan	1/29/18	
	A2.11	First Floor Reflected Ceiling Plan	1/29/18	
	A2.21	Second Floor Reflected Ceiling Plan	1/29/18	3/14/18
	A2.31	Ceiling Details	1/29/18	
	A3.01	Exterior Elevations	1/29/18	
	A3.02	Exterior Elevations	1/29/18	
	A3.03	Exterior Elevations	1/29/18	
	A3.11	Building Sections	1/29/18	
	A4.01	Wall Sections	1/29/18	
	A4.02	Wall Sections	1/29/18	
	A4.03	Wall Sections	1/29/18	
	A4.21	Section Details	1/29/18	
	A4.22	Section Details	1/29/18	

Dwg. No.	Title	100% CD Bid Package	Add. #02
A4.31	Plan Details	1/29/18	
A4.32	Miscellanous Plan and Section Details	1/29/18	
A4.41	Exterior Wall Restoration Details	1/29/18	
A5.01	Window Schedule and Details	1/29/18	
A6.01	Stair and Ramp Plans and Sections	1/29/18	
A6.02	Stair Plans and Sections	1/29/18	
A6.03	Exterior Stair and Ramp Plans and Sections	1/29/18	
A6.04	Stair and Ramp Details	1/29/18	
A6.05	Elevator Plan, Section and Details	1/29/18	
A7.01	Toilet Plans and Elevations	1/29/18	
A8.01	Interior Elevations	1/29/18	
A8.02	Interior Elevations	1/29/18	
A8.03	Interior Elevations	1/29/18	
A8.04	Interior Elevations	1/29/18	
A8.05	Interior Elevations	1/29/18	
A9.01	Millwork Details	1/29/18	
A10.01	Lower Level Finish Pattern Plan	1/29/18	
A10.11	First Floor Finish Pattern Plan	1/29/18	
A10.21	Second Floor Finish Pattern Plan	1/29/18	
A11.01	Door Schedule	1/29/18	
A11.02	Door Frame Types and Details	1/29/18	
Signage			
SP.01	Sign Graphics	1/29/18	
SP.02	Interior Signs	1/29/18	
SP.03	Interior Signs	1/29/18	
SP.04	Directional Signs	1/29/18	
SP.05	Installations Details	1/29/18	
SP.06	Sign Distribution LL	1/29/18	
SP.07	Sign Distribution 1	1/29/18	
SP.08	Sign Distribution 2	1/29/18	
SP.09	Exterior Building Sign	1/29/18	
Structural			
S1.01	Foundation Plan	1/29/18	
S1.01D	Demolition Plan	1/29/18	
S1.11	First Floor Framing Plan	1/29/18	
S1.21	Second Floor Framing Plan	1/29/18	
S1.31	Roof Framing Plan	1/29/18	
S2.1	Foundation Sections	1/29/18	
S2.2	Foundation Sections	1/29/18	
S2.3	Foundation Sections	1/29/18	
S2.4	Foundation Sections	1/29/18	
S2.5	Foundation Sections	1/29/18	
S3.1	Framing Sections	1/29/18	
S3.2	Framing Sections	1/29/18	
S3.3	Framing Sections	1/29/18	
S3.4	Framing Sections	1/29/18	
S3.5	Framing Sections	1/29/18	
S4.1	General Notes Typical Details	1/29/18	

Dwg. No.	Title	100% CD Bid Package	Add. #02
	Volume 2 of 2		
	General		
	Cover	1/29/18	
	MEP Demo		
MEPD1.01A	Lower Level Demolition Floor Plan - Area A - MEPD	1/29/18	
MEPD1.01B	Lower Level Demolition Floor Plan - Area B - MEPD	1/29/18	
MEPD1.11A	First Floor Demolition Floor Plan - Area A - MEPD	1/29/18	
MEPD1.11B	First Floor Demolition Floor Plan - Area B - MEPD	1/29/18	
MEPD1.21A	Second Floor Demolition Floor Plan - Area A - MEPD	1/29/18	
MEPD1.21B	Second Floor Demolition Floor Plan - Area B - MEPD	1/29/18	
MEPD1.31A	Demolition Roof Plan - Area A	1/29/18	
MEPD1.31B	Demolition Roof Plan - Area B	1/29/18	
	Mechanical		
M0.01	Cover Sheet - Mechanical	1/29/18	
M0.02	Flow & Control Diagrams - Mechanical	1/29/18	
M0.03	Flow & Control Diagrams - Mechanical	1/29/18	
M1.01A	Lower Level Floor Plan - Area A - Mechanical	1/29/18	
M1.01B	Lower Level Floor Plan - Area B - Mechanical	1/29/18	
M1.11A	First Floor Plan - Area A - Mechanical	1/29/18	
M1.11B	First Floor Plan - Area B - Mechanical	1/29/18	
M1.21A	Second Floor Plan - Area A - Mechanical	1/29/18	
M1.21B	Second Floor Plan - Area B - Mechanical	1/29/18	
M1.31A	Roof Plan - Area A - Mechanical	1/29/18	
M1.31B	Roof Plan - Area B - Mechanical	1/29/18	
M2.01	Part Plans - Mechanical	1/29/18	
M2.02	Riser Diagrams - Mechanical	1/29/18	
M3.01	Schedules - Mechanical	1/29/18	
M3.02	Schedules - Mechanical	1/29/18	
M3.03	Schedules - Mechanical	1/29/18	
M4.01	Details - Mechanical	1/29/18	
M4.02	Details - Mechanical	1/29/18	
M4.03	Details - Mechanical	1/29/18	
M4.04	AHU Diagrams - Mechanical	1/29/18	
M4.05	AHU Diagrams - Mechanical	1/29/18	
	Electrical		
E0.01	Cover Sheet - Electrical	1/29/18	
E0.02	Lighting Fixture Schedule - Electrical	1/29/18	
E0.10	Site Plan - Electrical	1/29/18	
E1.01A	Lower Level Floor Plan - Area A - Electrical	1/29/18	
E1.01B	Lower Level Floor Plan - Area B - Electrical	1/29/18	
E1.11A	First Floor Plan - Area A - Electrical	1/29/18	
E1.11B	First Floor Plan - Area B - Electrical	1/29/18	
E1.21A	Second Floor Plan - Area A - Electrical	1/29/18	
E1.21B	Second Floor Plan - Area B - Electrical	1/29/18	
E1.31A	Roof Plan - Area A - Electrical	1/29/18	
E1.31B	Roof Plan - Area B - Electrical	1/29/18	
E1.41	Lightning Protection Plan - Electrical	1/29/18	

Dwg. No.	Title	100% CD Bid Package	Add. #02
E2.01A	Lower Level RCP Plan - Area A - Lighting	1/29/18	
E2.01B	Lower Level RCP Plan - Area B - Lighting	1/29/18	
E2.11A	First Floor RCP Plan - Area A - Lighting	1/29/18	
E2.11B	First Floor RCP Plan - Area B - Lighting	1/29/18	
E2.21A	Second Floor RCP Plan - Area A - Lighting	1/29/18	
E2.21B	Second Floor RCP Plan - Area B - Lighting	1/29/18	
E4.01	Single Line Diagram - Electrical	1/29/18	
E4.02	Fire Alarm Riser - Electrical	1/29/18	
E5.01	Panel Schedules - Electrical	1/29/18	
E5.02	Panel Schedules - Electrical	1/29/18	
E5.03	Panel Schedules - Electrical	1/29/18	
E6.01	Details - Electrical	1/29/18	
E6.02	Details - Electrical	1/29/18	
Plumbing			
P0.01	Cover Sheet - Plumbing	1/29/18	
P1.01A	Lower Level Floor Plan - Area A - Plumbing	1/29/18	
P1.01AU	Lower Level Sub-Floor Plan - Area A - Plumbing	1/29/18	
P1.01B	Lower Level Floor Plan - Area B - Plumbing	1/29/18	
P1.01BU	Lower Level Sub-Floor Plan - Area B - Plumbing	1/29/18	
P1.11A	First Floor Plan - Area A - Plumbing	1/29/18	
P1.11B	First Floor Plan - Area B - Plumbing	1/29/18	
P1.21A	Second Floor Plan - Area A - Plumbing	1/29/18	
P1.21B	Second Floor Plan - Area B - Plumbing	1/29/18	
P1.31A	Roof Plan - Area A - Plumbing	1/29/18	
P1.31B	Roof Plan - Area B - Plumbing	1/29/18	
P2.00	Part Plans - Plumbing	1/29/18	
P2.01	Part Plans - Plumbing	1/29/18	
P2.02	Part Plans - Plumbing	1/29/18	
P3.01	Schedules - Plumbing	1/29/18	
P3.02	Schedules - Plumbing	1/29/18	
P4.01	Details - Plumbing	1/29/18	
P4.02	Details - Plumbing	1/29/18	
Fire Protection			
FP0.01	Cover Sheet - Fire Protection	1/29/18	
FP1.01A	Lower Level Floor Plan - Area A - Fire Protection	1/29/18	
FP1.01B	Lower Level Floor Plan - Area B - Fire Protection	1/29/18	
FP1.11A	First Floor Plan - Area A - Fire Protection	1/29/18	
FP1.11B	First Floor Plan - Area B - Fire Protection	1/29/18	
FP1.21A	Second Floor Plan - Area A - Fire Protection	1/29/18	
FP1.21B	Second Floor Plan - Area B - Fire Protection	1/29/18	
FP3.01	Riser Diagram - Fire Protection	1/29/18	
FP4.01	Schedules - Fire Protection	1/29/18	
FP5.01	Details - Fire Protection	1/29/18	
IT Demo			
ITD1.01A	Lower Level Demolition Plan - Area A - IT	1/29/18	3/14/18
ITD1.01B	Lower Level Demolition Plan - Area B - IT	1/29/18	3/14/18
ITD1.11A	First Floor Demolition Plan - Area A - IT	1/29/18	
ITD1.11B	First Floor Demolition Plan - Area B - IT	1/29/18	

	Dwg. No.	Title	100% CD Bid Package	Add. #02
	ITD1.21A	Second Floor Demolition Plan - Area A - IT	1/29/18	
	ITD1.21B	Second Floor Demolition Plan - Area B - IT	1/29/18	
	IT			
	IT0.01	Cover Sheet - IT	1/29/18	3/14/18
	IT0.02	Responsibility Matrix - IT	1/29/18	
	IT0.10	Site Plan - IT	1/29/18	
	IT1.01A	Lower Level Floor Plan - Area A - IT	1/29/18	
	IT1.01B	Lower Level Floor Plan - Area B - IT	1/29/18	
	IT1.11A	First Floor Plan - Area A - IT	1/29/18	
	IT1.11B	First Floor Plan - Area B - IT	1/29/18	
	IT1.21A	Second Floor Plan - Area A - IT	1/29/18	
	IT1.21B	Second Floor Plan - Area B - IT	1/29/18	
	IT1.31A	Roof Plan - Area A - IT	1/29/18	
	IT1.31B	Roof Plan - Area B - IT	1/29/18	
	IT3.00	Part Plans - IT	1/29/18	
	IT3.01	Part Plans - IT	1/29/18	
	IT3.02	Part Plans - IT	1/29/18	
	IT4.00	Conduit Riser and Fire Alarm Network Diagrams - IT	1/29/18	
	IT6.01	Details - IT	1/29/18	
	IT6.02	Details - IT	1/29/18	
Security Demo				
	SCD1.01A	Lower Level Demolition Plan - Area A - Security	1/29/18	
	SCD1.01B	Lower Level Demolition Plan - Area B - Security	1/29/18	
	SCD1.11A	First Floor Demolition Plan - Area A - Security	1/29/18	
	SCD1.11B	First Floor Demolition Plan - Area B - Security	1/29/18	
	SCD1.21A	Second Floor Demolition Plan - Area A - Security	1/29/18	
	SCD1.21B	Second Floor Demolition Plan - Area B - Security	1/29/18	
	Security			
	SC0.01	Cover Sheet - Security	1/29/18	
	SC1.01A	Lower Level Floor Plan - Area A - Security	1/29/18	
	SC1.01B	Lower Level Floor Plan - Area B - Security	1/29/18	
	SC1.11A	First Floor Plan - Area A - Security	1/29/18	
	SC1.11B	First Floor Plan - Area B - Security	1/29/18	
	SC1.21A	Second Floor Plan - Area A - Security	1/29/18	
	SC1.21B	Second Floor Plan - Area B - Security	1/29/18	
	SC1.31A	Roof Plan - Area A - Security	1/29/18	
	SC1.31B	Roof Plan - Area B - Security	1/29/18	
	SC4.00	Access Control and CCTV Riser Diagram	1/29/18	
	SC4.01	Access Control and CCTV Riser Diagram	1/29/18	
	SC4.02	Access Control and CCTV Riser Diagram	1/29/18	
	SC6.01	Details - Security	1/29/18	

Dwg. No.	Title	100% CD Bid Package	Add. #02
AV			
AV0.00	AV Symbols and Legends	1/29/18	
AV0.01	AV Details I	1/29/18	
AV1.01B	AV Floor Plan - Lower Level - Area B	1/29/18	
AV1.11A	AV Floor Plan - First Floor - Area A	1/29/18	
AV1.11B	AV Floor Plan - First Floor - Area B	1/29/18	
AV1.21A	AV Floor Plan - Second Floor - Area A	1/29/18	
AV1.21B	AV Floor Plan - Second Floor - Area B	1/29/18	
AV2.01B	AV RCP - Lower Level - Area B	1/29/18	
AV2.11A	AV RCP - First Floor - Area A	1/29/18	
AV2.11B	AV RCP - First Floor - Area B	1/29/18	
AV2.21A	AV RCP - Second Floor - Area A	1/29/18	
AV2.21B	AV RCP - Second Floor - Area B	1/29/18	
AV8.01	AV Interior Elevations I	1/29/18	
AV8.02	AV Interior Elevations II	1/29/18	
AV8.03	AV Interior Elevations III	1/29/18	
AV8.04	AV Interior Elevations IV	1/29/18	
AV9.00	AV Riser Diagrams I	1/29/18	
AV10.00	AV Functional Diagrams I	1/29/18	
AV10.01	AV Functional Diagrams II	1/29/18	
Existing Building Drawings - *Added for Reference via Addendum #02*			
	1949 Higgins Hall		
	1958 Higgins Hall Addition		
	1967 Annex Hall Set 1 & 2		
	1972 Higgins Annex As-Builts		
	1987 Volatile Chemical Storage Addition		
	1991 Higgins Addition Lecture Hall Renovation		
	1991 Higgins Chemistry Room Renovations		
	1999 Midtown Campus Underground Infrastructure Renovations		
	2009 Annex HVAC Improvement		
	2011 Annex Second Floor Lecture Hall		
	2011 Higgins Roof Replacement and Masonry Repairs		
	2012 Higgins Facade Repairs		
	2012 Higgins Record Room Renovation		
	2013 Annex Learning Emporium Set		
	2015 Midtown Campus Topo Based on HH		

Telecommunications Infrastructure Standards

Version: 4.0
Revision Date: October 24, 2016

The Telecommunications Infrastructure Standards contained here have been adopted and are to be applied to the system office and the colleges and universities that make up the Connecticut State Colleges and Universities.

Community Colleges

Asnuntuck Community College
Capital Community College
Charter Oak State College
Gateway Community College
Housatonic Community College
Manchester Community College
Middlesex Community College
Naugatuck Valley Community College
Northwestern CT Community College
Norwalk Community College
Quinebaug Valley Community College
Three Rivers Community College
Tunxis Community College

State Universities

Central Connecticut State University
Eastern Connecticut State University
Southern Connecticut State University
Western Connecticut State University

Table of Contents

1. Introduction

1.1 The Connecticut State Colleges & Universities (ConnSCU) has adopted the ANSI/TIA (American National Standards Institute, Telecommunications Industry Association) Standards and BICSI (Building Industry Consulting Service International) practices regarding the installation of structured cabling systems constructed with a minimum of Category 6 compliant components. Liberal reference to these standards and practices are made throughout this document, and the colleges/universities are encouraged to consult the original documents for more detailed information on wiring standards. This document is intended to summarize and highlight significant aspects of these standards and practices for the purpose of creating a simplified reference which colleges/universities may use in the planning, bid preparation, and implementation of a Structured Cabling System for their campus.

1.2 Each College/University is expected to adhere to the elements identified in this document for the implementation of any new wiring projects. Compliance with these standards will result in model installations which are easy to administer and modify when necessary, and which will in turn guarantee optimal performance from the network.

1.3 These standards are intended to allow ConnSCU to meet the telecommunications requirements of the colleges and universities for the next 15-20 years. It is essential that ConnSCU Network Management shall be consulted prior to and throughout the planning and design process to ensure that present and future voice and data service requirements can be met.

1.4 ConnSCU Information Technology (IT) Management MUST provide prior written approval for any deviations from these standards, or ConnSCU will not assume financial responsibility to upgrade the facility to performance expectations. Where ambiguity or questions arise to specific details not mentioned in these standards, appropriate TIA, NEC, and BICSI standards shall apply.

1.5 All applicable building codes must be strictly adhered to in regards to telecommunications services. ConnSCU cannot authorize variations to any building codes. In situations where a variance to a building code is required, the request for a variance must be submitted in writing to OSBI (Office of State Building Inspector) and local building officials, and only implemented if approved in written by the AHJ (Authority Having Jurisdiction).

1.6 The use of a Commissioning Agent for the Telecommunications infrastructure is allowed, but is not required. A manufacturer's system warranty is required for all projects unless otherwise instructed by ConnSCU.

1.7 The following Standards documents are referenced throughout this document. Where a conflict exists between the Standards listed below, and the requirements in this document, the more stringent requirement shall take precedence.

ANSI/TIA-560-C.0	Generic Telecommunications Cabling for Customer Premises.
ANSI/TIA-568-C.1	Commercial Building Telecommunications

	Cabling Standard.
ANSI/TIA-568-C.2	Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
ANSI/TIA-568-C.3	Optical Fiber Cabling Components
ANSI/TIA-569-D	Telecommunications Pathways and Spaces
ANSI/TIA-606-B	Administration Standard for Telecommunications Infrastructure.
ANSI/TIA-607-C	Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
IEEE 802.3af	Power over Ethernet (PoE) Standard.
IEEE 802.3at	Power over Ethernet+ (PoE+) Standard.
IEEE 802.3an	Physical Layer and Management Parameters for 10Gbps Operation Type 10GBASE-T.
IEEE 802.11	Wireless Standards (including a/b/g/n/ac)

1.8 Construction specifications are a main ingredient of an Information Technology system. Information Technology systems shall adhere to these specifications in order to be functional in a wide variety of communications applications. This document does not allow or condone the avoidance of following any of the Laws, Standards, or Procedures of any, but not limited to the following:

National Electrical Code (NEC)
International Building Code
Connecticut Building Code
Connecticut Fire Code
Building Industry Consulting Services International (BICSI)
Americans with Disabilities Act (ADA)

The documents listed above shall be the current edition or as adopted by the AHJ.

2. General

2.1 Introduction

2.1.1 The ConnSCU Wiring Distribution System (CWDS) is viewed as the most critical physical element of the long term telecommunications strategy. The Distribution System shall provide connectivity to all the other major subsystems including voice, data and video requirements. Any new systems installed shall be incorporated into the existing Distribution Systems and should combine copper and fiber optic technologies to provide enhanced communications services.

2.2 General Requirements

2.2.1 Any new systems installed shall be incorporated into the existing Distribution Systems and should combine copper and fiber optic technologies to provide enhanced communications services.

2.2.2 Installers for new construction or renovations shall be responsible for all cable, wire, hardware, labor, and materials for full installation of a functioning Distribution System supporting the requirements of all systems including the Telephone Systems, Campus Data Network, Video Systems etc. This includes, but is not limited to, cross-connect fields, station cable, fiber and copper riser cable, protection, station jacks, raceways, Telecommunication Room construction, outside facilities and all associated hardware and labor.

2.2.3 NEC requirements do not allow cables no longer in use to remain in the ceiling plenum. All abandoned cables must be completely removed. Any cable installed, but not terminated for use, must be tagged in accordance with NEC requirements.

2.2.4 ConnSCU requires a secure distribution system while minimizing installation expense wherever possible. Designers and/or Installers shall consider the re-use of newly installed wire and fiber optic cabling in those buildings where new wire has been installed. Already-installed wire and/or fiber optic cabling will be acceptable where it meets the Specifications in this document and ConnSCU IT Management.

2.2.5 ConnSCU requires fiber optic cables to be the media of choice for interbuilding data and video cabling to minimize future congestion in new conduits and to be positioned to exploit emerging technologies that require fiber connectivity.

2.2.6 Installers shall coordinate the reconnection of facilities cabling systems to the backbone infrastructure with ConnSCU IT Management and campus facilities personnel. All alarms shall be fully tested upon completion. During installation, the Installer shall not disturb fire alarm or other critical alarm circuits. If any such circuit is found to be inoperative between the time work commences in a building, but prior to system acceptance, the Installer shall immediately repair the circuit at no additional cost to the Owner.

2.2.7 All installation work shall be done in a neat and high quality manner. It is the responsibility of the Installer to ensure that all state and local building codes are met. Any costs for changes to materials in order to meet code requirements shall be borne by the Installer.

2.2.8 Each building requires a Building Demarcation Point (BDP) for terminating Service Provider facilities and the inter-building cabling; a Main Equipment Room (MER) will serve as the central point for Wiring Distribution System. Telecommunications Rooms (TR) are required for the termination of workstation cables and the cross-connections to the backbone cables. The Installer shall provide all hardware (e.g., mounting brackets, vertical and horizontal troughs, cable trays) within the Telecommunications Rooms.

2.2.9 Cross connection equipment used in the intra-building distribution system shall allow for direct termination of station and backbone cables on the blocks, and modular cross-connections between blocks.

2.2.10 All new construction or major renovation projects are required to have the design team either include or employ the services of a BICSI Registered Communications Distribution Designer (RCDD) to assist in planning and design of the telecommunications infrastructure. Additionally, CT State Statutes require licensure of individuals responsible for the design of Telecommunications systems per Public Act #01-164. The Telecommunications Infrastructure Layout Technician (TLT) license, issued by the Department of Consumer Protection, shall be presented upon request by ConnSCU, and may be required for stamping and signing of official design documents. Alternatively, those holding a Professional Engineer (PE) license may sign and stamp design documents.

2.2.11 All construction plans for BDP, MER and TRs shall be approved by the ConnSCU Telecommunications Department prior to construction. Approval shall also be obtained for the layout of the cross connect fields within the Telecommunications Rooms before work starts.

2.2.12 All Telecommunications plans shall be reviewed and approved by the campus as well as the ConnSCU Telecommunication Department before work starts.

2.2.13 All aspects of the telecommunications distribution infrastructure shall conform to the requirements contained herein. Any deviation from this specification in regard to the design and sizing of telecommunications spaces, vertical or horizontal pathways shall be brought to the attention of the ConnSCU Telecommunications Department and approval prior to the release of the bid specification.

2.2.14 The Installer shall be knowledgeable of all applicable industry standards including but not limited to NEC, ANSI/TIA and BICSI, and shall comply with all applicable regulations of the College/University, local, state, and federal governments. Any failure to pass inspections by any regulatory body shall be corrected wholly at the expense of the Installer and at no cost, whatsoever, to the Owner.

2.2.15 All work of this project shall conform to all applicable laws and ordinances and to the regulations of the local utility companies.

2.2.16 All components of the Installer's proposed systems shall meet the requirements of FCC Rules and Regulations Part 68 (Registration) and Part 15 (Emanation and Interference). All Proposals shall include all license, permit, and registration numbers obtained in compliance with FCC Rules and Regulations.

2.2.17 Any deviations to specifications must be submitted in writing with justifications and be approved by the campus facilities office and the ConnSCU Telecommunications Department.

2.2.18 The Installer shall comply with all laws and regulations regarding safety, protection and insurance.

2.2.19 All equipment installed shall be firmly held in place by fastenings and/or supports, which are adequate to support their loads with an ample safety factor. Cable run in the ceiling must be self-supporting and cannot be affixed, in any way, to the framework of the hung ceiling.

2.2.20 All cables, (where applicable) regardless of length, shall be marked and/or numbered at both ends. Marking codes shall correspond to recognized standards and specifications. All cabling shall be neatly laced, dressed, and adequately supported. No splices will be allowed in system wiring other than at approved designated locations.

2.2.21 Care shall be exercised in wiring to avoid damage to cable and equipment both existing and new. All wiring and connectors shall be installed in strict adherence to standard communications installation practices and all applicable Federal, State, and Local Building codes. Contractor shall take all necessary precautions to protect the building areas adjacent to work. All openings required by the Contractor for the installation of any cable shall be sealed by the Contractor in accordance with applicable fire and building codes. Any permits required shall be obtained by the Contractor.

2.2.22 Under no circumstances shall any device be connected to Owner's data network without approval from the Owner. This includes any phone switch equipment, laptops, PC, network diagnosis tools, hubs, data switches, or any other device capable of connecting to the data network.

2.2.23 IP Addresses for any contractor-installed equipment will be furnished by ConnSCU. Only devices that have been configured with a ConnSCU provided IP Address, subnet mask, gateway address, etc. may be placed on the network, and only after receiving approval from ConnSCU.

2.2.24 At the conclusion of the project, all telecommunications cabinets will be vacuumed to remove dust, dirt, wire clippings, and other debris. All rack mount equipment in cabinets and free-standing racks will be dusted and the Telecom rooms left broom clean. All work-related rubbish must be removed from the buildings. In the case of a dispute, The Owner may remove the rubbish and charge the cost to the selected vendor / contractor.

2.2.25 All services provided for installation of structure cabling system shall be professional and conform to the highest standards and industry best practices. ConnSCU Telecommunications Department reserves the right to halt any installation due to poor workmanship. All work shall be defect free and the installer will replace, at their expense, any work found to be defective.

2.3 ConnSCU Infrastructure Cabling Requirements

2.3.1 The primary objective for the proposed cable infrastructure system is to implement a telecommunications distribution design that allows the cable plant to be flexible, manageable, and expandable. The system should provide the ability to adapt to changing user and technology environments without recabling the building to meet demands for increased bandwidth or services and to facilitate ongoing moves, adds or changes. Designed to support true ubiquitous connectivity to an intelligent transport network capable of spanning both the nation and the globe, the distribution design will recognize that building communications systems and media are dynamic and shall be able to support a variety of applications and services. The distribution design should be able to accommodate voice, video, data, public address systems, CATV, security and environmental control.

2.3.2 The building backbone infrastructure systems will consist of cable pathways, telecommunications rooms, equipment rooms, telecommunications entrance facilities, transmission media, and support facilities that meet the requirements of the Connecticut State Colleges and Universities. The proposed backbone system for data networking is a high bandwidth, low attenuation, fiber optic design that provides a universal transport system for voice, data, video and facilities systems. Coaxial cable for CATV and broadband applications will also be provided where applicable. The proposed telecommunications building backbone infrastructure shall meet code and comply with industry and Connecticut State University System standards.

2.3.3 All products and installation procedures used as part of the horizontal and backbone cabling systems must be free from defects and support any current or future application ratified by IEEE, ANSI and ISO that is developed for an ANSI/TIA-568-C.0 compliant structured cabling system. A manufacturer's warranty is to be furnished at the completion of the project which guarantees system performance, the installed components, and the installation integrity of the horizontal and backbone cabling. This warranty must be valid for a minimum of 20 years. An example includes the Hubbell Mission Critical Warranty of equivalent.

2.3.4 The standards set forth in this document are basic standards for system wiring and components. These are minimal requirements only; a detailed system specification and design is required for each installation.

2.3.5 These standards and specifications shall be updated periodically to reflect the most current ANSI/TIA and BICSI standards. All wiring systems that are being upgraded shall meet these guidelines. To achieve a successful long-term cabling solution, ConnSCU established the following performance goals based on emerging technology:

a. Cabling system shall operate the application(s), which the system was designed to support. Applications may include, but are not limited to: 10/100/1000 Mbps Ethernet (IEEE 802.3), 10Gbps Ethernet, and other network services and applications.
b. Provide a cable system with adequate bandwidth to deliver the network existing and future applications.
c. Provide a strong network foundation and physical connectivity for each campus to build upon to support the instructional and administrative data needs.
d. Provide a cable system than supports the majority of workstations upon implementation, and that can be easily expanded in the areas to meet the individual campus instructional needs.
e. Provide a cable system that has high integrity, performance, and usability based on the current ANSI/TIA Commercial Building Telecommunications Cabling Standard, BICSI, and future ANSI/TIA & IEEE standards.
f. Cabling System must meet the ANSI/TIA-568-C.0 standards for Category 6 or better wiring as stated above. Any deviations from standards from this document will require the prior approval of ConnSCU.

2.3.6 Installer's Responsibilities

2.3.6.1 The Installer shall be fully responsible to the University for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by the contracted vendor.

2.3.6.2 The Installer shall obtain and pay for all surveys, permits, licenses, inspections and fees, and make all deposits required for the proper execution of the work after award of Contract.

2.3.6.3 The Installer shall be responsible for loss or damage in shipment, delivery and installation of all equipment, parts, and goods until time of transfer to and acceptance by the University.

2.3.6.4 The Installer shall guarantee that equipment provided will not endanger the safety of university employees or the public, damage, require change in, or alterations for equipment or other facilities of the university including telephone and data network systems, interfere with the proper functioning of telephone equipment or facilities, or otherwise injure the public in its use of telephone services.

2.3.6.5 The Installer shall be responsible for full restoration of all surfaces including floors, walls, ceilings and interior finishes damaged, altered or changed; building, and grounds of the University to their original condition.

2.3.6.6 The students, faculty and staff of the University will occupy the campus during the entire period of installation. The nature of the work of the students, faculty and staff of the University is such that there must be a minimum degree of interference from the contracted vendors, and the work is to be performed at such times as directed by the University.

2.3.6.7 All installation efforts shall be coordinated with the University project manager prior to commencement of work.

2.3.6.8 Unnecessary noise shall be avoided at all times and unavoidable noises must be reduced to a minimum.

2.3.6.9 The Installer and his representatives shall exercise every precaution to protect and maintain free from damage portions of the campus and buildings adjacent to and adjoining the work. Damage to the buildings or campus must be repaired to the satisfaction of the University and at the expense of the Contracted vendors.

2.3.6.10 The Installer shall install all equipment in accordance with the manufacturer's specifications.

2.3.7 Special Requirements

2.3.7.1 The ConnSCU Telecommunications Infrastructure Standards publication is intended to address standard installation practices for all of the Colleges and Universities, with safety and performance being the most important factors. While these standards are carefully monitored to ensure that the hardware and practices are technologically current, it is possible that some applications may require special consideration.

2.3.8 ConnSCU buildings frequently contain special purpose facilities and equipment with unique telecommunications requirements. Special telecommunications requirements may require deviation from these specifications. ConnSCU IT Management needs to be notified of these special requirements as early in the design process as possible.

2.3.8.1 The following is a short (but not all-inclusive) list of facilities and equipment that commonly have special telecommunications requirements:

a. Data Centers or Computer Rooms
b. Computer labs or classrooms
c. Video conferencing rooms

d. Audio/Video and Broadcast equipment
e. Laboratories
f. Nursing simulation laboratories
g. Scientific Equipment

2.3.8.2 Installation designs and practices not specifically identified as standard in this document will require appropriate ConnSCU IT Management approval before connection to the campus voice or data network.

3. Interior Telecommunications Pathways

3.1 General Information and Installation Practices

3.1.1 Communications Pathways are facilities used to distribute and support cable and connecting hardware between the MER and/or TR, and the work area outlet. Pathways that may be utilized are described in detail in Parts 3.3 thru 3.13 of this section.

3.1.2 Empty Raceways and Raceways installed for Telecommunications Systems including telephone, data, security, alarm, CATV, sound, video, low voltage conductors, etc. shall be installed as required by the National Electrical Code, as required for raceways specified in this Section and as indicated herein.

3.1.3 Backbone Communication Pathways

3.1.3.1 Backbone Communication Pathways may consist of conduits and floor penetrations (i.e., sleeves or slots), which provide routing space for communication cables.

3.1.3.2 Vertically aligned Telecommunications Rooms with connecting sleeves are the most common type of backbone pathway.

3.1.3.3 Designer shall position cable sleeves adjacent to a wall, which can support backbone cables. Sleeves must not obstruct wall-terminating space. All sleeves must be constructed in accordance with the National Electrical Code (NEC) and local fire codes and has a minimum of 2-inch high curb from the finished floor.

3.1.3.4 Quantity, size, location and spacing of all sleeves must be reviewed and approved by a structural engineer.

3.1.3.5 Design sleeves with a 4-inch diameter unless a smaller size is required by the structural engineer.

3.1.4 Horizontal Communication Pathways

3.1.4.1 Horizontal Distribution Systems (horizontal pathways and spaces) consist of structures that conceal, protect, and support horizontal cables between the communications workstation outlet and the horizontal cross connect in the serving telecommunications room.

3.1.4.2 Horizontal communications pathways are used to distribute and support horizontal cable and connecting hardware between the workstation outlet and the telecommunications room. These pathways and spaces are the "container" for the horizontal cabling.

3.1.4.3 NOTE: It is the responsibility of the Architect/Engineering Firm to review all proposed Horizontal Distribution Systems with ConnSCU to ensure the system design:

a. Makes optimum use of the ability of the horizontal cabling system to accommodate change
b. Is as unconstrained as possible by vendor dependence
c. Compliance with this document, Local, State, and Federal Codes
d. Compliance with ANSI/TIA-569-D.

3.1.5 Designer shall follow guidelines of ANSI/TIA-569-D for determining the number of 4-inch sleeves required.

3.1.6 Empty Raceways and Raceways installed for Telecommunications Systems including telephone, data, security, alarm, CATV, sound, video, low voltage conductors, etc. shall be installed as required by the National Electrical Code, as required for raceways specified in this Section and as indicated herein.

3.1.7 Terminate conduits with bushings. Provide grounding bushings for backbone and riser conduits and for conduits entering equipment rooms or Telecommunications Rooms. Ground conduits, cable trays and raceways to the local Telecommunications ground bus using braided hollow copper conductor equal to Belden #8669 (equivalent to #6 AWG).

3.1.8 Adequate expansion/compression fittings shall be used where crossing building expansion joints. Expansion fitting shall be multidirectional and have grounding jumpers, and shall be manufactured by O-Z Gedney, Crouse-Hinds or approved equal.

3.1.9 Raceways shall have expansion fittings installed as recommended by the manufacturer. Provide a minimum of one expansion fitting per one hundred feet or fraction thereof for non-metallic raceways.

3.1.10 Raceways and outlets shall be separated from sources of EMI and RFI such as transformers, ballasts and power lines. Do not install raceways parallel to power raceways unless four foot (1219mm) distance is maintained. Cross other raceways at 90 degrees. Maintain minimum 12 inch (305 mm) clearance in all directions from lighting fixtures and power wiring rated over 20 A. Maintain a minimum 6 inch (153 mm) clearance elsewhere from raceways and outlets. Maintain 48 inch (1220 mm) clearance from transformers. Clearances are measured all around raceway and outlets including through walls and floors.

3.1.11 Install raceways and outlets for power and telecommunications in separate stud wall or block cavities.

3.1.12 Align sleeves and conduits on opposite walls so there is a straight line between corresponding openings, parallel or perpendicular to Building Structure.

3.1.13 Non-metallic raceways or boxes are not allowed in interiors of buildings.

3.2 Pathway Design

3.2.1 The Architect and low voltage designer shall coordinate with the other design disciplines (i.e. mechanical, electrical, structural, etc to provide adequate telecommunications pathways designed for accessibility and growth. The Architect shall bear in mind that mechanical, structural and electrical facilities tend to be static systems while the telecommunications systems are dynamic in nature, subject to additions and changes to the telecommunications systems, over the life of the facility.

3.2.2 Horizontal Distribution Systems must be designed to accommodate diverse user applications including but not limited to:

a. Data Communications including infrastructure for wireless networking.
b. Cable TV (both Fiber/Coax and IP based)
c. Audio Visual Systems
d. Public Address Systems
e. Distributed Antenna Systems
f. Electronic Security (Access Control, Video Surveillance, Intrusion Detection, Audio/Video Intercom)

Note: The designer should also consider that other building information systems (e.g., building alarms and security, audio visual and audio PA system) may require area/space in the Horizontal Distribution System and should plan with these facilities accordingly.

3.2.3 Telecommunications Spaces and pathway design shall accommodate and facilitate continuing changes and allow for a minimum of 50% growth.

3.2.4 Telecommunication spaces and pathway shall not be located in stairways, elevator shafts or elevator equipment rooms.

3.2.5 An open ceiling distribution system is the preferred cable distribution system.

3.2.5.1 An open ceiling distribution system shall not be installed above inaccessible ceiling areas such as lock-in type tiles, drywall or plaster. Suspended ceiling tiles shall be of the removable or lay-in type and located a maximum of 11’0” above the floor whenever possible.

3.2.5.2 Where the cable pathway will be routed above an inaccessible ceiling, metallic conduits shall be installed between accessible areas of the ceiling with no more than two 90-degree bends. If additional bends are required, a junction box with access panel in the ceiling shall be provided. Coordinate Access Panel locations and sizes with architect. Conduits shall align as closely to the Cable Tray or other cable support above the accessible portion of the ceiling.

3.2.5.3 Under no circumstances may unsupported telecommunications cables lay on top of ceiling tiles, pipes, ductwork, or other above ceiling structures.

3.2.6 Adequate and suitable space shall be available in the ceiling area for the distribution system. Mechanical systems (i.e. HVAC, sprinkler, etc.) shall be located as high as possible above the finished ceiling to provide space for the data/telecommunications pathways. Coordination between design disciplines during building design is critical to avoid conflicts. Utilize three-dimensional design tools (i.e. BIM) to facilitate coordination, including Clash Detection or other method to identify conflicts prior to construction.

3.2.7 A minimum of 6" of clear space all around the cabling ~~spaces and~~ pathways shall be clear accessible space not required for the removal of tile, light fixtures or service and access to other systems.

3.2.8 An effective design of a building's Horizontal Distribution System should meet the following criteria:

a. Comply with all applicable local, state, and federal codes.
b. Comply with all applicable BICSI, ANSI/TIA, UL, NEC, FCC standards and codes.
c. Provide flexible cable distribution to workstation locations.
d. Facilitate ongoing maintenance.
e. Easily accommodate future changes in equipment and services.
f. Minimize occupant disruption when horizontal pathways and spaces are accessed.

3.2.9 The horizontal distribution system must be designed to handle all types of communications cabling (i.e., UTP, Coax, and Fiber Optic). When determining the type and size of the cable pathway, consider the quantity and size of the cables that the pathway is intended to house, and allow for growth of the area served over the planning cycle.

3.2.10 When designing the horizontal distribution system it is important to consider adds, moves, and changes, and minimal disruption to immediate occupants.

3.2.11 For new construction or major renovation projects where ready access to the roof is available, a minimum of one (1) 4" conduit shall be routed to the roof of the building from the MDF to be used for routing of antenna and other communications services into the building (i.e. Satellite, DAS, Wireless Bridge, etc).

3.2.11.4 Location of roof penetration shall be coordinated with Architect and other design disciplines.

3.2.11.5 Conduits to be terminated on roof to weatherproof junction box. All penetrations into junction box to be properly sealed to maintain weatherproof rating.

3.2.11.6 If a mast or other structure is required, the wind and ice loading of the mast must be coordinated with the structural engineer in accordance with TIA-222 Rev. G (or most current version).

3.2.11.7 Conduit to extend to MDF Room with grounding bushing bonded to the TMGB.

3.2.12 Grounding and Bonding

3.2.12.1 Horizontal Pathways must be grounded and bonded in accordance with the requirements specified in ANSI/NFPA 70 and Section 7 of this document, except where other codes or local authorities impose more stringent requirements.

3.2.13 Firestopping

3.2.13.1 All horizontal pathways that penetrate fire rated barriers must be stopped in accordance with applicable codes.

3.3 Conduit Types

3.3.1 Galvanized rigid steel conduit and Intermediate Metal Conduit shall be zinc-coated steel conforming to industry standards and specifications. GRC/IMC conduits shall be used in wet or damp environments, or in environments with a high level of vibration.

3.3.2 Intermediate Metal Conduit shall be zinc-coated steel conforming to industry standards and specifications and as manufactured by Allied Tube & Conduit Corp., Triangle/PWC, Inc., or approved equal.

3.3.3 Electrical Metallic Tubing shall be zinc coated steel conforming to industry standards and specifications and as manufactured by Allied Tube & Conduit Corp., Republic Steel Corp., Triangle/PWC, Inc., and Wheatland Tube Co.

3.3.4 Non-metallic conduit shall be composed of polyvinyl chloride, Schedule 40 suitable for 90 C conductors, conforming to industry standards and specifications and as manufactured by Carlon or approved equal. Provide sunlight resistant conduit where exposed.

3.3.4.1 Conduit, fittings and cement shall be produced by the same manufacturer, who must have had at least 5 years of experience in manufacturing the products.

3.3.4.2 Flexible conduit shall be galvanized, spiral wrapped metallic conduit or liquid-tight flexible metal conduit as herein specified.

3.3.4.3 All conduits are to be reamed and bushed.

3.4 Conduit Installation

3.4.1 Distribution

3.4.1.1 Horizontal conduit system consists of conduits radiating from the accessible ceiling in rooms or corridors to the workstation outlets in the floor, walls, and columns of a building.

3.4.1.2 Telecommunication outlets shall be with a minimum 1-inch ID continuous Electrical Metal Tubing (EMT) conduit provided to the accessible ceiling.

3.4.1.3 Conduits shall be provided with a bushing at cable exit point.

3.4.1.4 Conduits shall be placed in the straightest run possible with no more than the equivalent of two 90° bends per run. Refer to the latest edition of the BICSI TDMM for information on conduit sizing and routing.

3.4.1.5 All conduits shall be equipped with a contiguous length of plastic or nylon pull string with a minimum rating of 200 lbs. (90 Kg) or a 12 AWG wire. Secure pull line at each end to prevent it from slipping back into raceway.

3.4.2 Routing of Conduits

3.4.2.1 Conduit runs should be designed in the most direct route, parallel to building lines, with no more than two (2), 90 degree bends between pull points or pull boxes, and contain no continuous sections longer than one hundred feet (100') without pull points or pull boxes installed.

3.4.2.2 It is recommended that conduit runs be kept to no more than 150 ft. in total length including sections through pull boxes.

3.4.3 Conduit Bend Radii

3.4.3.3 The radius of a conduit bend must be at least 6 to 10 times the diameter of the conduit.

a. 2 inch (53mm) trade size and less - 6 times conduit diameter.
b. 2-1/2 inch (63mm) trade size and larger - 10 times conduit diameter.
c. Conduits for fiber optic cabling - 10 times conduit diameter.

3.4.3.4 Conduits designated for Futureflex tubing must be installed with a minimum bend radius of 12 times the diameter of the conduit.

3.4.4 Conduit Entering Telecommunications Rooms

3.4.4.1 Horizontal distribution conduits entering a Telecommunications Room should terminate near the corners and allow for proper cable racking. If conduits are entering through the floor, they must terminate four (4) inches above the finished floor.

3.4.4.2 If conduits are entering through a wall, the conduits must be reamed and bushed, and terminated as close as possible to the terminating rack or wall.

3.5 Pull Boxes

3.5.1 Provide pull boxes each time raceway installation exceeds a 100 foot (30M) section or a total of 180 degrees in bends and offsets between pull boxes. Do not install a pull box in lieu of a conduit bend. Align the corresponding conduits on opposite sides of pull box with each other.

3.5.2 Pull boxes shall be sized according to the following table:

Minimum Space Requirements in Pull Boxes Having One Conduit Each in Opposite Ends of the Box

MAXIMUM TRADE SIZE OF CONDUIT IN INCHES	Size of Box			**FOR EACH ADDITIONAL CONDUIT INCREASE WIDTH**
	Width	Length	Depth	
21mm (0.75 in.)	102 mm (4 in.)	305 mm (12 in.)	76 mm (3 in.)	51 mm (2 in.)
27 mm (1.0 in.)	102 mm (4 in.)	406 mm (16 in.)	76 mm (3 in.)	51 mm (2 in.)
35 mm (1.25 in.)	152 mm (6 in.)	508 mm (20 in.)	76 mm (3 in.)	76 mm (3 in.)
41 mm (1.5 in.)	203 mm (8 in.)	686 mm (27 in.)	102 mm (4 in.)	102 mm (4 in.)
53 mm (2.0 in.)	203 mm (8 in.)	914 mm (36 in.)	102 mm (4 in.)	127 mm (5 in.)
63 mm (2.5 in.)	254 mm (10 in.)	1067 mm (42 in.)	127 mm (5 in.)	152 mm (6 in.)
78 mm (3.0 in.)	305 mm (12 in.)	1219 mm (48 in.)	127 mm (5 in.)	152 mm (6 in.)
91 mm (3.5 in.)	305 mm (12 in.)	1372 mm (54 in.)	152 mm (6 in.)	152 mm (6 in.)
103 mm (4.0 in.)	381 mm (15 in.)	1524 mm (60 in.)	203 mm (8 in.)	203 mm (8 in.)

NOTE: Width is measured perpendicular to conduit orientation. Length is measured parallel to conduit orientation.

3.5.3 Pull boxes with covers over 20 inches (508 mm) shall have piano hinged covers with pad locking capability Covers over 20 inches (508 mm) wide shall be split bulkhead type with piano hinges located on the long sides. Provide doors where one door is able to be secured to the pull box while the other is able to swing free.

3.5.4 Locate pull box so it is accessible and covers can be opened at least to 90 degrees. Where above ceiling or behind access door center pull box in access door or ceiling tile opening

3.5.5 Pull boxes shall be securely mounted to building structure.

3.5.6 Grounding continuity shall be assured throughout raceway and pull box installation equal to electrical power raceway installation.

3.5.7 Junction boxes shall be constructed of code gauge galvanized sheet metal, of not less than minimum size required by the Electrical Code or other applicable Specification "Standards" and shall be furnished with screw fastened covers. Boxes exceeding 48 inches (1200mm) in any direction shall be properly reinforced with angle iron stiffeners.

3.5.8 Junction boxes to be installed in normally wet location areas shall be of the cast type with threaded hub and gasketed cover plate. The cast pull and junction boxes shall be manufactured by Crouse-Hinds, Appleton, Russell and Stoll, or approved equal.

3.6 Cable Tray Systems

3.6.1 General Information

3.6.1.1 Properly installed and coordinated cable trays in the primary cable paths for Category 6 and Category 6A data cabling are critical for cable and network performance.

3.6.1.2 In the Design Development and Construction Document Phase, the Architect and the MEP engineers shall carefully design and coordinate the cable tray paths and clearances to avoid elevation changes and transitions of the continuous path. Careful consideration in the Design and Construction Document Phases must be given to the space within the ceiling plenum so that HVAC ducts, piping, and equipment do not interfere with the cable tray paths.

3.6.1.3 In the Contract Documents phase, the Architect shall require a coordination submittal to ensure that plan and section drawings are submitted and reviewed to insure a continuous uninterrupted cable tray installation fully coordinated with HVAC systems, ducts, sprinklers, piping, and electrical work. The Architect shall provide a copy of this reviewed submittal to the Owner's representative along with a letter verifying that this submittal has been approved and coordinated and furnished to the Contractor for coordination during the Contract Administration Phase of the work.

3.6.1.4 Cable tray systems are used primarily as main corridor distribution apparatus. Cable tray system recommended for use in plenum areas above dropped ceilings in corridors of newly constructed and renovated buildings.

3.6.1.5 Cable wireway system is not required in all corridors. It is left to ConnSCU discretion to decide if application warrants the cost of the cable tray system.

3.6.1.6 Cable wireway systems should be designed as equipped to support only telecommunications and data communications cable. Other low voltage systems may be placed in the wireway system if the disparate systems are properly separated with physical barriers.

3.6.1.7 Shared systems with power are not acceptable under the guidelines listed in avoiding EMI.

3.6.1.8 Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

3.6.2 Acceptable Cable Tray Systems

3.6.2.1 The tray shall be wire basket style.

3.6.2.2 A wire basket tray shall be U shaped and constructed of round wire mesh. The basket tray shall be hung via the trapeze style or wall-mounted.

3.6.2.3 Cable tray system must not be center hung.

3.6.3 Routing of Cable Tray

3.6.3.1 Cable tray systems should be installed with a minimum of bends. If more than three 15 degree turns are installed in a contiguous length, then de-rate the effective capacity of the cable tray by twenty five (25) percent.

3.6.3.2 Delineations in a level cable tray installation are often unavoidable; however, these delineations should be kept at a minimum, with each delineation not exceeding 30 degrees and 24 inches offset. The total delineation for the tray span should not exceed 180 degrees.

3.6.3.3 The cable tray system shall support unbalanced load without tilting.

3.6.3.4 Use end-of-tray cable waterfalls where wire drops down to prevent abrasions and cuts from metal tray edges.

3.6.4 Cable Tray Size and Capacity

3.6.4.1 Cable tray size and capacity shall be determined by the amount and type of cable, the static load capacity of the tray, and the length of the support span.

3.6.4.2 Cable tray systems should be designed to accommodate 100 percent future growth.

3.6.5 Cable Tray Installation Clearance

3.6.5.1 Cable trays containing telecommunication cables shall not contain any pipes, tube or equal for steam, water, air, gas, drainage or any service other than telecommunication.

3.6.5.2 It is recommended that the cable tray system be installed with as much clearance as possible from other building facilities, and installed in the lowest most location below all other building facilities but above the ceiling grid, in accordance with ANSI/TIA standards and meeting the following criteria:

a. 6 in. clearance from obstructions on both sides.
b. 6 in. clearance from obstructions to the top.

3.6.5.3 Installation of cable tray pulley systems installed in a solid ceiling environment should provide access points at 20 ft. centers and at any directional deviation greater than 15 degrees and/or 90 degree turns.

3.6.6 Cable Tray Entering Telecommunications Rooms

3.6.6.1 It is recommended that cable trays NOT be used as a method of passing through walls into the Telecommunications Rooms. The recommended method is to stop the cable trays at the wall and provide the appropriate number of 4" sleeves through the wall, continuing the pathway in the Telecommunications Room with Ladder Racks to the terminating rack or wall. However, if a cable tray is to be used to enter a Telecommunications Room through a wall, the cable tray should be terminated as close as possible to the terminating rack or wall, and the wall opening be properly firestopped with a mechanical firestop system.

3.7 Cable Hangers

3.7.1 General Information and Installation Practices

3.7.1.2 Installation and configuration shall conform to the requirements of the ANSI/TIA Standards 568-C.0 & ANSI/TIA-569-D, NFPA 70 (National Electrical Code), and applicable local codes.

3.7.1.3 Cable Hangers shall be spaced every 3'-5'.

3.7.1.4 Refer to manufacturer specifications for the maximum capacity of Category-6 and Category-6A cables (both UTP and STP) allowed per support.

3.7.1.5 The appropriate type of support must be utilized based on the quantity and weight of cables being supported.

3.7.2 Adjustable Fabric Cable Support

3.7.2.1 In the areas along the corridors, where the cable tray cannot be used, and cables are required to be run "free-air", flexible cable wrap systems shall be used.

3.7.2.2 Cable support straps shall be attached to 3/8" threaded rod. The rods shall be secured to the building structure and be spaced a maximum of 4' apart. The cable support straps shall be flexible and shall hold up to 100 four-pair UTP cables.

3.7.2.3 The cable support straps shall feature a simple locking and unlocking to allow the additions of cables pull easily through.

3.7.2.4 Cable support system shall be suitable for air handling spaces (Plenum).

3.7.2.5 Installation and configuration shall conform to the requirements of the ANSI/TIA Standards 568-C.0 & 569-D, NFPA 70 (National Electrical Code), and applicable local codes.

3.7.2.6 Cable support system shall be Caddy CAT425 or equal.

3.7.3 Cable Hook Systems

3.7.3.1 In the areas where the cables are to be branched out from the main corridors to the workstations or classrooms, cable hook systems shall be used.

3.7.3.2 Cable hooks shall be capable of supporting a minimum of 30 lbs. with a safety factor of 3.

3.7.3.3 Do not install more cables on a "J"-hook than recommended by the manufacturer.

3.7.3.4 Installation and configuration shall conform to the requirements of the ANSI/TIA Standards 568-C.0 & 569-D, NFPA 70 (National Electrical Code), and applicable local codes.

3.7.3.5 Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653 G90. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.

3.7.3.6 Cable hooks for corrosive areas shall be stainless steel, AISI type 304.

3.7.3.7 Cable hooks shall be Eaton (Cooper Industries) series BCH21, BCH32, BCH64, or other manufacture that meets these specifications.

3.7.4 Bridle Rings with Saddle

3.7.4.1 Bridge Rings may be used where less than 10 cables are required to be routed above an accessible ceiling.

3.7.4.2 Plastic saddles must be secured to the ring. The use of Bridal Rings without a saddle is prohibited.

3.8 Outlet Boxes

3.8.5 General Information and Installation Practices

3.8.5.1 Exposed, surface mounted outlet boxes or outlet boxes installed in normally wet locations shall be of the cast metal type with threaded hubs.

3.8.5.2 Recessed outlet boxes for dry locations shall be of the pressed sheet steel, zinc coated type.

3.8.5.3 Telecommunications outlet boxes should be mounted at least 18”AFF (Above Finished Floor) or even with adjacent electrical duplex services.

3.8.5.4 All conduits entering an outlet box are to be reamed and bushed.

3.8.5.5 Where telecommunications outlet boxes are designated for LED Screens (i.e. Digital Signage), the boxes should be mounted at 84 inches AFF or other height as coordinated with the Architect. Locate outlets boxes for video screens such that when the screen is installed, it does not cover Fire Alarm devices or other wall-mounted devices.

3.8.5.6 Outlet boxes should not be placed back to back in wall-stud cavities.

3.8.5.7 Outlet boxes shall be spaced 6 inches (150mm) minimum from an electrical receptacle. Install outlet boxes in separate stud cavity from electrical wiring.

3.8.5.8 For applications requiring soundproofing, specify the appropriate soundproofing material to be placed around the outlet box.

3.8.5.9 Where conditions do not allow for an outlet box with conduit to accessible ceiling to be installed, a low voltage mounting bracket, secured to the gypsum wall with screws, may be utilized (Erico #MPLS / MPLS2 or equal).

3.8.5.10 If the cable routing to an outlet box requires passing cables through the cutouts in a steel stud, insulated bushings or grommets must be provided to protect cables. This is applicable to both factory cutouts in the stud and cutouts made in the field.

3.8.6 Outlet Box and Conduit Sizes

3.8.6.1 Up to two Category-6 cables or one Category-6A Cable:

a. Telecommunications outlet boxes installed in drywall, plaster, or concrete block wall must be 4-inch by 2-inch by 2-1/2 inch boxes with 1” conduit from accessible ceiling.

3.8.6.2 Up to four Category-6 Cables or three Category-6A Cables:

a. Telecommunications outlet boxes installed in drywall, plaster, or concrete block wall must be 4-inch by 4-inch by 2-1/2 inch boxes with 1.25" conduit from accessible ceiling.
b. For single-gang faceplates, a reducing ring shall be provided.
c. Outlet boxes for general use, flush mounted in concrete work and walls in normally dry locations, shall be manufactured by Steel City, Appleton, Raco or approved equal.

3.8.6.3 Up to eight Category-6 Cables or up to six Category-6A Cables:

a. Telecommunications outlet boxes installed in drywall, plaster, or concrete block wall must be 5-inch by 5-inch by 2-7/8 inch boxes with two 1.25" conduits from accessible ceiling.
b. For single-gang faceplates, a reducing ring shall be provided.
c. '5-Square' outlet boxes for general use, flush mounted in concrete work and walls in normally dry locations, shall be manufactured by Randl #T-55017 or approved equal.

3.8.6.4 In applications where Telecommunications cables need to share the same outlet box with Audio Visual or other low voltage cabling, the size of the backbox shall be coordinated among disciplines.

3.8.7 Mounting Outlet Boxes Above Counters

3.8.7.1 Outlet boxes installed above a counter will meet the following criteria:

a. Counter with backsplash – Mount outlet box at least 6 inches above the top of the counter to the center of the outlet.
b. Counter without a backsplash – Mount outlet box at least 12 inches above the top of the counter to the center of the outlet.
c. Outlet boxes for Telecommunications shall be at the same height as outlet boxes for electrical receptacles unless otherwise specified by the Architect.

3.8.8 Outlet Boxes for Wall Telephones

3.8.8.1 Telecommunications outlet boxes designated for wall telephones should be mounted per ADA.

3.8.8.2 8" clearance on either side of the outlet box shall be specified to ensure that when the telephone set is installed, it does not interfere with light switches, thermostats, or other devices in proximity to the telephone.

3.9 Perimeter Raceways

3.9.1 Provide surface metal raceway system to outlets where cabling cannot be concealed within a wall cavity or other space. No cabling to a Work Area outlet may be installed exposed.

3.9.2 Surface mounted raceways shall be of sheet steel with matching covers, galvanized or painted to protect against corrosion conforming to industry standards and specifications. All necessary bends, couplings, connectors, etc., shall be provided.

3.9.3 Surface mounted raceways shall be suitable for lay in conductors with connector covers permanently attached so that removal is not necessary to utilize lay in feature.

3.9.4 If surface mounted raceways are to be used for both telecommunications and electrical wiring, a dual-channel style raceway with a fixed divider shall be utilized. Coordination of size and style of raceway is to be coordinated between the Architect, Electrical Engineer, and Telecommunications Designer.

3.9.5 Interior parts shall be smooth and free of sharp edges and burrs.

3.9.6 Surface mounted raceways shall be sized for adequate wire bending radius as required by code and ANSI/TIA standards.

3.9.7 Surface mounted raceways shall be as manufactured by Legrand, Panduit, or approved equal.

3.10 Floor Boxes / Poke-Thru's

3.10.1 Floor boxes and/or Poke-Thru's must have sufficient capacity for both power and data cabling, as well as A/V inputs if required.

3.10.2 The appropriate device must be specified based on the floor type (i.e. wood, concrete, etc) and should be coordinated with the Architect. Finish styles of the device must also be coordinated with the Architect.

3.10.3 The device, when installed, must maintain the fire rating of the floor.

3.10.4 Devices, when installed, must be flush with the floor surface. Monument-style devices are not allowed unless specifically approved by ConnSCU.

3.10.5 Poke-Thru devices must be spaced a minimum of 2 feet on-center apart, and not more than one device per 65 square feet of floor area may be installed in a single span.

3.10.6 Acceptable manufacturers include Hubbell, Legrand, FSR or approved equal.

3.11 Power Poles

3.11.1 Power Poles are only allowed if no other method of delivering power and data to a work area is available.

3.11.2 Power Poles, if sharing with power, must be dual-channel to provide proper separation between electrical and low voltage conductors.

3.12 Furniture In-Feeds

3.12.1 In open office areas with modular furniture, an in-feed may be required to route data cables into the modular furniture.

3.12.2 If feeding from a wall, provide a conduit (conduit size based on quantity of cables such that 40% fill ratio is not exceeded) from accessible ceiling to a junction box in the wall. From the junction box to the furniture, route a piece of flexible metallic conduit into the furniture system. Spiral Wrap or Loom Tubing may also be utilized.

3.12.3 If feeding from the floor, utilize a floor box or poke-thru specifically designed for this purpose (i.e. Legrand Multi-Service Furniture Feed). Location of floor box / poke-thru is to be coordinated and dimensioned by the Architect, but must not present a trip hazard, and should maintain the aesthetics of the furniture as much as possible.

3.12.4 Coordinate with the Furniture System manufacturer for the exact method for in-feeding cables into the furniture system.

3.12.5 While the length of the flexible metal conduit is not limited per the NEC when used for other purposes besides lighting, the length of the flexible conduit should be minimized to facilitate routing of cables, and to maintain the aesthetics of the infeed.

3.13 Underfloor Pathways

3.13.1 Underfloor Pathways are typically found in Data Centers, however other spaces may have a raised floor.

3.13.2 The use of Cable Tray and J-Hooks as described above is acceptable. All components must be plenum rated.

3.13.3 The appropriate mounting hardware for attaching to raised floor support posts must be specified.

4. Outside Plant Telecommunications Pathways

4.1 General Information

4.1.1 The installation of conduits for inter-building cabling may be required. This shall include, where appropriate, the required conduits as well as spare and empty conduits, all associated manholes, etc.

4.1.2 The acceptable means of service entrance to the building is an underground conduit system. All entrance conduits must be a minimum of four (4) inch conduit(s), buried at a minimum of thirty six (36) inches below grade. Building mounted boxes are not acceptable.

4.1.3 All outside plant conduit must be PVC, Type "C" or Schedule 40, four inch inner diameter (I.D.). Only non-metallic conduit shall be used, except where otherwise noted in this specification. One inch inner diameter (I.D.) may be used from an emergency phone station drop to a building or a manhole with the ConnSCU Information Technology department's authorization only.

4.1.4 Entrance conduit begins at the designated manhole and ends when terminated in the Building Demarcation Point (BDP) for that structure.

4.1.5 The cable routing for the CWDS must utilize the same campus conduits and trenches wherever possible.

4.1.6 The Installer shall be prudent in the design and installation of inter-building cabling to fully utilize already in-place individual conduits and to avoid the use of spare conduits. A fully utilized conduit is at its maximum when filled to 40% of capacity.

4.1.7 A minimum of two spare and empty four inch conduits must be provided for every new conduit bank.

4.1.8 All inter-building runs shall be well marked with a continuous marking strip buried in the same trench as the cable and/or conduit and placed 18" above the cable or conduit.

4.1.9 All bend radius will be at least 10 times the internal diameter of the conduit. Prefabricated fittings must be used. Pull boxes or joint boxes must not be used in place of bends.

4.1.10 Watertight joints between sections of conduits must be made using PVC solvent cement.

4.1.11 All conduits must be encased in concrete; PVC conduit separators must be placed at intervals of approximately three feet and fastened securely. The minimum depth of any conduit in the encasement to any exterior surface of concrete must be six inches.

4.1.12 Galvanized, rigid steel conduit must be used where conduit runs cross open ditches, attach to bridges or similar structures. All fittings must be suitable for connection to the PVC conduits. Proper grounding and bonding of these conduits is mandatory and must be specified in appropriate engineering installation plans.

4.1.13 All conduits crossing steam lines or running parallel within three feet of steam lines must be four inch fiberglass conduit for at least ten feet on either side of the steam line. All fittings must be suitable for connection to the PVC conduits.

4.1.14 Conduits shall be separated from other utilities for safety of personnel and for protection of equipment. There shall be 12 inches of earth between the telecommunications conduits and power or other foreign conduits. When crossing gas, oil, water or other pipes 6 inches of separation are required. Conduit runs parallel to pipes shall be separated by 12 inches of earth.

4.1.15 The conduit systems must be gradually sloped sufficient to permit penetrating water to drain towards the manholes. The highest point of each conduit must be at the center of each conduit run. The minimum depth of any conduit run to the ground surface is 24 inches unless otherwise specified and agreed to by the College or University.

4.1.16 All unused and spare conduits must be provided with removable conduit plugs for waterproofing and protection from earth and debris. All conduits, used and unused must be equipped with a minimum 200 pound strength pull cord.

4.1.17 Four #4 reinforcing rods must be installed in all concrete encasements where entering buildings. Rods must extend six feet from the building. Tie to the building must be provided. The Vendor may install rigid galvanized steel conduit in place of the reinforced concrete. For either alternative the raceway should slope downward from the building and extend into undisturbed earth.

4.1.18 Service entrance conduits entering the building must extend to the BDP. These must be rigid conduits. If pull boxes are required, a #6 AWG ground wire must be pulled to the box from the common building/electrical ground. When transitioning from underground PVC to metallic conduit, a PVC to Rigid Metallic Conduit adapter shall be placed at least 10’ from the building foundation wall. The RMC shall enter the BDP/MER and terminate with a grounding bushing bonded to the TMGB.

4.2 ~~Plan~~ Manholes

4.2.1 Buildings identified to be a demarcation point for outside service providers (Comcast, Frontier, Verizon, Lightower, etc), the following apply:

4.2.1.1 When a building is not on the property line, a minimum of four conduits from the BDP inside the building to the property line shall be provided. The conduits shall be terminated at a manhole, which shall be positioned as close as possible to the property line. However, the manhole shall be away from traffic conditions and be easily accessible for maintenance.

4.2.1.2 Service providers (Telephone Company, cable company, etc.) will make the proper tie-in from the underground conduit to the building's conduits in the manhole. The location of the manhole must be coordinated with service provider engineers.

4.2.1.3 For campuses with more than 1 building, a minimum of four additional conduits are required for the ConnSCU Wiring Distribution System (CWDS). The conduit shall be terminated in the designated manhole and routed to the BDP. If the same manhole is utilized for both the campus CWDS and the outside service providers, a minimum of eight conduits shall be installed.

4.2.2 All buildings shall have a minimum of four (4) 4" conduits entering the building. Additional conduits may be required, determined by ConnSCU IT and/or campus IT, and will be included in the design. All Outside Plant (OSP) conduits shall terminate in the BDP and in designated manhole.

4.2.3 Fiber or copper splices must only occur in manholes or other protected and easily accessible locations.

4.2.4 All fiber optic cables shall be pulled through a corrugated innerduct in the conduits. Fabric Innerduct may also be utilized (i.e. MaxCell).

4.2.5 New manholes shall be reinforced concrete, cast in place or precast, and a minimum of 6 feet wide by 12 feet long and 6½ feet high. The concrete strength for manhole construction shall be 3600 P.S.I.

4.2.6 A PVC water barrier must be installed at each construction point.

4.2.7 The maximum distances between manholes must not exceed 600 feet for runs containing an aggregate of 45 degree bend, and must not exceed 400 feet for runs containing an aggregate of 90 degree bend. The Vendor must be responsible for the ability to pull cables in any conduit regardless of the distance limitations between manholes.

4.2.8 The manhole entrance, manhole roof, and manhole walls down to a level of at least 12 inches below the roof must be coated with one coat of cold asphalt tar and two coats of hot asphalt tar before backfilling around the manhole.

4.2.9 Manhole windows must be sealed watertight where conduits or laterals enter or leave.

4.2.10 A standard manhole collar and cover must be located in the exact center of the manhole roof, and flush with the finished grade of the ground, concrete, or asphalt surface.

4.2.11 Manholes must not be shared with power facilities. The covers must be physically designated as telecommunications manholes.

4.2.12 Joint boxes must be proposed only in cable routes having less than four conduits where no branches are required and must be approved by ConnSCU IT.

4.2.13 All splice connections in manholes must be in watertight enclosures and sealed according to industry standards. All splices must be re-enterable.

4.2.14 All copper cable sheaths must be bonded together at all splices with a #6 solid copper or equivalent.

4.2.15 Conduit entering service boxes and vaults shall be cut flush with the inside of the box. Voids around conduit, as well as the joints between box sections shall be mortared where appropriate. Terminators shall be used on all thermoplastic boxes. The boxes and vaults shall be free of mud, dirt, and debris.

4.2.16 All vaults and manholes furnished and installed shall be fully equipped with racking, pulling irons, steel ladders, grade rings, adjustable collars, vertical support brackets, frames and covers. Conduits shall be terminated in the lowest knockouts first. The frame and cover shall be adjusted to the final grade.

4.2.17 Conduit terminations in service vaults and manholes shall not be brought into the neck, middle of any sidewall, or within 12" of the top or bottom. No conduits shall be terminated on the bottom of the vault. There should be a 2" separation between ducts as they terminate in the vault.

4.3 Installation Guidelines and Requirements

4.3.1 The Installer shall provide storage and work facilities for all equipment and personnel used on the project. The University can furnish raw acreage but cannot supply finished facilities for use by the installer.

4.3.2 All construction, excavation, and restoration plans for new conduit, ducts, and manholes shall be submitted to and approved by the appropriate ConnSCU Telecommunications Department, College/University and State of Connecticut departments prior to commencement of work.

4.3.3 The Installer shall protect, replace, or restore to original or better condition any architectural or landscape features of the campus disturbed or altered by any construction.

4.3.4 The Installer shall protect all above and below grade existing utilities. Any damages to existing utilities must be corrected by the Vendor on an immediate, emergency basis. Established cutover dates will not be modified as the direct result of damages, delays or other circumstances. All damages are the sole responsibility of the Installer and the repair thereof shall be at vendor expense.

4.3.5 The Installer shall immediately remove from the site any debris, including earth, resulting from construction.

4.3.6 The Installer shall do any pumping necessary to remove any water from construction areas.

4.3.7 The Installer shall repair all damage to building exterior and interior walls, ceilings, foundations, or floors.

4.4 Outside Plant Conduit Inside a Building

4.4.1 Design conduits entering from below grade point to extend 4 inches above the finished floor.

4.4.2 Conduits shall be provided with a grounding bushing at cable exit point. Grounding bushing to be bonded to the nearest Grounding Busbar with #6 AWG Ground Wire.

4.4.3 If the conduits enter the building below the finished floor, this is best accomplished by creating a trench for the conduits to enter. The trench must be a minimum of three (3) feet deep and two (2) feet wide.

4.4.4 It is imperative that slope and grade be considered in the design and installation of entrance conduits, ensuring that conduits are sloping away from the building toward the hand hole, thus eliminating drainage problems.

4.4.5 All entrance conduits shall be securely fastened to the building so they can withstand the typical placing procedures by the service provider.

4.4.6 Rubber conduit plugs, a water plug, or duct sealer (depending upon the conditions) shall be used to seal inside-the-building end of a conduit to prevent rodents, water, or gases from entering the building.

4.4.7 The contractor shall reseal conduits after cable is placed in them per 4.4.6 above.

5. Telecommunications Spaces

5.1 Overview:

5.1.1 This section defines the standards for Telecommunications Spaces, which are the areas used for housing telecommunications/computing equipment and cables. Discussed in this section are Building Demarcation Point, Main Equipment Rooms, and Telecommunications Rooms.

5.1.2 It is strongly recommended that the Telecommunications Spaces be constructed as early as possible in the construction schedule, including buildouts of the rooms (walls, floors, doors, ceiling, paint, plywood), lighting, UPS and electrical power, cooling, door locks, and all backbone cabling between the rooms. Completion of the Telecommunications Spaces will allow for installation and configuration of networking equipment by ConnSCU. This networking equipment is required for connection of CCTV cameras, IP Door locks, Access Control panels, Wireless Access Points, Building Management System components, and other devices that will require network connectivity for building Commissioning by individual sub-contractors and/or the Commissioning agent.

5.2 Definitions:

5.2.1 The Building Demarcation Point (BDP) consists of equipment (cables, connecting hardware, protective devices, etc.) and areas that terminate outside services into the premises (building, or campus) cabling. Here we would find protective devices that also serve as the demarcation point for outside carriers.

5.2.2 The Main Equipment Room (MER) is the primary communications room for a building or facility. Other common terms or abbreviations used to describe this room are Building Equipment Room (BER), Main Distribution Frame (MDF), or simply Equipment Room (ER).

5.2.3 The Telecommunications Room (TR) is set aside on each floor of a building for the exclusive purpose of housing the communications equipment and related wiring that serves that specific area of the building. Other common terms or abbreviations to describe this space are Satellite Equipment Room (SER), or Intermediate Distribution Frame (IDF).

5.3 **PROHIBITED** use of Telecommunications Spaces:

5.3.1 Using any Telecommunications Space (BDP, MER or TR) as a route for other facilities to pass through or above (such as water, drainage, electric, etc.).

5.3.2 Using boiler rooms, air exchange rooms, janitorial closets, electrical distribution closets or areas with water heaters and wet sinks as a Telecommunications Space.

5.3.3 Telecommunications Spaces cannot have any water pipes within the room's interior space, routing horizontally on the floor directly above the room or within the floor slab

5.3.4 Lay-in ceilings (Acoustical Ceiling Tiles) in Telecommunications Spaces.

5.3.5 Locating non-IT resources in Telecommunications Spaces.

5.4 Building Demarcation Point (BDP)

5.4.1 Space Design Criteria

5.4.1.1 Minimum Room Size:

a. Small Buildings (serving size of <20,000 Sq. Ft.) – 4’ x 5’
b. Large Buildings (serving size of <50,000 Sq. Ft.) - 6’ x 8’
c. If the BDP is co-located within the MER, follow the Space Design Criteria for MER.

5.4.1.2 Location: The BDP room shall be located on the basement or ground floor.

5.4.1.3 Floor Loads: Floors shall be designed to support 4.8 kPA (100 lb/ft^2) minimum

5.4.1.4 Door: Rooms shall have a fully opening, lockable door, which is at least 36" wide and 80" in height.

5.4.1.5 Interior Finishes: To minimize dust, floors should be vinyl composition tile or sealed concrete, and all exposed concrete, brick and gypsum board walls should be painted or sealed.

5.4.1.6 HVAC: Rooms shall have HVAC to control temperature and humidity. The heating, ventilating, and air conditioning (HVAC) system shall be designed to maintain an air temperature in the room of between 64°F - 72°F, with a humidity level of 55 - 30%. Design the system for the maximum amount of telecommunication equipment that the room could support.

5.4.1.7 Grounding: Provide a building ground wire, with bus bar, to the room. Locate the bus bar at the lower left corner of the plywood backboard. The Owner will indicate on which backboard to place the bus bar. Refer to the Grounding section of these standards.

5.4.1.8 Lighting: Provide minimum lighting to be equivalent of 540 lux (50 foot-candles) measured 3 feet AFF.

5.4.1.9 Plywood Backboards:

a. Three interior walls in the room, excluding the wall which contains the entrance door, should be covered with ¾" plywood. Plywood should be fire-rated or treated with a minimum of two coats of fire retardant white paint on all sides.
b. The plywood shall reach from corner to corner. Install the plywood vertically from 6" to 8’6” above finished floor (AFF) and anchored securely to wall substrate with a minimum of five (5) equally spaced fasteners along each vertical edge and down the centerline of each sheet of plywood.
c. Fasteners shall be of the appropriate type for each substrate.
d. Provide blocking or additional studs in framed walls to receive plywood backup panel fasteners.
e. In order to field verify the type of plywood installed, at least one of the legible grade stamps on each sheet of plywood shall be masked or covered prior to painting.

5.4.1.10 Electrical:

a. On each wall, except the wall containing the door, install two 120 volt, 20-amp electrical four-plex outlets with a dedicated circuit to each receptacle, evenly spaced, at 102" AFF. Refer to Power section of these standards.
b. Separate duplex 120V convenience electrical outlets shall be installed (for tools, field test instruments, etc.), which are:
    i. Located at 18” AFF

ii. Placed at 6 ft. intervals around perimeter walls

c. Isolated power and emergency receptacles shall have a finish color that is distinct from receptacles that are connected to normal power

d. Note: Project plans may specify the need for additional electrical outlets to be installed, depending on the location of the electrical equipment

5.4.2 If BDP and MER are in separate rooms, the following guidelines for the BDP room shall be met:

5.4.2.1 Room should be near or at the point where the facilities enter the building.

5.4.2.2 A maintenance clearance of 36 inches is required in front of all wiring or equipment panels.

5.4.2.3 Room shall be free of any storage material or other obstructions that could prevent technicians from performing their duties.

5.4.2.4 Provide a minimum of 4-4 inch conduits from the BDP to the MER. Provide 50% spare 4 inch conduits.

5.4.3 It is important to note that the BDP might <u>not</u> be located within the Main Equipment Room (MER) and, in these circumstances, the same number and size of the conduit as installed for the service entrance, must be installed between these two locations. It is not unusual for the demarcation point (BDP) to be located in the ground floor and the Main Equipment Room to be located on a higher floor.

5.4.4 All penetrations into fire walls, conduits, and sleeves through floors and cable trays that pass through a fire-rated wall must be properly fire-stopped in accordance with the National Fire Protection Association (NFPA), ANSI/NFPA-70 NEC, Article 300-21, and ANSI/TIA-569-D.

5.5 Main Equipment Room (MER)

5.5.1 Overview

5.5.1.1 The MER is used to distribute communication services to all of the floor Telecommunication Rooms (TR) within the building and, as such, it can be viewed as the center of the star for wiring and cable distribution. The room contains the necessary wiring cross connects, punch down blocks, fiber patching equipment, and other components to connect to each TR within the building.

5.5.1.2 Items included in a typical MER are the network racks, file servers, video surveillance cabinet and servers, CATV termination hardware, PA system cabinet, PA termination field, 110 blocks for voice, video communication cabinet, UPS's, conduit sleeve receiving services from outside campus for CATV, WAN fiber, and voice circuits.

5.5.2 Space Design Criteria

5.5.2.1 MER Room Size:

a. Main Equipment Rooms should be sized to meet the requirements of the current and planned communications equipment. When the

designer/engineer does not know the specific equipment that may be used in an equipment room, the ANSI/TIA-569-D standard recommends that there be a minimum of 0.35 square feet of space for every 100 square feet of workspace. (A minimum of 280 square feet is recommended.)

b. The actual size of the MER shall be determined during the design phase of the project when more information, pertinent to the size and application of the building, is available.
c. The MER must be a secure room and that disaster backup and continuity plans must be in place for this facility.
d. Coordination with the Electrical Engineer is necessary to determine the physical size of the UPS that may be located in the MER. All clearances around electrical equipment per NEC requirements must be adhered to.

5.5.2.2 Location

a. Every building shall have one Main Equipment Room, and the room should be centrally located in the basement or ground floor.
b. The MER shall not be located below potential water level unless positive preventative measures against water infiltration are employed. The space shall be free of water, heating or drain pipes not directly required in the support of the equipment within the room. A floor drain with tram and back flow preventer or sump with automatic pump shall be provided within the room if risk of water infiltration exists.
c. When selecting the room location within the building, avoid locations that are restricted by building components that limit pathway access or future expansion, such as elevators stairways, outside wall, load bearing walls, utility shafts, ductways and pipe chases, etc, Accessibility for the delivery of equipment to the space shall be provided for.
d. Do <u>not</u> locate equipment rooms in places that are subject to the following conditions:
    i. Water infiltration
    ii. Steam infiltration
    iii. High humidity from nearby sources
    iv. Heat (e.g., direct sunlight)
    v. Any other corrosive atmospheric or environmental conditions
    vi. Adjacency requiring access through other secure areas
e. Shared use of equipment room space with other building facilities must be avoided. Locations which are unsatisfactory for equipment rooms include space in or adjacent to:
    i. Electrical closets
    ii. Boiler rooms
    iii. Washrooms
    iv. Janitor closets
f. Space that contain:
    i. Sources of excessive EMI (i.e. transformers, ballasts, motors, machinery or fan units)

ii. Hydraulic equipment or other heavy machinery that may cause excessive vibration
iii. Steam pipes
iv. Drains
v. Cleanouts

g. The location of the MER can have significant impact on all other aspects of communications system distribution design. In selecting a location, awareness of the spaces immediately adjacent to (i.e., beside, below, and above) the equipment room must be addressed. When designing equipment rooms, the following factors shall be considered:
i. Services to be terminated
ii. Access and proximity to distribution cable pathways
iii. Building facilities and access to the equipment room
iv. Telecommunications provider requirements
v. Proximity to electrical service and electro-magnetic interference (EMI) sources
vi. Space required for equipment
vii. Provisions for future expansion
viii. HVAC issues

5.5.2.3 Wall Requirements

a. A minimum of three interior walls in the room should be covered from 6" above finished floor 8 feet up, with ¾" plywood. Plywood should be fire-rated or treated with a minimum of two coats of fire retardant white paint on all sides. In order to field verify the type of plywood installed, at least one of the legible grade stamps on each sheet of plywood shall be masked or covered prior to painting.
b. The plywood shall reach from corner to corner. Install the plywood vertically and anchor securely to wall substrate with a minimum of five (5) equally spaced fasteners along each vertical edge and down the centerline of each sheet of plywood.
c. Fasteners shall be of the appropriate type for each substrate.
d. Provide blocking or additional studs in framed walls to receive plywood backup panel fasteners.
e. If the Building Demarcation Point (BDP) is located within the room, wall space with backboards must be provided for terminations and related equipment. Due to equipment mounted on the walls and workspace requirements, this need may have an effect on the three-foot workspace

5.5.2.4 Ceiling Requirements

a. A minimum ceiling height of 10'-0" must be maintained.
b. MER rooms shall not have a lay-in or drop ceiling.

5.5.2.5 Floor Requirements

a. Flooring should be sealed concrete, or other finished surface to keep dust at a minimum. VCT tile may also be considered but is not required. Anti-static flooring shall be installed as required by equipment.

b. The floor rating under distributed loading must be greater than 12 Kpa (250 lb./ft.2).
c. The floor loading may be concentrated and therefore must be greater than 4.4 M (1000 lbs.) in areas where support for communications equipment, racks, and cabinets is required

5.5.2.6 Firestopping

a. All penetrations into fire walls, conduits, and sleeves through floors and cable trays that pass through a fire-rated wall must be properly fire-stopped in accordance with the National Fire Protection Association (NFPA), ANSI/NFPA-70, the NEC, ANSI/TIA-569-D and the latest edition of the BICSI TDMM. The manufacturer's recommended installation practices must be followed.
b. Each installation of fire-stopping material must only be used in applications as specified by the fire-stop manufacturer. When installing additional cabling/wiring, the fire-stop system must be reevaluated, and if necessary, a new fire-stop system must be installed to restore the firewall integrity with the appropriate UL-classified system. Only use of UL-classified fire-stop systems is acceptable.

5.5.2.7 Door Requirements

a. The door shall be at least 3' 6" wide and swing open out of the room wherever possible. If door swing out is not possible, then the room must be enlarged to accommodate the swing such that racks, cabinets, or other equipment does not block the swing of the door.
b. The door should lock from outside access. Where available, the door to the MER shall be equipped with a proximity card reader connected to the building Access Control System, door contacts to provide door status, and Request to Exit sensor or button as required.
c. The door to the MER shall not be located at the center of the front wall. Place the door at the outermost end of the corridor side of the MER.

5.5.2.8 Grounding

a. MER shall have a ground bus and meet all requirements of NECA/BICSI 607-2011 Standard for Bonding and Grounding Planning for commercial Buildings. Refer to Section 8 of this standard for Bonding and Grounding Requirements.
b. A grounding system must be designed. The system must provide a short, low-resistance path to ground from all conductive surfaces. Follow Grounding and Bonding as outlined in Section 8 of this document.

5.5.2.9 Fire Protection

a. The Main Equipment Room and Telecommunications Rooms are critical elements of the communication and emergency system of the College/University. It is essential to protect both the facility and the equipment delivering communication services

b. Pipes must be insulated to prevent water condensation from forming and possibly damaging telecommunications equipment. Fire suppression system pipes shall not be installed directly over equipment, but rather they shall be placed near the walls with the manifold pipes in ceiling corners.
c. Fire protection for the MER and/or Telecommunications Room(s) containing equipment in addition to network switches and routers (e.g. computer servers, security systems, network storage devices, etc.) shall be achieved by a combination of a pre-action sprinkler system and a clean agent fire suppression system. Notwithstanding the foregoing, rooms containing only network switches and routers need not comply with the above.
d. Where more than one telecommunication space is involved that requires a clean agent fire suppression system as identified above, each telecommunication space shall be protected by an individual system. Multiple areas remote from each other shall not be served by a single interlock pre-action / clean agent system.
e. The fire protection systems shall comply with the requirements of the Connecticut State Building Code and Fire Code and the referenced editions of NFPA 13, NFPA 70, NFPA 72 and NFPA 2001.
f. The single interlock pre-action / clean agent system shall both be controlled by a single control panel with dual release capability. System release shall be activated by a combination of cross zoned ionization and photoelectric smoke detectors in alarm or by a high sensitivity smoke detection system as determined most appropriate by the consultant. System control shall also include manual release, system abort and service by-pass functions.
g. The single interlock pre-action / clean agent control panel(s) shall be interfaced with the building fire alarm system to relay system trouble and alarm conditions to the building fire alarm system.
h. Smoke detection shall be provided within all areas served by the protection systems including any plenum spaces within the telecommunications room protection envelope.
i. The consultant shall coordinate location of storage tanks, control panels and pipe routing with the telecommunication equipment layout in order to minimize interference with room equipment. Coordinate the location of fire protection system components with room ductwork and lighting. Route system pipes over foot traffic areas and avoid installing piping directly over telecommunication equipment.
j. The consultant shall specify that the installer shall provide a shop drawing submittal indicating, but not limited to, the following:
    i. The sequence of operation of the detection and release equipment
    ii. The internal control panel wiring diagram
    iii. Scaled installation drawings at not less than 1/8” scale showing: storage tanks, control panels, agent nozzles,

sprinklers, piping, smoke detectors, manual pull stations, abort switches, and audible/visual alarms

iv. Manufacturer's literature on all specified equipment

v. Hydraulic calculation data

k. Where existing telecommunication spaces are to be modified, any existing wet sprinkler piping shall be removed and replaced with a single interlock pre-action sprinkler system.

l. The clean agent system shall be a total flood system utilizing Novec1230, commonly known by the trade name Sapphire. The system shall be designed to provide the required agent discharge in 10 seconds or less and maintain the required design concentration within the protected space for a minimum of 10 minutes.

m. Sizing of the clean agent system piping system shall be performed by the installer utilizing clean agent manufacturer's UL listed software and in accordance with NFPA 2001.

n. The design concentration of the clean agent within the protected space shall equal or exceed the manufacturer's current recommendation for a Class C electrical fire. The design concentration shall not exceed the NOAEL value stated in NFPA 2001.

o. The consultant shall coordinate electrical power shutdown of equipment within the protected space with the electrical engineer.

p. The consultant shall coordinate with the architect the required sealing of the room to properly maintain the required clean agent discharge concentration. Spaces protected by the clean agent system shall be properly sealed by the appropriate use of door sweeps, self-closing doors, painting of porous walls; and sealing of all holes, cracks, and penetrations. Where possible, walls for the protected space are to extend up to deck.

q. All ductwork within the space shall be properly sealed. Ducts with inlets or outlets to the protected space shall be provided with dampers to provide a 100% duct closure to the space prior to clean agent system discharge. Consultant shall coordinate with the HVAC engineer to ensure such function is provided.

r. The design specifications shall require the installing contractor to provide a room fan test as described in NFPA 2001, Annex C to verify the proper sealing of the protected space.

5.5.2.10 Mechanical System Requirements

a. The MER heating, ventilating, and air conditioning (HVAC) system shall be designed to maintain an air temperature in the room of between 64°F - 72°F, with a humidity level of 55 - 30%. If the room is to be regularly occupied, ventilation air is required meeting the International Mechanical Code.

b. Design the system for the maximum amount of telecommunication equipment that the MER could support. Coordinate with ConnSCU for equipment requirements so that heat load estimates can be calculated.

c. Cooling in the MER is critical to the operation of the network electronics and shall be maintained continuously 24x7x365. Each telecommunications room shall have an independent environmental system that is neither part of nor dependent upon building HVAC.
d. Telecommunications room HVAC systems shall derive power for operations from emergency or back-up generator systems in the event of power loss to the building (NOT the UPS).
e. The cooling and heating system within the MER shall remain independent of the building automated systems and/or building automatic shutdown system, if any, and shall not be subjected to building power-saving shutdowns (evenings, weekends, and holidays). Provide continuous dedicated environmental control (24 hours per day, 365 days per year).
f. Telecommunications rooms shall maintain a positive pressure with a minimum of one air change per hour.
g. Where ever possible, HVAC system is to be located outside the MDF/IDF room and appropriate cooling feed ducts and return ducts entering and exiting the room. HVAC equipment located inside MDF/IDF rooms may be either floor mounted, wall mounted or suspended from joists or building structure above. If the HVAC equipment is suspended from above, the minimum clearance shall be 10'0". HVAC equipment including lines shall not be located over or above telecommunications equipment.
h. Ductwork for HVAC systems within the Telecommunications Room shall be run so that it will not eclipse trays nor block access to other equipment.
i. Supply diffusers shall be placed in front of equipment cabinets and/or racks, and returns placed at the rear of equipment cabinets and/or racks to create a "hot aisle – cold aisle" configuration.
j. The temperature display for the MER shall be mounted above lighting switches next to the entry door. Temperature will be controlled digitally through the building automation system.
k. Where water-based HVAC systems are utilized, water lines and coils shall not be located over planned communications equipment locations.
l. Condensate liners shall drain to building exterior, or sanitary drain line, without use of condensate pump. Evaporator unit shall include secondary drain pan (provided it does not interfere with the unit airflow) with float switch designed to shut off unit in the event of overflow. Floats switches shall be UL 508 listed.
m. Provide the ability for BMS (where provided) to remotely monitor temperature and humidity and alarms.

5.5.2.11 Electrical System Requirements

a. All new construction and major renovations shall include both a UPS system and backup generator to support the Telecommunications rooms. The physical size of the UPS must be accounted for in MER/TR room layout. All required clearances around the UPS must be adhered to.

b. Each MER shall be wired for a UPS system with transient voltage surge suppression (TVSS) protection device. The size of the UPS system will be determined on a project by project basis. A transfer switch will provide a feed to the UPS system and will receive its feed from two sources: the building's main power distribution panel; and a backup telecommunications generator.
c. The centralized UPS system will feed an electrical distribution panel in each telecommunications room (MER/TR). The distribution panels will be sized on a project by project basis with a minimum size to accommodate four dedicated 30 amp 2 pole circuits with 100% expansion space. Individual rack-mounted UPS's in each TR are not permitted unless approved by ConnSCU. Features of the centralized UPS shall include the following:
    i. Provide clean, uninterrupted power to MER/TR Room equipment including but not limited to network switches, servers, security equipment, etc. UPS shall also protect against spikes, surges and sags from utility power sources.
    ii. UPS shall be scalable. Provide N+1 redundancy for reliability and future growth. UPS to be on-line type, double conversion.
    iii. The UPS shall be sized for 150% of the anticipated load to allow for future capacity.
    iv. If a generator is installed and supports the MER/TR UPS, runtime must be sufficient to allow the generator to become fully operational. If no generator, the UPS runtime must be a minimum of 30 minutes.
    v. A full wrap-around bypass shall be provided.
    vi. UPS shall be equipped with a network management card for connection to the ConnSCU network for remote monitoring. Additionally, the UPS shall have the capability to connect to the Building Management System.
    vii. Based on the type and quantity of batteries, provide hydrogen gas detection and ventilation per code requirements. System shall be connected to Building Management System. VRLA type batteries typically do not require ventilation, but must be confirmed with UPS manufacturer.
d. All electrical equipment in the MER/TR Rooms, including electrical panels, UPS, disconnect switches, etc.) must not be located below any sources of water (i.e. sprinkler pipes, water pipes, air conditioner units, etc). All clearances required per NEC must be adhered to.
e. Each Active Equipment Cabinet/Rack (housing servers, network equipment, video surveillance, etc.) shall be equipped with electrical receptacles to accommodate the equipment located in the rack. Receptacles may include Quad 5-20R, L5-20R (20A/120V Twist-Lock), L6-20R (20A/208V Twist-Lock), L5-30R (30A/120V Twist-Lock, or L6-30 (30A/208V Twist-Lock).

f. Each receptacle may require a dedicated circuit, but should be coordinated with equipment loads and ConnSCU. Active equipment may be equipped with multiple power supplies that will require individual receptacles.
g. Receptacles for equipment racks shall be located on the ladder rack above each equipment rack wherever possible.
h. **Electrical Engineer shall coordinate with Structured Cabling System Designer, ConnSCU IT and Owner for quantity and location, and mounting height of receptacles for each specific telecommunication room layout**.
i. Coverplates for surface mounted boxes in Telecommunication Room spaces shall be raised cover galvanized steel manufactured for the purpose.
j. Coverplates shall be identified with panelboard designation on top and circuit number below engraved or silk screened.
k. Environmental alarms must meet state, federal, codes and be interfaced to the College/University card access/alarm panels. Panel inputs include all UPS alarms; generator active alarms; fire, temperature, humidity, A/C unit transition switch; floor water detection; battery damper; and door breech.

5.5.2.12 Lighting Requirements

a. MER shall have adequate and uniform lighting with a minimum of 50-footcandles (540 lux) at 3 feet (910 mm) above floor level. (Take into account the light loss due to the full cable tray and light that may be blocked by equipment cabinets when performing the lighting calculations.)
b. Coordinate positions of the light fixture with the equipment layout, particularly overhead cable trays and equipment cabinets, to ensure the light is not obstructed.
c. Use high efficacy LED fixtures. Light fixtures shall be properly secured to the ceiling.
d. LED fixtures shall be bi-level switching type, low level shall be at the 50% light output and the high level shall be full light output.
e. Install lighting fixtures at a minimum of 8'-6" above the finished floor. Locate lighting fixtures to maintain minimum ANSI/TIA distance requirements between lighting fixtures and all telecommunications cabling and equipment. Coordinate locations of lighting fixtures in order to provide adequate lighting (without shadows) for personnel working on or around telecommunications equipment. Locate in front and rear of cabinet/rack aisles.
f. Provide a minimum equivalent of 540 lux (50 footcandles) measured 3'-0" above the finished floor.
g. Emergency lighting is recommended within telecommunications rooms.
h. Provide emergency lighting in the MER consistent with the emergency lighting system for the building.

5.5.2.13 Cable Management

a. Overhead cable management must be given careful consideration during planning stages of construction.

b. At a minimum, all communication spaces should have Ladder Rack installed at a height of ninety-six (96) inches off the floor, with minimum width of 12".
c. Locate the Ladder Rack on the perimeter walls of the MER with the Ladder Rack providing access to equipment racks. Radius Drops (cable Waterfalls) shall be installed on Ladder Rack to maintain proper bend radius of cabling.
d. All cable wireways shall be UL approved for use with communication cabling

5.5.2.14 Conduits and Sleeves

a. Riser and distribution cables leaving the room to building TRs should be via cable tray, four-inch (4") conduits, ~~or~~ sleeved cores, or fire-rated assemblies (i.e. STI EZ-Path Sleeves).
b. The exact number of conduits required or size of the cable wireway should be determined based upon the amount of fiber and copper cable that must be supported in each Computer Room or Telecommunications Room.
c. Additional conduits or sleeved cores must be included in the design to provide for future growth.
d. If the Building Demarcation Point (BDP) is not located within the MER, sufficient conduit must be run between these two locations. Additional cores/conduits must be provided for future growth.
e. All conduits/coring should be kept six inches (6") or less from walls whenever construction permits.
f. All penetrations must be sealed with a smoke and flame stops, which meet applicable code.
g. Pull cable must be installed in all conduits.
h. Provide a minimum of 4-4 inch conduits from the MER to each TR. If the MER and TR's are stacked, sleeves are acceptable. Provide 50% spare 4 inch conduit/sleeves. (This means that if four 4" conduits/sleeves are provisioned for use, there must be an addition two 4" spare conduits/sleeves installed for future growth, for a total of six 4" conduit/sleeves.)
i. If Armored backbone cables are specified, the use of conduits between the MER and TR are not required. Armored cables must be properly supported on Cable Tray, J-Hooks, or other approved cable support method.

5.5.2.15 Additional MER Design Considerations

a. The layout of major communications equipment in the MER must facilitate the effective routing of power and communications cabling. The Main Equipment Room must prove adequate space for:
    i. Server rack(s)
    ii. Network equipment rack(s)
    iii. Cable rack(s)
    iv. Video surveillance equipment rack(s)
b. In addition to space for communications requirements, an equipment room also shall include space for necessary

environmental control equipment, power distribution/conditioners, and UPS systems that may be installed.

c. When designing equipment rooms, consider incorporating building information systems other than traditional voice and data communications systems (e.g., CATV distribution systems, alarm and security systems, and audio/paging systems). In some instances, the MER (equipment room) may also serve as the entrance facility for the building communications.
d. The design of a new equipment room should begin with an assessment that considers each of the factors listed below. The information gathered from this assessment must be considered by the engineers/designers at all stages of the project design, along with guidelines and requirements of applicable local, state, federal standards and this design document. The following design factors shall be considered:
    i. College/University requirements
    ii. ConnSCU System requirements
    iii. Telecommunications pathway locations
    iv. Service provider (Local Exchange Carrier [LEC]) requirements
    v. Environment/Facility conditions and resources
e. The designer shall make provisions for access to equipment for maintenance and administration as well as for future growth. NEC Section 110.26 requires three (3) feet of clear working space around equipment with exposed live parts. This applies to communication equipment rooms.

5.6 Telecommunications Room (TR)

5.6.1 Overview

5.6.1.1 The equipment in the TR includes wiring cross connects and patch panels, punch down blocks, fiber patching equipment, etc. The TR also contains communications equipment such as routers and switches where applicable.

5.6.1.2 While the MER serves as the communications hub for the entire building, the TR serves as the center of the star for wiring and cable distribution for that floor (or portion of the floor). Wiring from the TR is distributed to each work space served by that TR; this wiring can be distributed via a number of methods depending upon building and electrical codes, fire safety codes, etc. The most common methods are cable tray systems, cable suspension (above a dropped ceiling), conduits and various under floor systems.

5.6.1.3 The cable distance between the TR and any workspace must be less than 295 feet of measured cable length.

5.6.1.4 Design and engineering standards for the MER as specified previously in this document detailing specifications on: Power/UPS, HVAC, Fire Alarm, Security, Cable Management, and Electrical Systems, apply to TR design as well.

5.6.1.5 There will be one or more TRs depending on the size and layout of a floor. The TRs should be located so that it is easy and straightforward to run cable to each location served by that TR without having to penetrate or pass around architectural barriers.

5.6.1.6 Telecommunications communications rooms should be dedicated spaces located on every floor and be vertically stacked with hallway or public area access. They should be strategically located to serve a maximum of 20,000 SF of building floor space and limit maximum horizontal cabling runs to 90 meters (295 feet).

5.6.1.7 The rooms should be sized to optimize their ability to accommodate known requirements of specific equipment to be installed allowing for a minimum of 100% future expansion, and the ability to accommodate change and to be as unconstrained as possible by vendor equipment and media requirements.

5.6.2 TR Room Size

5.6.2.1 TRs vary in size depending on their function, concentration of telecommunication outlets and the size of the floor area they serve. The actual size of TR will depend on the building and therefore will require input from ConnSCU during the design phase of the project. However, the room must be rectangular in shape, and the minimum size of a TR should not be less than 9’ x 10’.

5.6.2.2 Telecommunications rooms that meet the square foot requirements but have jogs in the floor plan or structural elements such as columns that interfere with the equipment layout do not meet these requirements.

5.6.3 Location

5.6.3.1 TRs should be located so that it is easy and straightforward to run cable to each location served by that TR without having to penetrate floors or pass around architectural barriers.

5.6.3.2 It is imperative that TRs be located so as to minimize cable lengths for both horizontal and vertical cable runs.

5.6.3.3 Vertical Distribution - When designing Telecommunications Rooms for vertical distribution, it is preferable to "stack" rooms so that the Telecommunication Room on level one is located directly below the Telecommunications Room on level two, etc. Rooms should be connected to one another via four (4) inch conduits. Conduits should penetrate the floor in the room on the far left corner of the room, and extend no less than six (6) inches above the floor.

5.6.3.4 Horizontal Distribution - Telecommunication Rooms must be located to maintain a distance no greater than 295 feet (cable length) from the furthest termination point (communication outlet) served by that room. Ensure that conduits and cable trays feeding the Telecommunication Room terminate completely inside the room.

5.6.4 Walls, Floors, Ceiling, Door Requirements

5.6.4.1 Requirements for the Telecommunications Room (TR) shall follow the same guidelines as the MER.

5.6.5 Fire Protection Requirements

5.6.5.1 Requirements for the Telecommunications Room (TR) shall follow the same guidelines as the MER.

5.6.5.2 Fire protection sprinklers should only be provided in telecommunications rooms if required by code or local jurisdiction. The preferred system type is a double interlock system installed in the MDF only. If sprinkler heads are provided, install wire protective cages to prevent accidental operation. For wet pipe systems, provide drainage troughs, where applicable. Provide as required by code or local jurisdiction.

5.6.5.3 Fire alarm sensing devices (smoke and thermal detectors) connected to the building's fire alarm system is the preferred method of fire protection. Provide as required by code or local jurisdiction.

5.6.6 Mechanical, Electrical and Lighting Requirements

5.6.6.1 Requirements for the Telecommunications Room (TR) shall follow the same guidelines as the MER.

5.6.6.2 Additional Electrical Requirements:

a. When designing electrical system for TRs, an engineer shall assume that the Owner will install in the room a Power over Ethernet (PoE/PoE+) data switch. Current and emerging PoE standards define the following per port wattages that must be considered when calculating the TR electrical requirements.
   i. 15.4W (12.95W at end device) per 802.3af.
   ii. 30W (25.5W at end device) per 802.3at.
   iii. 55W per proposed 802.3bt.
   iv. 90-100W per proposed 802.3bt.
b. The most current version of the National Electrical Code shall be followed with respect to delivering Power over Ethernet (all versions) over 4-Pair telecommunications cable.
c. The Electrical Engineer shall coordinate with the Low Voltage Systems Designer for the quantity of data cables required for all telecommunication rooms in project scope and verify all power requirements and components.
d. The TR UPS distribution panel fed from the MER UPS system will be sized on a based on the requirements of the TR with a minimum size to accommodate a minimum of four dedicated 30 amp 2 pole circuits with 100% expansion space.

5.6.7 Additional TR Design Considerations:

5.6.7.1 NEC Section 110.26 requires three (3) feet of clear working space around equipment with exposed live parts. This applies to communication Telecommunication Rooms.

5.6.7.2 It is essential that clear, unobstructed access to cable tray and conduits be provided within the TR. When possible, entrance conduit and distribution conduit/cable tray should enter and exit on the same wall; if this is not possible, cable tray inside the room should be provided for distribution from wall to wall.

5.7 Equipment Racks, Cabinets, and Cable Management

5.7.1 Overview

5.7.1.1 The Cable Management System shall be used to provide a neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures.

5.7.1.2 The system shall be a complete cable management system comprised of floor mount racks, vertical and horizontal cable managers to manage cables on both the front and rear of the rack.

5.7.1.3 The system shall protect network investment by maintaining system performance, controlling cable bend radius and providing cable strain relief.

5.7.2 2-Post Equipment Racks

5.7.2.1 Passive equipment racks shall house Cable Termination components (e.g. Patch Panels, Fiber Optic Enclosures, etc.) and active equipment racks shall house Electronic Equipment (e.g. Network Switches, Routers, Servers, etc). Electronic Equipment will typically be furnished and installed by ConnSCU, however the designer must coordinate equipment requirements with ConnSCU so adequate rack space can be allocated.

5.7.2.2 Racks shall typically be 84" in height and shall be self-supporting. In certain situations with limited space in the MER and/or TR, 96"H equipment may be specified, but must be approved by ConnSCU.

5.7.2.3 All Racks shall be standard 19" wide.

5.7.2.4 Channel uprights shall be spaced to accommodate Industry standard 19" mounting. Mounting holes shall utilize #12-24 mounting screws, and be in a 5/8"-5/8"-1/2" pattern per the EIA-310D Standard.

5.7.2.5 A passive equipment rack shall not have more than six 48-port patch panels (288 copper cable terminations) for terminating cables. If more than 200 cables are designed for a TR, a second passive equipment rack shall be installed. (If more then 400, then a third must be installed, and so on).

a. If Angled patch panels or higher density patch panels are specified (i.e. 48 ports on a 1U panel), the six patch panel per rack limit may not be applicable.

5.7.2.6 For each passive equipment rack installed, a minimum of one active equipment rack shall be installed. Additional active equipment racks may be required, consult with ConnSCU Telecommunications and Campus IT. Coordinate with ConnSCU to determine placement of Active equipment racks in relation to Passive equipment racks.

5.7.3 4-Post Equipment Racks

5.7.3.1 4 post active equipment racks may be required to accommodate active equipment. The design engineer must consult with ConnSCU Telecommunication and Campus IT

5.7.3.2 Racks shall typically be 84" in height and shall be self-supporting. In certain situations with limited space in the MER and/or TR, 96"H equipment may be specified, but must be approved by ConnSCU.

5.7.3.3 All Racks shall be standard 19" wide.

5.7.3.4 Mounting rails shall be square-punched per the EIA-310D Standard, and must accommodate 10-32, 12-24, 1/4-20 or M6 Cage Nuts. Threaded rails on 4-post racks are not permitted unless approved by ConnSCU.

5.7.4 Enclosed Cabinets

5.7.4.1 In MER/TR Rooms, 2-post and 4-post equipment racks are preferred.

5.7.4.2 If lockable equipment cabinets are required, they shall meet the following guidelines:

a. Be a minimum of 30" in depth
b. Have adequate internal ventilation (i.e. fan kits).

5.7.4.3 Wall-Mount cabinets are not to be specified without approval from ConnSCU, and shall only be used in situations where constructing a Telecommunications Room meeting the guidelines in this document is infeasible.

5.7.5 Ceiling Enclosures

5.7.5.1 Ceiling enclosures for termination of cabling and housing of network switches are only to be used with approval from ConnSCU.

5.7.5.2 Enclosure shall be designed to fit into a 2x2 or 2x4 ceiling tile, and must be properly supported from the building structure per manufacturer instructions.

5.7.5.3 Enclosures must be plenum rated, and be equipped with integrated power strip and fan kit.

5.7.5.4 Enclosures must be easily accessible with a ladder. No enclosures may be mounted in a ceiling more than 10' in height.

5.7.6 Cable Management

5.7.6.1 Vertical Cable Management

a. At the Telecommunication Rooms, vertical cable management shall be furnished and installed on both sides of racks to organize cables on front and rear of telecommunication racks.
b. Vertical cable management shall be 6" wide as a minimum. When using angled patch panels, 10" wide vertical cable management should be considered.
c. Vertical cable managers shall include components that aid in routing, managing and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
d. Open cabling section on the rear shall provide easy access and routes cable bundles feeding into the back of patch panels and 1 RMU cable guides on the front shall enable fanning and managing patch cords.
e. Door/Cover (front only) shall be able to open from the right or left and still be easily removed to allow for quick moves, adds, and changes.

5.7.6.2 Horizontal Cable Management

a. Horizontal cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment.

b. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief.
c. The duct fingers shall include retaining tabs to retain the cables in place during cover removal.
d. The covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
e. Where Cable Termination Hardware is wall mounted, the cable pathway shall be established for jumpers routed from the Equipment Rack(s) to the wall. This shall be in the form of slotted ducts, troughs or other means.
f. Horizontal cable managers are not required between angled patch panels.

5.7.7 Installation Guidelines

5.7.7.1 Equipment racks shall be bolted to the floor as recommended by the manufacturer. Multiple racks shall be joined and the ground made common on each. Racks shall also be stabilized by extending the support bracket to the overhead cable tray.

5.7.7.2 The rear of the rack should be approximately 40" from the wall to allow for access by maintenance personnel. In all cases, a minimum of 36" workspace in front of the rack is also required. Locations where these guidelines cannot be followed should be brought to the attention of ConnSCU Telecommunications Department for resolution prior to installation.

5.7.7.3 Positioning of hardware should be reviewed and approved by ConnSCU and Site Coordinator(s) prior to installation.

5.7.7.4 Equipment Rack shall be equipped with cable management hardware as to allow an orderly and secure routing of twisted pair cabling to the data patch panels. At minimum, one such Horizontal Jumper Management Panel shall be placed below each Fiber Optic and Category 6 Patch Panel. Additional Jumper Management panels may be required pending installation of other cable types on the rack.

5.7.7.5 The rack shall be equipped with rack ground bar (RGB), grounded to the Telecommunications Ground (TGB) using a #6 AWG (or larger) insulated stranded copper conductor (GREEN jacket).

5.7.7.6 Each rack shall be equipped with a vertical rack-mount power strip, including a 10-foot cord with plug matched plug into receptacle located above rack per the electrical requirements in section 5.5.2.11 of this document. Vertical power strips shall contain a minimum of twenty (20) L5-20R receptacles and a power meter. Confirm with ConnSCU if any IEC-C13 or IEC-C19 receptacles are required on the power strip. Standoff mounting brackets are required so power strip does not block rear rail or vertical wire manager.

6. Backbone Cabling

6.1 Inter-Building Copper Backbone Cabling (Outside Plant)

6.1.1 The Copper Backbone cable shall meet or exceed the ANSI/TIA Category 3 performance requirements.

6.1.2 A minimum of 50 pairs of copper cable are to be installed from the Campus Node Room to the BDP. ConnSCU will identify the Campus Node Room. Additional pairs may be required based on the needs of the College/University and will be identified during the design phase of the project.

6.1.3 OSP Copper Backbone Cable shall incorporate 24 AWG solid copper conductors insulated with a polyvinyl chloride skin over expanded polyethylene with a gel-based (ETPR) filling compound. Conductors shall be twisted to form pairs and fully color-coded.

6.1.4 OSP rated cables may not be routed within a building more than 50' unless placed in metallic conduit.

6.2 Inter-Building Fiber Optic Cabling

6.2.1 OSP Fiber optic backbone cable shall be stranded loose tube cable consisting of a minimum 96 strands of Singlemode cable. All fiber strands will be terminated with LC connectors. No fiber will be daisy chained for use on the ConnSCU network.

6.2.2 All OSP fiber shall be installed in PE constructed corrugated inner duct when placed in underground conduits. The underground 4" conduits will house a minimum of three 1-1/4" innerducts per conduit.

6.2.3 OSP rated cables may not be routed within a building more than 50' unless placed in metallic conduit.

6.3 Intra-Building Copper Backbone Cabling (Inside Plant)

6.3.1 Overview

6.3.1.1 The function of the backbone wiring is to provide the interconnection between each telecommunications room (TR), building demarcation point (BDP), and Main Equipment Room (MER) in the telecommunications system-wiring structure.

6.3.1.2 All backbone cables shall be Plenum rated (CMP, CATVP. OFNP, etc.

6.3.2 Voice Backbone Cabling

6.3.2.3 The Voice Backbone cable shall meet or exceed the ANSI/TIA Category 3 performance requirements.

6.3.2.4 Voice Backbone Cable shall incorporate 24 AWG solid copper conductors insulated with a polyvinyl chloride skin over expanded polyethylene. Conductors shall be twisted to form pairs and fully color-coded.

6.3.2.5 Voice backbone cables shall be terminated on wall mounted 110 type blocks with C5 clips at BDP, MER & TRs. Termination field shall include all troughs as required for cable management. All 110 blocks shall be labeled indicating the source / destination of the cable.

6.3.2.6 A minimum of one 24-port CAT 6 patch panel shall be installed in each MER and TR for special circuits and/or analog phones. The ConnSCU Telecommunications department will designate the equipment rack that will house this patch panel. CAT 6 cable will be installed from the patch panel to a wall mounted 110 type block on an adjacent wall (location to be designated by ConnSCU).

6.4 Intra-Building Fiber Backbone Cabling (Inside Plant)

6.4.1 Fiber optic backbone cable installed between the MER and each TR shall be 24 strands of Single Mode OS2 rated cable. The cables shall be OFNP rated.

6.4.2 The indoor fiber optic backbone cable shall have inter-locking armor made of aluminum. Armor sheath must be properly bonded to the TGB at each end unless a dielectric armored cable is utilized.

6.4.3 All fiber strands will be terminated with LC connectors.

6.4.4 No fiber will be daisy chained for use on the ConnSCU network.

6.4.5 The use of pre-terminated fiber trunk cables are permitted within Data Centers, MER Rooms, and other locations if approved by ConnSCU. When connected to the cassette in the fiber enclosure, the fiber trunk shall be broken out to LC connectors on the front side of the enclosure.

6.5 Coaxial Backbone Cabling

6.5.1 Acceptable Cable Types:

6.5.1.1 RG-11 Quad Shield

6.5.1.2 P3-500

6.6 Termination of Backbone Cabling

6.6.1 Copper Cabling

6.6.1.1 Each 25-Pair binder group is to be terminated to a wall-mounted 110-Style termination block using C5 clips.

6.6.1.2 Outside plant copper cables shall be terminated to a Building Entrance Terminal (BET) with sufficient capacity to allow for termination and protection of all incoming pairs. BEP to be bonded to TMGB/TGB with minimum #6 AWG ground wire. Each cable pair to be protected with Solid State 5-Pin Protector Module designed to protect both analog and digital circuits.

6.6.2 Fiber Optic Cabling

6.6.2.3 Fiber Optic Enclosures

a. Separate patch panels shall be installed for each type (single mode and multimode) of fiber optic cable and shall be labeled accordingly.
b. All terminated fibers shall be mated to duplex LC couplings mounted on enclosed patch panels. Couplers shall be mounted on a panel that, in turn, snaps into the enclosure.
c. The patch panel enclosure shall be sized to accommodate the total fiber count to be installed at each location plus 20% for expansion.
d. Patch panels shall be designed for easy installation, front removal and expansion of snap-in adapter panels.
e. Patch panels shall be enclosed assemblies affording protection to the cable subassemblies and to the terminated ends. The enclosures shall incorporate a hinged or retractable front cover designed to protect the connector couplings and fiber optic jumpers.
f. The patch panel's enclosure shall provide for strain relief of incoming cables and shall incorporate radius control mechanisms to limit bending of the fiber to the manufacturer's recommended minimums or 1.2", whichever is larger.
g. Access to the inside of the patch panel enclosure during installation shall be from the front and rear. Panels that require any disassembly of the cabinet to gain entry shall not be accepted.
h. All patch panels shall provide protection to both the "facilities" and "user" side of the coupling. The patch panel enclosure shall be configured to require front access only when patching. The incoming cables (e.g., backbone, riser) shall not be accessible from the patching area of the panel. The enclosure shall provide a physical barrier to access of such cables.
i. Fibers shall be terminated either by (1) splicing of factory-terminated cable assemblies ("pigtails") or (2) the use of a "fan-out" kit. In the latter approach, individual fibers are to be secured in a protective covering – such as an Aramid reinforced tube for example - with connectors mated to the resulting assembly. In both instances, the termination hardware shall incorporate a mechanism by which cable and sub-assemblies are secured to prevent damage. Splicing shall be by the "fusion" method. Individual splice loss shall not exceed 0.2 dB.

6.6.2.4 Fiber Optic Coupler (Adapter Modules)

a. All terminated fibers at the Telecommunication Rooms shall be mated to couplings mounted inside fiber enclosures. Couplings shall be mounted on a panel that, snaps into the housing assembly. Any unused panel positions shall be fitted with a blank panel inhibiting access to the fiber optic cable from the front of the housing.
b. Couplings shall be color coded. Single mode couplings shall be Blue and Laser Optimized OM3/OM4 Multimode shall be Aqua. For applications requiring angled polished connectors (APC), the coupling color shall be Green.

c. All couplings shall be fitted with a dust cap.
d. Fibers from multiple locations may share a common enclosure but must be segregated on the connector panels and clearly identified. Fibers from multiple destinations may be secured in a common enclosure, provided that they are clearly identified as such. Fibers from different locations shall not share a common connector panel (e.g. "insert").
e. Slack in each fiber shall be provided as to allow for future re-termination in the event of connector or fiber end-face damage. Adequate slack shall be retained to allow termination at a 30" high workbench positioned adjacent to the termination enclosure(s). A minimum of 1-meter (~39") of slack shall be retained regardless of panel position relative to the potential work area.
f. Insertion loss of two mated connectors shall be less than or equal to 0.75dB.

6.6.2.5 Fiber Connectors

a. Fiber optic connector shall be small factor connector "LC" style.
b. The connector shall meet or exceed a Fiber Optic Connector Intermateability Standard (FOCIS) document (TIA/EIA-604-10).
c. The LC connector must meet the mechanical and environmental performance requirements set forth in ANSI/TIA-568-C.3. The basic minimum requirements for an optical connector are maximum loss of 0.75 dB for multimode or singlemode fibers and a minimum return loss of 20 dB for multimode and 26 dB for singlemode fiber.
d. Applications requiring broadcast video may require the use of Angled Polished Connectors (APC). Coordinate with ConnSCU Staff for specific requirements.
e. Connectors shall sustain a minimum of 200 mating cycles per TIA-455-21 without violating specifications.

7. ~~Inside Building~~ Horizontal Cabling

7.1 PROHIBITED

7.1.1 Daisy chaining of conduit.

7.1.2 Splitting copper pairs between jacks. Each 4-pair cable shall be terminated in an eight-position modular jack at the work area outlet.

7.1.3 Sharing the outlet and conduit pathway.

7.1.4 Using traditional nylon synch style tie wraps to bundle cables. Only Velcro style tie wraps are acceptable.

7.1.5 Copper Clad Aluminum (CCA) cables. All Cat-6/6A conductors shall be pure copper.

7.1.6 Painting of cables. All installed cables shall be protected so that paint does not adhere to the cable jacket, and potentially void the cable warranty.

7.2 General Requirements

7.2.1 Telecommunications outlets shall be wired with unshielded, twisted pair 23 AWG wire (UTP) with suitable insulation and sheath material to meet or exceed ANSI/TIA-568-C.0 and ANSI/TIA-568-C.1 or equivalent. The wire shall be type communications riser cable (CMR) or communications plenum cable (CMP) (UL) with rating dependent or NEC Section 800-15.

7.2.2 Structure cabling distribution system shall be designed and installed in a "star" or "hierarchical star" topology configuration with the MER being the central "hub."

7.2.3 The sum total cable length between each Work Area Outlet (WA) to Telecommunication Room (TR) shall not exceed 295 ft.

7.2.4 NO SPLICES or TAPS are allowed. Each run from outlet to panel must be a single continuous cable.

7.2.5 Each Work Area Outlet shall be supplied by no less than two (2) separate communication cables.

7.2.6 Cables shall, at a minimum, adhere to the Category 6 specifications (higher categories when approved).

7.2.7 UTP cables shall be terminated on an eight conductor eight position (commonly referred to as "RJ45") jack. The wiring scheme shall T568B unless existing terminations in an existing building utilize the T568A scheme in which case T568A may be used.

7.2.8 Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by ConnSCU Telecommunications Department prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

7.2.9 Any cables installed in 'wet locations' as defined by the NEC (including below grade conduits), must utilize an OSP rated Cat-6/6A cable. CMX rated cables may also be used where applicable. Examples include routing cables to a floor box in a slab on grade application, or to outdoor CCTV Cameras.

7.2.10 A Cat-6/6A building entrance terminal must be used in the channel to protect equipment. Each incoming OSP rated cable must be protected. Entrance terminals must be properly bonded to the TR grounding system or to building steel.

7.3 Horizontal Fiber Cabling

7.3.1 Powered Fiber

7.3.1.1 Devices located greater than 295' from a Telecom Room may utilize a power fiber cable to extend network connectivity and Power over Ethernet (PoE) beyond the traditional 295' limit.

7.3.1.2 Typically applications include but are not limited to:

a. Outdoor CCTV Camera's not attached to the façade of a building (i.e. on a light pole).
b. Outdoor Wireless Access Points
c. Digital Signage
d. Outdoor Digital Signage

7.3.1.3 Pathways to outdoor devices must be coordinated with the Site/Civil engineer, including providing sufficient pull points and sufficient conduit diameter. Refer to Section 4 of this document for Exterior Pathway guidelines.

7.3.1.4 Products include Berk-Tek OneReach, CommScope Powered Fiber, or equivalent.

7.3.2 Fiber to the Desk (FTTD)

7.3.2.1 Horizontal fiber to locations within distance to a Telecom Room are not approved for use unless otherwise authorized by ConnSCU.

7.3.3 Passive Optical Networking (PON / GPON)

7.3.3.1 A PON / GPON solution may be considered as an alternative to a standard Structured Cabling System, however it must be reviewed and approved by ConnSCU prior to design and implementation.

7.4 Horizontal Coax Cabling

7.4.4 If required, coax cabling to be RG-6 Quad Shield and plenum rated (CATVP).

7.5 Horizontal Copper Cabling

7.5.1 All horizontal data cables shall be Category 6 UTP to support 1 Gbps data rates, except as noted. Cables shall terminate on modular Patch Panels in the Telecommunications Rooms.

7.5.2 Refer to Appendix A for a listing of cable quantities and types for typical devices and work areas.

7.5.3 The following devices require cabling other than Category 6 UTP:

a. Wireless Access Points are to receive two Category-6A STP cables.
b. IP enabled door locks require one Category-6 STP cable with drain wire.
c. Twisted pair cabling used for Audio Visual HDBase-T applications shall utilize a shielded Category-6A cable.

7.5.4 IEEE 802.3an standard defines the requirements for transmission of 10 Gbps. For applications requiring 10 Gbps data rates, an augmented Category-6 cable (Category-6A) must be specified. Given the larger cable diameters and weight of Category-6A, cable pathways, cable supports, rack requirements, conduit and backbox requirements, etc. must be adjusted to accommodate a Category-6A system.

7.5.5 The maximum permitted horizontal distance is 295 feet with 33 additional feet allowed as the total cumulative length for patch cables, jumpers cords, etc. (total maximum length not to exceed 328 feet).

7.5.6 Category 6 and 6A cables shall be suitable for installation free-air, in building risers, in conduit and/or in cable tray and carry CMP or CMR rating dependent or NEC Section 800-15.

7.5.7 The following characteristics of the Category-6 and 6A cables must be adhered to:

7.5.7.2 Category-6 cable shall be 'enhanced', often referred to as Category-6e. Minimum compliant cable is not acceptable. Headroom above TIA Standards for NEXT and PSNEXT shall be at least 3dB. All Cat-6 cables shall be constructed with an internal pair separator.

7.5.7.3 Category-6A shielded cable shall have an overall shield over all pairs, and constructed to support Power over Ethernet of up to 100 Watts.

7.5.7.4 All cable must be constructed of pure copper. Aluminum clad copper cable is not acceptable.

7.5.8 The jacket color for data cables shall be coordinated with the Owner.

7.5.9 Category-6 and 6A Jacks

7.5.9.1 Horizontal cables shall each be terminated at their designated workstation location on modular Category 6/6A jacks. The jacks shall snap into a modular faceplate.

7.5.9.2 Each jack shall be labeled with TR #, panel # and jack ID numbers.

7.5.9.3 Jacks colors shall be coordinated with the Owner.

7.5.9.4 Additional modules for copper shall include the following:

a. F-Type coax coupler module, female-female threaded
b. HDMI Module

c. Female-female coupler module
d. HDMI with 110-style termination.
e. USB Module
f. Coupler module (USB-A or USB-B Style)
g. USB with 110-style termination.
h. 3.5mm Audio Jack

7.5.9.5 IMPORTANT: Cable and Termination Components (Jack, Patch Panel, and Wiring Blocks) shall be designed and installed to function as a System. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the Termination Component Manufacturer.

7.5.10 Category-6 and 6A Patch Panels

7.5.10.1 Data horizontal cables shall be terminated at the Telecommunication Rooms on high-density angled modular patch panels.

7.5.10.2 Data Patch Panels shall be designed and installed in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.

7.5.10.3 Data Patch panels shall be sized to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.

7.5.10.4 The patch panels shall contain labels on a front for easy port edification.

7.5.10.5 STP cables must be terminated to patch panels designed for this purpose. These patch panels must be properly bonded to the grounding system in the Telecom Room. Vertical Rack Grounding Bars (RGB) located on the equipment racks facilitate this bonding.

7.5.11 Faceplates

7.5.11.1 Faceplates shall be plastic and incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.

7.5.11.2 Any unused jack positions shall be fitted with a removable blank inserted into the opening.

7.5.11.3 Single gang faceplate shall be installed, where a standard single gang mod ring mount over dual gang outlet box.

7.5.11.4 Dual gang faceplates shall be installed where a dual gang outlet box used for the telecommunications outlet.

7.5.11.5 Wall-mounted “Wall Phone” outlets shall be installed where identified on the Floor plan Drawings to accommodate wall-mounted telephone sets. The Wall Plate shall be a single gang faceplate to accommodate one data jack, mounted on a standard single gang outlet box or bracket.

7.5.12 Installation Practices

7.5.12.1 Station Cabling

a. All new telecommunication outlets shall contain a minimum of two Category 6 rated cables.
b. This configuration will support current applications and present an additional growth capability.

c. All Cat-6 cables shall be terminated in compliance with Category 6 specifications to two RJ45 jacks and labeled with the MER/TR #, Patch Panel #, and jack ID numbers.
d. Locations and quantities of telecommunication outlets shall comply with the ConnSCU specification.
e. Station cables shall be run in conduit, free-air, above drop ceiling, or in cable tray from the Telecommunications Room to the WA serving each area.
f. Contractor shall be responsible for installing station cabling in such a manner as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints shall be identified and reported to the architect prior to installation, so that the architect may discuss changes to the plan with ConnSCU.
g. Contractor shall avoid abrasion and other damage to cables during installation.
h. All cable shall be free of tension at both ends.
i. Where installed free-air, installation shall consider the following:
    i. Cable shall run at right angles and be kept clear of other trades work.
    ii. Cables shall be supported according to code utilizing "J-" hooks or cable wraps anchored to ceiling concrete, walls, piping supports or structural steel beams.
    iii. Those devices shall be designed to maintain cables bend to larger than the minimum bend radius (typically 4 x cable diameter).
    iv. Supports should be spaced at a maximum of 4-foot intervals unless limited by building construction. If cable "sag" at mid-span exceeds six (6) inches, another support shall be used.
    v. Cable shall never be laid directly on the ceiling grid.
    vi. Cables shall not be attached to existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit.
j. Manufacturers minimum bend radius specifications shall be observed in all instances.
k. Use of loop-and-hook (Velcro) type fasteners is the preferred method to bundle cables together. If plastic tie wraps are needed to attach cable bundles to anchors, then the tie wraps should be left loose fitting. No sharp burrs should remain where excess length of the cable tie has been cut. Also, tie wraps must not be used on cable bundles exceeding 24 cables, or Cable Tray is the appropriate method of supporting cables.
l. Cable sheaths shall be protected against damage from sharp edges. A bushing or grommet shall be used to protect the cable wherever it passes over a sharp edge.
m. A one (1) foot coil of each cable shall be placed in the ceiling at the last support (e.g. J-Hook, Bridal Ring, etc.) before the cables

enter a fishable wall, conduit, surface raceway or box. At any location where cables are installed into movable partition walls, via a service Pole, approximately 15-feet of slack shall be left in each station cable under 250-feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling, and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

n. Refer to Section 3.2.12 of this document for separation requirements from EMI sources.
o. At Work Area Outlets and Patch Panels, the installer shall insure that the twists in each cable pair are preserved to within 0.5-inch of the termination for the cables. The cable jacket shall be removed only to the extent required to make the termination.
p. Twisted pair cabling for connection to a Wireless Access Point (WAP) or CCTV Camera may be terminated with a Male RJ-45 connector for direct connection to the device. Shielded jacks must be used at WAP locations.

7.5.12.2 Aesthetics

a. All cables terminating at the patch panels shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
b. All MER/TR tie and station cable bundles shall be combed and bundled to accommodate individual termination block rows and patch panels. Each tie cable or cable bundle shall be secured to both the distribution frame and the structure to which the frame is attached with anchor points, placed a maximum of nine inches apart, starting at the center of the top of the termination block. Anchor points will extend up each cable or cable bundle to a point a maximum of two inches below the false ceiling or from under the raised floor.
c. Cable bundles for station cables should not exceed 24 cables per bundle.
d. For any given MER/TR, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.
e. All surface-mounted devices shall be firmly secured, including station cable termination plates/jacks.

7.5.12.3 Work Area Outlet

a. Work Area Outlets shall be flush-mounted on wall-mounted boxes, in floor-mounted boxes, and on modular furniture.
b. Any outlets to be added where these conditions are not met shall be positioned at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Architect. Nominal height (from finished floor to center line of Outlet) in new installation shall be as follows:

i. Standard Work Area Outlet (WA): 18” above finished floor.
ii. Wall-Mounted Telephone Outlet (WA-W): 48” above finished floor.
iii. Wall-Mounted Wireless Access Point Outlet (WAP): 96” above finished floor, or 12” below finished ceiling.
iv. Ceiling-Mounted Wireless Access Point: Box to be located a minimum of 12” above the accessible ceiling to allow ceiling tiles to be removed. If the installation required a Wireless Enclosure (i.e. Oberon enclosure), cables are to be terminated inside the enclosure.
v. CCTV Cameras: Height to be coordinated with Security designer or integrator.
vi. LED Screens (TV / Digital Signage): Height to be coordinated with Audio Visual designer or integrator. If an in-wall A/V box in specified (i.e. PAC box), the cables will be terminated inside the in-wall box.

8. Grounding and Bonding

8.1 Overview

8.1.1 ANSI/TIA-607-C Commercial Building Bonding and Grounding Requirements for Telecommunications define bonding as the physical joining of conductive materials bringing them to the same electrical potential. Grounding is the physical connection of conductive materials to ground or an electrical potential of zero. If both the transmitting and receiving stations are not referencing the same zero potential, data errors will occur. In order for network communications systems to perform properly, all components of the system must be bonded and grounded per ANSI/TIA specifications. In addition, grounding is essential for the protection of life and property. Properly bonded and grounded systems will conduct electrical energy (static, lightning, short circuit, etc.) away from sensitive equipment as well as living creatures and either trip protective devices or dissipate this energy safely to ground. The goal of a proper grounding and bonding system is to have no more than 5 ohms impedance between any two-grounded points in the building. A good rule of thumb is, if it's metal, ground it.

8.1.2 The grounding system must be intentional, visually verifiable, and adequately sized to handle expected currents safely. The grounding system shall be designed and installed in accordance with the NECA/BICSI 607-2011 and ANSI/TIA-607-C Standard for Bonding and Grounding Planning for commercial buildings.

8.1.3 Ground conductors shall be of electrical grade copper except where otherwise indicated. Grounding connector shall be uninsulated unless otherwise indicated.

8.1.4 All permanent grounding connections shall be exothermic welded connections. Cadweld or Thermoweld processes are acceptable.

8.2 TMGB – Telecommunications Main Grounding Busbar

8.2.1 All telecommunications grounding and bonding systems begin at the Telecommunications Main Grounding Busbar (TMGB), which is usually located in the MER.

8.2.2 The length of this bar is determined by the amount of connections that will be made to it, but the minimum thickness is ¼ inch. The TMGB shall be 4 inches high, a minimum of 20 inches long, and of variable length to accommodate the expected number of lugs and allow for future growth.

8.2.3 TMGBs shall be electotin plated for reduced contact resistance.

8.2.4 The TMGB shall be mounted using minimum 2-inch insulated standoffs.

8.2.5 The TMGB is connected to the building's main electrical panel ground by a licensed/certified electrical contractor.

8.2.6 When connecting the TMGB to a buried ground rod or field, only exothermic connections shall be used.

8.2.7 TMGBs shall be assigned a unique identification and permanently labeled.

8.3 TGB – Telecommunications Grounding Busbar

8.3.1 Telecommunications Grounding Busbars, or TGB's, are located in Telecommunications Rooms (TR) to provide grounding for racks, enclosures, and equipment in these spaces.

8.3.2 The length of this bar is determined by the amount of connections that will be made to it, but the minimum thickness is ¼ inch and the minimum width is two inches.

8.3.3 TGBs shall be electotin plated for reduced contact resistance.

8.3.4 The TGB shall be mounted using minimum 2-inch insulated standoffs.

8.3.5 When there is an electrical panel present in these rooms, it shall be bonded to the TGB by a licensed/certified electrical contractor using a #6 AWG bonding conductor. When an electrical panelboard is not located in the room, a #6 AWG bonding conductor should be run from the busbar to the nearest electrical panelboard (where feasible).

8.3.6 All metal racks, enclosures, equipment and cable pathways entering these spaces shall be bonded to the TGB using minimum #6 AWG wire and crimp or weld-on lugs.

8.3.7 All exposed/accessible building steel within these spaces shall be bonded to the TGB using minimum #6 AWG wire and crimp or weld-on lugs.

8.3.8 TGBs shall be assigned a unique identification and permanently labeled.

8.4 TBB – Telecommunications Bonding Backbone

8.4.1 The Telecommunications Bonding Backbone or TBB is used to connect all TGBs throughout a building to the TMGB.

8.4.2 The busbars on each floor shall be bonded to the Telecommunications Bonding Backbone (TBB). The TBB shall be routed in as straight a line as possible and be continuous, with no splices, from the TMGB to the top floor TGB. It shall be sized in accordance with ANSI/TIA-607-C (See Table 1). The bend radius on any necessary bends in this cable should be greater than 8 inches.

Table 1: Sizing of the TBB

TBB Length in Linear meters (feet)	TBB Size (AWG)
Less than 4 (13)	6
4-6 (14-20)	4
6-8 (21-26)	3

TBB Length in Linear meters (feet)	TBB Size (AWG)
8-10 (27-33)	2
10-13 (34-41)	1
13-16 (42-52)	1/0
16-20 (53-66)	2/0
Greater than 20 (66)	3/0

8.4.3 The TMGB shall be bonded to an approved grounding electrode and to the building's main electrical ground system. This grounding electrode conductor shall be no smaller than the TBB. Connections to the TGBs at every floor except the top floor shall be made via copper compression H-Tap (see section 8.4.9) and a conductor no smaller than the TBB.

8.4.4 The TBB shall be an insulated copper conductor sized to allow no more than 25 ohms resistance between any two points in the grounding system. The minimum conductor size is #6 AWG.

8.4.5 When two or more TBBs are run vertically in a multi-story building, they shall be bonded together using a TBB Intermediate Bonding Conductor or TBBIBC. TBBIBCs shall be installed at the top floor and a minimum of every third floor with a Grounding Equalizer (GE), which is equal in size to the TBB.

8.4.6 TBB/TBBIBCs shall be installed and protected from physical and mechanical damage.

8.4.7 Any metallic conduit used to protect grounding or bonding conductors shall be bonded to that conductor.

8.4.8 TBBs shall be assigned a unique identification and permanently labeled.

8.4.9 Compression Fittings

8.4.9.1 Lugs and HTAPs must be manufactured of tin plated copper and fastened via irreversible compression (crimped). Lugs shall have spacing to fit Panduit GB series predrilled busbars and a window to allow for inspection of the crimp. HTAPs shall be contained in clear covers that allow inspection of the die marks to ensure that the proper die was used.

8.4.9.2 Approved HTAP's

a. Panduit HTWC series.
b. Burndy YH series (when used with clear covers) or a ConnSCUapproved substitute.

8.4.9.3 Approved Lugs

a. Panduit LCC or LCCX series.
b. Burndy YAZ series.
c. Chatsworth Products, Inc.
d. Electric Motion Company CCL Series.

8.5 Rack Grounding

8.5.1 Electrical continuity throughout each rack or cabinet is required to minimize safety risks. The racks shall be assembled using paint-piercing grounding washers (Panduit Part no. RGW, or ConnSCU-approved substitute) and antioxidant (per the recommendations of the manufacturer). An electrostatic discharge port kit (Panduit RGESD, or ConnSCU-approved substitute) shall be placed on the rack (on the right side when facing the rack) at 40 inches above the floor. All bonding connections to the rack shall be made with thread-forming screws (Panduit Part no. RGTS, or ConnSCU-approved substitute), or the threads must be cleaned of all paint or residue (per the NEC).

8.5.2 In locations with multiple racks, the rack shall be connected to the common bonding network with a #6 AWG conductor and a copper compression HTAP. In locations with single racks, a #6 AWG conductor to the busbar is sufficient. The common bonding network is a 2 AWG continuous conductor placed below or above the racks. Refer to NECA/BICSI 607-2011 for design recommendations.

8.6 Pathway Grounding

8.6.1 Any metallic component, including equipment, ladder racks, enclosures, cable trays, etc. must be bonded to the grounding system. Provisions must be made to bond individual segments of ladder rack and basket tray together in order to make them electrically continuous. Any metallic conduit that carries a grounding conductor and is greater than 3 feet long must have both ends bonded to the conductor with a bonding jumper no longer than 12 inches and fastened with a compression HTAP to the conductor on one side and to the conduit on the other.

8.7 Equipment Grounding

8.7.1 Although AC-powered equipment typically has a power cord that contains a ground wire, the integrity of this path cannot be easily verified. Thus, many equipment manufacturers require grounding above and beyond that which is specified by local electrical codes, such as the NEC. Always follow the grounding recommendations of the manufacturer when installing equipment.

8.8 Grounding of Outdoor Wireless Access Points and other Antenna equipment

8.8.1 If outdoor Wireless Access Point is equipped with a ground wire, this ground wire shall be extended into the building and bonded to building steel. If no steel structure is available to bond to, route ground wire to nearest electrical panel.

8.9 Testing and Documentation of Grounding

8.9.1 The grounding system shall be documented by means of a diagram showing the locations of the busbars and the size of the conductors, indicating all connections between conductors from the busbars or TBB back to the building electrical grounding system. This includes: connections to building AC panelboards, building steel, the building electrical service ground, connections between the busbar(s) and the TBB. If not connected with a two-hole lug, the connection type of any bonding connection (HTAP, clamp, etc) between the busbar and the building ground point should be specified on the drawing.

8.9.2 To ensure that bonding connections from the busbar to infrastructure within the telecommunications spaces are of low resistance and that the impedance to ground is as low as possible, the following checks shall be performed.

8.9.2.1 Lugs: Visually check that the conductor is visible in the window of the lug to ensure that it was fully inserted, and that the lug is properly crimped. Check that the lug is fastened through both mounting holes, that the connection is tight and that antioxidant was used (if necessary).

8.9.2.2 HTAPs: Ensure that the mark left on the HTAP indicates that the appropriate manufacturer-recommended die was used for that HTAP, and that the connection is protected by a clear cover that allows visual inspection.

8.9.2.3 Racks: Visually check that the racks have been assembled with paintpiercing washers or are constructed so as to make such measures unnecessary (i.e. welded).

8.9.2.4 Conduits: If a bonding conductor is routed through a metallic conduit more than three feet long, ensure that both ends of the conduit are bonded to the conductor with a suitable method, avoiding sharp bends in the cable. Looping the conductor itself through the conduit bonding collar is prohibited.

8.9.3 Measurements – Ensure that the measurement of the following connections is less than 0.1 ohms:

8.9.3.1 Lug to HTAP for any connections to Common Bonding Network.

8.9.3.2 Rack bonding lug to any rack section (the paint-piercing washers make good test points).

8.9.3.3 Bonding lugs to busbar, cable tray, and cable bond.

9. Testing, Acceptance, Documentation and Labeling

9.1 Test Requirements for Horizontal Copper Cabling

9.1.1 Horizontal cabling testing shall be conducted from the jack at the outlet in the Work Area to the Termination Block on which the cables are terminated at the MER or TR.

9.1.2 Baseline accuracy of the test equipment must exceed TIA Level III, as indicated by independent laboratory testing. Test adapter cable must be approved by the manufacturer of the test equipment.

9.1.3 All horizontal copper cables must be tested with a Level 3 Fluke DTX Networks Cable Tester.

9.1.4 Testing of the Permanent Link shall be performed. However, Contractor shall warrant performance based on channel performance and provide patch cords that meet channel performance criteria. All cabling not tested strictly in accordance with these procedures shall be retested at no cost to the Owner.

9.1.5 Horizontal "Station" cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and Wire Map (Conductor Position on the Modular Jack). Any defective, split or miss-positioned pairs must be identified and corrected.

9.1.6 Testing of the Cabling Systems rated at TIA Category 6 and above shall be performed to confirm proper functioning and performance.

9.1.7 Testing of the Transmission Performance of station cables (Category 6 shall include:

a. Length
b. Attenuation
c. Pair to Pair NEXT
d. ACR
e. PSNEXT Loss
f. Return Loss
g. Pair to Pair ELFNEXT Loss (Equal Level Far End Cross-Talk)
h. PSEFEXT Loss
i. Propagation Delay
j. Delay Skew

9.1.8 The maximum length of station cable shall not exceed 295 feet (90 meters), which allows 33 feet (10 meters) for equipment and patch cables.

9.1.9 Cables shall be tested to the maximum frequency defined by the ANSI/TIA-568-C standards covering that performance category. Test records shall verify a "PASS" on each cable and display the specified parameters—comparing test values with standards based "templates" integral to the unit.

9.1.10 Any "Pass*" or "Warning" test results shall be considered a "FAIL" for the channel or permanent link under test. In order to achieve an overall "Pass Condition", the test result for each individual test parameter must be "PASS"

9.1.11 All data shall indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1MHz to the highest relevant frequency, using a swept frequency interval consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combinations, and in both directions when required by the appropriate standards.

9.2 Test Requirements for Fiber Optic Cabling System

9.2.1 Upon completion of cable installation and termination, the Fiber Optic cabling shall be tested to include Optical Attenuation ("Insertion Loss" Method).

9.2.2 Optical Attenuation Testing

9.2.2.1 Optical Attenuation shall be measured on all terminated optical fibers, in both directions of transmission, using the "Insertion Loss" method. Measurement shall be inclusive of the optical connectors and couplings installed at the system endpoints. Access jumpers shall be used at both transmit and receive ends to ensure an accurate measurement of connector losses.

9.2.2.2 Field test instruments for multimode fiber cabling shall meet the requirements of ANSI/TIA526-14A. The light source shall meet the launch requirements of ANSI/TIA-455-50-B.3, Method A. This launch condition shall be achieved either within the field test equipment or by use of an external mandrel wrap per ANSI/TIA-568-C.

9.2.2.3 Field test instruments for single mode fiber cabling shall meet the requirements of ANSI/TIA-526-7.

9.2.2.4 The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy. Proof of tester calibration performed by the tester manufacturer may be requested by ConnSCU.

9.2.2.5 The fiber optic launch cables and adapters must be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.

9.2.2.6 The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests detailed in the following table.

9.2.2.7 Tester manufacturer's requirements must be followed.

9.2.3 Performance Test Parameters

9.2.3.1 The link attenuation shall be calculated by the following formulas specified ANSI/TIA-568-C.0 Standard.

a. Link Attenuation = Cable_Attn + Connector_Attn + Splice_Attn
b. Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)
c. Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
d. Splice_Attn (dB) = number of splices (S) * splice_loss (dB)

9.2.3.2 The values for the Attenuation_Coefficient are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/km)
Single-mode Outside Plant	1310	0.5
	1550	0.5
Single-mode Inside Plant	1310	1.0
	1550	1.0
Multimode Inside Plant	850	3.5
	1300	1.5

9.2.3.3 Maximum allowable mated connectors_loss = 0.70 dB

9.2.3.4 Maximum allowable splice_loss = 0.2 dB

9.2.3.5 Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

9.2.3.6 Test equipment shall measure the link length and automatically calculates the link loss based on the above formulas is preferred.

9.2.3.7 The above link test limits are based on the use of the One Reference Jumper Method specified by ANSI/TIA-526-14A, Method B and ANSI/TIA-526-7, Method A.1. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.

9.2.3.8 The backbone link (multimode) shall be tested in two directions at both operating wavelengths to account for attenuation deltas associated with wavelength.

9.2.3.9 Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with ANSI/TIA-526-14A.

9.2.3.10 Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.

9.2.3.11 Single mode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA-526-7. All single mode links shall be certified with test tools using laser light sources.

10. Labeling

10.1 Overview

10.1.1 All labeling shall confirm to the ANSI/TIA-606-B Standard (or latest version) unless otherwise directed by ConnSCU.

10.1.2 All labels must be mechanically printed. Label background color to be white with Black print. If cable jacket color is white, use a label with a yellow background with black print.

10.1.3 Handwritten labels are not acceptable.

10.1.4 Final labeling of devices must match as-built drawings.

10.2 Labeling of Cabling and Termination Components

10.2.1 Equipment Racks

10.2.1.1 Equipment Racks shall be labeled by the Contractor identifying the Telecommunication Room. Additionally, Equipment Racks shall have an alpha character after the room number unique to that particular Telecommunications Room. For example, TR1-A would be the first rack in TR1.

10.2.1.2 Character height shall be 1-inch (minimum).

10.3 Fiber Optic Backbone, Riser Cables and Termination Components

10.3.1 All fiber optic backbone and copper (inter-building, riser and tie) cables shall be identified AT BOTH ENDS with a designation that identifies where the opposite end of the same cable terminates (e.g. Equipment Room or Telecommunications Room I.D.). In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.

10.3.2 Each fiber optic termination panel shall be clearly labeled indicating the destination of the cable(s) and the fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

10.4 Standard Work Outlet Faceplates

10.4.1 All faceplates shall be clearly labeled indicating the destination of the cable(s) (Telecommunication Room Number), the Data Patch Panel(s) letter designation, and the Data Port number(s) on the Data Patch Panel(s).

10.4.2 Telecommunications Outlets are to be labeled (1) on the cover of the assembly and (2) on each cable terminated at that location.

10.4.3 Station cables shall be labeled within 2-inches of the cable end.

10.5 Data Patch Panels

10.5.1 All Data Patch Panels shall be clearly labeled indicating the Telecommunication Room Number, The Data Patch Panel letter designation and the Data Port Number on the Data Patch Panel [Ports 1 through 48]. Each Telecommunication Room shall start with Data Patch Panel 'A' and continue through the Alphabet. The Data Patch Panels shall be installed to allow for growth of 20% within each Telecommunication Room.

10.5.2 Station cables at the patch panels shall be labeled within 2-inches of the cable end.

10.5.3 A Data Port Schedule for each Telecommunication Room shall be created in spreadsheet format (Excel) with the Telecommunication Room Number, Data Patch Panel Letter Designations, Data Port Numbers and Room Numbers identified in the spreadsheet. In addition for each Data Patch Panel Port a Fields shall be provided in the spreadsheet for the Owner to manage the cabling infrastructure by recording the Device and any special Notes pertaining to the Room utilizing the Data Cable terminated to the port.

10.6 Fiber Optic Cables and Termination Components

10.6.1 All Fiber Optic Cables, Termination Enclosure and Connector Panel, shall be clearly labeled.

10.6.2 In addition, labeling of all Fiber Optic Cables shall include the number of fibers in the cable.

10.6.3 Each Fiber Optic Termination Panel shall be clearly labeled indicating (1) the destination(s) of the cable(s) and (2) fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

10.7 Ground System Labeling

10.7.1 All Grounds should be labeled as close as practicable (i.e. for ease of access to read the label) to the point of termination. Labels shall be nonmetallic and include the following statement "WARNING: If this connector or cable is loose or must be removed, please call the building telecommunications manager."

11. Documentation

11.1 Upon completion of the installation, Contractor shall provide full documentation sets to ConnSCU for approval. All documentation shall become the property of the Owner.

11.2 Documentation shall include the items detailed in the sub-sections below:

11.2.1 Campus plans showing:
- a. Conduit and manhole locations.
- b. Cable identifiers, counts, and routes.
- c. Any other outside facilities installed.

11.2.2 Floor prints showing:
- a. Office, building, or campus layout.
- b. Location of all station jacks with identifying numbers.
- c. Location and size of all communications raceways.
- d. Cable identifiers, pair counts and routes for all station and backbone cables.

11.2.3 If Wireless Access Points (WAP) are installed by contractor:
- a. Floor plan showing the exact location of each WAP
- b. Cable ID('s) connected to each WAP
- c. MAC Address and Serial Number of each WAP

11.2.4 BDP, MER and TR layouts.

11.2.5 Cross-connect field, equipment rack and frame layouts.

11.2.6 Cross-connects installed by the vendor as part of their installation.

11.2.7 Telephone locations and types (if installed by the vendor).

11.2.8 Certified test and inspection results both electronically and paper copy.

11.2.9 Certification that all cable, associated hardware and their installation meet all requirements in this document.

11.2.10 The following information is required for each fiber run:
- a. Splice and termination points.
- b. Cable routes.
- c. Strip chart showing the pull tension imposed on the cable during installation.
- d. Attenuation test results.

11.3 All documentation shall be consistent with the labeling used by the college/university on previous projects. The Vendor is responsible for entering appropriate data into College/University's cable management system. The College/University may also request that the information be provided in a format compatible with its electronic cable management system.

11.4 One hard copy of each updated cabling location table will be posted in the location Telecommunications Room (TR/MER), attached to or inside the rack or enclosure.

11.5 Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons and drawing conventions used shall be consistent throughout all documentation provided.

Appendix A
ConnSCU Work Area Design Criteria

Note: The following table summarizes minimum cabling requirements for common spaces within a building, but is not intended to be an all-inclusive list. All cabling requirements must be confirmed on a project-by-project basis with the individual College or University, ConnSCU, and the Architect. Cable jacket colors shall be also confirmed with the individual College or University.

LOCATION	CABLING	MOUNTING HEIGHT	NOTES
Single Occupancy Office <150 SF	One duplex Cat-6 in proximity to desk, and one duplex Cat-6 on opposite wall or located per architectural program.	18” AFF	
Single Occupancy Office >150 SF	One duplex Cat-6 in proximity to desk, and two duplex Cat-6 on alternate walls per the architectural program.	18” AFF	
Open Office (Cubicles)	One duplex Cat-6 per desk/workstation.	Routed to base channel in furniture or 18” AFF on wall.	Coordinate infeed from floor or wall with Architect.
Shared Office	One duplex Cat-6 per desk/workstation.	18” AFF	
Residence Hall Room / Apartment	One duplex per room.	18” AFF	
Shared use printer locations	One duplex Cat-6.	18” AFF or above Counter.	Confirm with ConnSCU if analog line is required for Fax.

Copy Room	One duplex Cat-6 per network connected device.	18" AFF or above Counter.	Includes Printers, Copiers, Postage Meters, etc.
Huddle Room / Small Group Study Room	One duplex Cat-6.	18" AFF	
Small Conference Room with 4-12 Seats	One duplex Cat-6 below table. Additional Cat-6 as required for A/V equipment (LED, AV Switcher, etc).	Floor Box / Poke-Thru	Coordinate if Cat-6 is located inside a floor box or routed to an in-table A/V box.
Medium Conference Room or Seminar Room with 12-20 Seats	Two duplex Cat-6 below table. Additional Cat-6 as required for A/V equipment (LED, AV Switcher, etc).	Floor Box / Poke-Thru	Coordinate if Cat-6 is located inside a floor box or routed to an in-table A/V box.
Large Conference Room or Seminar Room with 20 or more Seats	One duplex Cat-6 per 10 seats. Additional Cat-6 as required for A/V equipment (LED, AV Switcher, etc).	Floor Box / Poke-Thru	Coordinate if Cat-6 is located inside a floor box or routed to an in-table A/V box.
Teacher Desk / Lectern	Minimum of Four Cat-6 cables based on A/V equipment and other requirements.	18" AFF	Coordinate with College / University personnel for specific school requirements.
Wall Phone	One Cat-6	48" AFF	Maintain 8" clearance on either side of wall phone.
Point of Sale device	One duplex Cat-6.	Wall mounted at 18" AFF or inside Floor Box / Poke-Thru	Confirm if analog line is needed for Credit Card device.

Wireless Access Point	Two Cat-6A Shielded with 15' Service Loop for relocation by ConnSCU as needed.	96" AFF if wall-mounted or inside ceiling-mounted WAP enclosure.	Terminate inside WAP enclosure unless otherwise directed. Rooms with occupancy of greater than 75 people may require more than one WAP.
Vending Machine	One Cat-6 per machine	18" AFF behind each machine.	
CCTV Camera	One Cat-6	Coordinated with Security equipment.	
IP Door Lock	One Cat-6 Shielded	Coordinated with Security equipment.	
IP Intercom Door Station	One Cat-6	Coordinated with Security equipment.	
IP Intercom Master Station	One Cat-6	Coordinated with Security equipment.	
LED Screen	One Cat-6	Coordinated with AV equipment.	HDBase-T applications require Cat-6A Shielded.
A/V Control Panel / Touch Panel	One Cat-6	Coordinated with AV equipment.	
IP Clock	One Cat-6	90" AFF	Coordinate height and location with Architect.
Time Clock	One Cat-6	48" AFF	Coordinate height and location with Architect.

WESTERN CONNECTICUT STATE UNIVERSITY

WCSU Security Management System Specifications

5/31/2017

1.0 **GENERAL**

1.1 REFERENCE TO OWNER'S GENERAL CONDITIONS

A. The Project General Conditions shall be considered part of this Specification. Unless this Section contains statements, which are more definitive or more restrictive than those contained in the General Conditions, this Specification shall not be interpreted as waiving or overruling any requirements expressed in the General Conditions.

B. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Consultant, and agents and employees of any of them from and against claims, damages, losses, and expenses. This shall include, but not be limited to, attorney's fees arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting there from, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this paragraph.

1.2 DEFINITIONS

A. The following shall serve as general identifiers as specified herein.

1. Owner — The Owner is Western Connecticut State University.
2. Consultant — The Consultant.
3. Contractor — The Contractor is the firm submitting a proposal to furnish and install the Work as defined within this Specification.
4. Subcontractor — The Subcontractor is the firm approved by the Owner and hired by the Contractor to furnish and install a specific task or part of the Contractor's obligations to the Work as defined with in this Specification.
5. Specification — Contract Documents for Work Contained in the Security Management System Specifications.
6. Project — The Project is the Security Management System installation.
7. Work — The term "Work" means all construction and services specified within this document. The Work includes all related labor, materials, equipment, and services provided, or to be provided, by the Security Contractor to fulfill the proposal's obligations.
8. Drawings — The term "Drawings" means all security System Drawings and associated sketches, details, riser diagrams, etc.

B. As used in the Drawings and Specifications for the Work, certain non-technical words and phrases shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions or other documents governing the Work.

1. "Furnish" — Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the security Systems Work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased items are free of all liens, claims, or encumbrances.

2. "Install" — Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the Work.
3. “Integrate” – To Provide Circuitry and coordinated alignment of two otherwise independent Subsystems.
4. “New" — Manufactured within the past year and never before used.
5. "Provide" — Furnish and Install.

C. Regardless of their usage in codes or other industry standards, certain words or phrases as used in the Drawings or Specifications for the Work, shall be understood to have the specific meanings as ascribed to them in the following list:
1. "Circuit" — Any specific run of circuitry.
2. "Circuitry" — Any Work which consists of wires, cables, raceways, and/or specialty wiring method assemblies complete with associated junction boxes, pull boxes, outlet boxes, joints, couplings, splices, and connections except where limited to a lesser meaning by specific description.
3. "Concealed" (as applied to circuitry) — Covered completely by building materials, except for penetrations (by boxes and fittings) to a level flush with the surface as necessitated by functional or specified accessibility requirements.
4. "Exposed" (as applied to circuitry) — Not covered in any way by building materials.
5. "Normal Work Conditions" — Locations within building confines that are not damp, wet, or hazardous and that are not used for air handling.
6. "Patch Panel" — A System of terminal blocks, patch cords, and backboards that facilitate administration of cross-connecting cables.
7. "Raceway" — Any pipe, duct, extended enclosure, or conduit (as specified for a particular System) which is used to contain wires and which is of such nature as to require that the wires be installed by a "pulling in" procedure.
8. "Riser" — Shall refer to the portion of the installation that transmits between building floors (or between security System rooms), also referred to as "Backbone Cabling".
9. "Security Closet" — The enclosed area or room specifically designated for the routing, termination, and/or cross connecting of security System cable (i.e. riser cable) to other security System cable and/or equipment.
10. "SMS" — Security Management System, includes all components contained herein that work in conjunction to create and completely integrated and fully functioning system as described within the Drawings and Specifications.
11. "Security System Wiring" — See "Circuitry".
12. "Security System Work" — See "Work”.
13. "Standard" (as applied to wiring devices) — Not of a separately designated individual type.
14. "Subject to Mechanical Damage" — Exposed within seven (7) feet of the floor in mechanical rooms, manufacturing spaces, vehicular spaces, or other spaces where heavy items are moved around or rigged as a common practice or as required for replacement purposes.
15. “Subsystem” – Any ancillary system approved by Owner to be Integrated with the SMS.
16. "System" — See "SMS”.

17. "Wiring" — See "Circuitry".
18. "Workstation" — The location where security System monitoring equipment is provided.

D. Where the word "conduit" is used without specific reference to type, it shall be understood to mean "raceway".
E. Reference to "U.L. (Materials Construction) Standards" shall mean the "Standards for Safety" published by Underwriters Laboratories, Inc.
F. Reference to "NEMA Standards" shall mean the "Approved Standards" published by the National Electrical Manufacturers Association.
G. Reference to "ANSI Standards" shall mean the standards published by the American National Standards Institute.
H. Reference to "IEEE Standards" shall mean the standards published by the Institute of Electrical and Electronics Engineers.
I. Reference to "BICIS Standards" shall mean the guidelines and methods published by the Building Industries Consulting Service International.

1.3 SCOPE OF WORK

A. The Work shall include installation and commissioning of the following:
   1. Integrated Security Management System (SMS) consisting of:
      a. Access Control and Alarm Monitoring System (ACAMS).
      b. Data Gathering Panels (DGPs).
      c. Intercom Communications (IC) System.
   2. Interfaces
      a. SMS.
      b. Fire Alarm System.
      c. Handicapped Door Operators
   3. Equipment Racks and Consoles (ERC).
   4. Wire and cable to install all equipment as specified herein.
   5. Miscellaneous conduit and back boxes (not shown on the Drawings as provided, but required for a complete installation).
B. The Work detailed within the Contract Documents has been specified to meet certain requirements for performance, appearance, and costs. Some information, such as exact locations of field equipment, exact wire routing, and exact conduit requirements have been intentionally omitted. It shall be the responsibility of the Contractor to implement the guidelines and requirements contained in the Specification and translate them into a complete design package containing all elements necessary for a complete, operational, and functionally integrated Security System.
   1. Coordinate with related trades to schedule the Work and ensure a complete installation in accordance with the schedule outlined by the Owner.
C. Provide all work as detailed in the Specification as a turnkey installation including all material, labor, warranties, taxes, freight, and permits. Only items and requirements specifically stated to be provided by others shall not be a requirement for this Section of the Work.
D. Coordinated Work

1. Coordinate with related trades to schedule the Work and ensure a complete installation in accordance with the schedule outlined by the Owner.
2. Within the Specification, certain mounting heights and general device locations are specified. Carefully examine related architectural and engineering drawings to coordinate final equipment/device locations, facility designations, floor accessibility, floor type, ceiling heights, ceiling accessibility, and ceiling types. Verify the exact mounting locations and mounting heights of all equipment with the Owner prior to installation. Notify the Owner in the event that a particular location appears to be unsuitable.

1.4 GENERAL CONDITIONS

A. The Contractor represents that they are familiar with, and have expertise in the Work of this nature and scope. The Contractor shall be Software House certified. The Contractor shall have Software House certified technicians installing and programming the system. The Contractor further agrees that they shall provide all Work as may be required to make a complete System of that which may not be fully defined in the Contract Documents.

B. The Contractor shall be licensed by the State of Connecticut Department of Consumer Protection as an E-1, L-5, or C-5. All Journeyperson's working for the contractor shall be licensed by the State of Connecticut Department of Consumer Protection as an E-2, L-6, or C-6. Any other person working on the SMS shall be a State of Connecticut registered apprentice with the State of Connecticut Department of Labor.

C. The Contractor shall comply with all of the regulations, including OSHA safety regulations of municipal, city, local, and other government agencies having jurisdiction concerning the work of the Contractor. The Contractor shall give all notices and comply with all laws, ordinances, codes, rules, and regulations bearing on the conduct of the Work. If the Contractor performs any work, which is contrary to such laws, ordinances, codes, rules and regulations, they shall make all changes for compliance and bear all associated costs.

D. The Contractor shall be responsible to provide and maintain a storage facility. If this storage facility is required to be on-site it shall be the Contractors responsibility to coordinate the size and spatial requirements with the Owner. The Contractor shall assume full responsibility for the storage facility and all contents, unless otherwise indicated by the Owner.

E. The Contractor shall utilize good housekeeping practice with respect to their work including cleanup of all dirt and debris created by the Contractor during installation operations on a daily basis.

F. The Contractor shall provide all protection necessary to safeguard their work from damage by their operations and the operations of others. Unless the Contractor proves to the Owner's satisfaction that the Work has been damaged by others, the Contractor shall promptly repair, adjust, and clean all defective installations and bear all associated costs.

G. All of the Contractor's work shall be tested and inspected by all authorities having jurisdiction and in accordance with all Specifications. The Contractor shall coordinate and cooperate fully and shall provide at no additional cost to the Owner, manpower, blueprints, facilities, scaffolds, etc. to reasonably assist the inspectors.

H. The Drawings are, in general, diagrammatic. The Contractor shall coordinate the installation of all devices and/or equipment with the Owner prior to installation based on the existing field conditions.
I. The contractor shall provide complete log of location and Serial Numbers of devices installed.
J. The Contractor shall examine the site and the Contract Documents and review with the Owner the designated areas of access, delivery, and storage for the Contractor's use. The Contractor agrees that such areas are satisfactory and sufficient for their needs in the completion of their work and in conformance with the terms of this Contract.
K. Should any questions of union jurisdiction arise, the Contractor shall immediately take steps to settle such disputes and shall use such labor as may be determined to have jurisdiction, at no additional cost to the Owner. Should the Contractor fail to take expeditious action, they shall be responsible for any time lost because of delays arising from such a dispute.
L. The Owner reserves the right to furnish any materials necessary for the Project.
M. All permits required for any part of the Contractor's work shall be procured and paid for by the Contractor. The Contractor shall determine all permits required and transmit this information to the Owner.
N. The Contractor warrants that both they and their subcontractors are licensed as required by the authorities having jurisdiction and as required by local ordinances.
O. The Contractor must state if they intend to utilize a subcontractor, and provide said subcontractor's name and address. The subcontractor shall comply with all the same rules, regulations, laws, codes, licenses, certifications etc. as required by the Contractor and as specified herein. The Owner reserves the right to approve or disapprove any subcontractor proposed by Contractor.
P. All pre-fabrication and record drawings required for the Project and as stated herein, shall be completed within the latest version of AutoCAD.
Q. The Contractor, upon receiving notice from Owner that the Contractor has furnished inferior, improper or unsound work or materials (including equipment), or work or materials at variance with that which is specified, will, within 24 hours, proceed to remove such work or materials and make good all other work or materials damaged thereby, and, at the option of the Owner, the Contractor shall immediately replace such work or materials with work or materials as specified. The removal, replacement, and repair shall be performed at such times and with manpower sufficient, in the judgment of the Owner, so as to avoid disturbance to occupants, or other ongoing work for the Project.
    1. If the Contractor does not remove such unsound Work within a reasonable time, the Owner may remove it and may store the material at the expense of the Contractor. If the Contractor does not pay the expenses of such removal within ten (10) days' time thereafter, the Owner may, upon written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor and all expenses of the sale.
    2. The Owner shall have the authority at all times, until final completion and acceptance of the Work, to inspect and reject work and materials which in its judgment are not in conformity with the Drawings and Specifications, and its decision in regard to character and value of

Work shall be final and conclusive on both contracting parties. If the Owner permits said Work or materials to remain, the Owner shall be allowed the difference in value or shall at its election have the right to have said Work or materials repaired or replaced, as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the entire project, or within such longer period as may be covered by any guaranty; and neither payments made to the Contractor, nor any other acts of the Owner, shall be construed as evidence of acceptance, waiver, or estoppels.

3. Any expense incurred by the Owner in connection with the foregoing, shall be borne by the Contractor, and the Owner may withhold money due to the Contractor or recover money already paid to the Contractor, to the extent of such expense.

R. It shall be understood that the Specifications and Drawings are complementary. Where there are conflicts between the Drawings and Specifications or within the Specifications or Drawings themselves, the overall design intent shall govern.

S. To the extent that they govern the Work, the Specifications and Drawings also govern change order Work, if any.

T. The Drawings for the Work utilize symbols and schematic diagrams that have no dimensional significance. The Work shall be installed to fulfill the diagrammatic intent expressed on the Drawings, field layouts, and shop drawings of all trades.

U. Certain details appear on the Drawings for the Work that are specified with regard to the dimensioning and positioning of the Work. These are intended only for general information purposes. They do not obviate field coordination for individual items of the indicated Work.

V. Information as to general construction and architectural general construction and architectural features and finishes shall be derived from the structural and architectural drawings and specifications only.

W. Ratings of devices, materials, and equipment specified without reference to specific performance criteria shall be understood to be nominal or nameplate ratings established by means of industry standard procedures.

X. It is the intent of the Drawings and Specifications to provide a complete operating security System. All Work necessary to provide such a System shall be performed. Any discrepancies shall be brought to the Owner's attention.

Y. The Work called for under this Contract shall be carried on simultaneously with the Work of other trades and Owner functions in such a manner as to not delay the overall progress of the construction project. The Contractor is responsible for all coordination of the Work with other trades.

Z. Include in the Work all necessary supervision and issuing of all coordination information to any other trades who are supplying work to accommodate the security System installation.

AA. For items of equipment which are to be installed but not purchased as part of the Work, the Work shall include:

1. Coordination of delivery.
2. Unloading from delivery trucks.
3. Safe handling and field storage up to the time of permanent placement in the project.
4. Correction of any damage to the item(s).

5. Mounting in place and connection(s) as specified.
6. Logging of Serial Number and location of device.

BB. Items which are to be installed but not purchased as part of the Work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the Work will be considered only if presented in writing within one (1) week of the date of delivery to the project of the items in question. The Work includes all procedures necessary to put in satisfactory operation all items for which no claims have been submitted as outlined above.

CC. Where cabling is specified to be provided by the Owner or his representative, the Contractor shall identify the cable types, quantities, and lengths required and provide them to the Owner to be ordered. It is the Contractor's responsibility to ensure that the information is complete and accurate. Any errors or omissions in the ordering information will be the responsibility of the Contractor.

1.5 PROJECT MANAGEMENT

A. The Contractor shall provide a Project Manager to oversee and coordinate all activities on the Project.

B. Project Manager's Duties and Responsibilities:

1. The Contractor shall provide to the Owner, as a part of the prefabrication submittal, the name of the Project Manager that will provide all duties and responsibilities as specified herein, during the term of the project.
2. The Project Manager shall maintain the ability of making all managerial decisions on behalf of the Contractor on a day-to-day basis, and shall retain the authority of accepting notices of deduction, inspection reports, payment schedules and any other project related correspondence on behalf of the owner.
3. The Project Manager shall schedule and attend project management meetings, during which time all System related issues are discussed, scheduled, confirmed, and/or resolved.
4. The Project Manager shall be available during normal business hours (8:00 AM to 5:00 PM) within two (2) hours by telephone during the term of the project.
    a. After normal business hours, the Project Manager shall be available within four (4) hours by telephone during the term of the project.
    b. In the event that the Project Manager is not available within the allotted time frame, the Contractor may designate another employee to temporarily act as the Project Manager in all correspondence with the Owner.
    c. The Contractor shall ensure that any individual temporarily assuming the duties of the Project Manager is at equal or higher level in the Contractor's managerial chain of command.
5. Upon notification by the Owner, of any project related installation issue, or issue that may contradict the Specifications as stated herein, the Project Manager shall respond to such issue, verbally and/or in writing within an eight (8) hour period.
    a. Responses to such issues as stated above shall include a clear understanding of the issue, along with a tentative plan of action, reflecting milestones and/or deadlines to resolve the issue.

b. Where appropriate, based on the overall importance of the project issue, the Project Manager shall follow-up their initial response with a written response to the issue within 24 hours of identification of the issue.

6. Prior to the initiation of the Work, the Project Manager shall submit a schedule reflecting key milestones of the Work, including but not limited to the following:
   a. Bid award.
   b. Kick-off meeting.
   c. Prefabrication submittal.
   d. Ordering, deliver, and installation of head-end System equipment.
   e. Field equipment delivery.
   f. Project management schedule.
   g. Payment schedule.
   h. Installation completion date.
   i. System training.
   j. Delivery of As-Built documentation.
   k. Delivery of Operations & Maintenance Manuals.
   l. Final System Test.
   m. Acceptance of System.
7. The Project Manager shall update the schedule on a weekly basis to reflect the status of each key milestone as the Work progresses.
8. As the System installation progresses, the Project Manager shall be capable of discussing any/or all of the above mentioned items at the request of the Owner, and shall address each item, as it relates to the current status of the Work.

1.6 OTHER CONDITIONS

A. The Owner may at any time choose to replace, modify, or otherwise delete any item from the scope of Work defined herein without undo cost or charge for said change in scope by the Contractor. For this reason the Contractor shall submit unit pricing as defined in the Instructions to Bidders which shall include the Net Add and Net Deduct pricing for each component defined herein. This "Net" pricing shall include all labor, materials, and equipment associated with each component. In addition individual unit prices for "equipment only" shall be provided that will enable the Owner to replace a component with a similar device to be installed by the Contractor.

1.7 SPECIAL CONFIDENTIALITY REQUIREMENT

A. The Work is critical to the security of the Owner's facility. All Drawings, Specifications and other material and information about the Work are confidential information and must remain secure and confidential at all times. Confidential information must not be deliberately or inadvertently disclosed to anyone other than the Contractor's personnel and subcontractors who require disclosure to perform their portion of the Work.

B. The Contractor shall keep track of all confidential information at all times and shall ensure that all copies are accounted for at all times. The Contractor shall not permit any persons to have access to the confidential information of the Work unless and until the Contractor has assured itself of the trustworthiness of such persons.

C. All paperwork associated with the installation, programming, and user guides of the equipment being Installed shall be retained by the Contractor and submitted to the Owner upon completion of the Work.

1.8 REFERENCES

A. The Security System shall be installed in accordance with the latest applicable revisions pertaining to all applicable national, state, and local codes and standards including, but not limited to the following:
   1. National Fire Protection Association, (NFPA 70).
   2. National Fire Protection Association Life Safety Code, (NFPA 101).
   3. National Electrical Code (NEC).
   4. Building Officials & Code Administrators International, Inc. (BOCA) National Building Code.
   5. Americans with Disabilities Act (ADA).
   6. Underwriters Laboratories (UL) Applicable Standards for Safety.
   7. Underwriters Laboratories (UL) Applicable Standards for Proprietary Security Systems.
   8. Uniform Building Code, (UBC).
   9. Local Governing Authorities Having Jurisdiction.

1.9 PRE-FABRICATION SUBMITTALS

A. General Description and Requirements.
   1. Submit pre-fabrication submittals in accordance with the Owner's construction schedule.
   2. Pre-fabrication submittals shall consist of product data, shop drawings, samples, and a detailed completion schedule. Partial submittals will not be accepted without prior written approval from the Architect.
   3. Pre-fabrication submittals shall be furnished in electronic formats as defined by the General Conditions under Part 1 of the Project Specifications.
   4. No portion of the Work shall commence nor shall any equipment be procured until the Owner has approved the pre-fabrication submittals in writing.
   5. A letter of transmittal identifying the name of the Project, Contractor's name, date submitted for review, shall accompany pre-fabrication submittals and a list of items transmitted.

B. Product data required as part of the pre-fabrication submittal shall include the following:
   1. Equipment schedules listing all System components, manufacturer, model number and the quantity of each.
   2. General functional descriptions for each System.
   3. Manufacturer's data specification sheets for all System components, including any warranty information (sheets containing more than one device or component model number shall be clearly marked to delineate items included in the Work).
   4. A complete list of cable and wiring types, sizes, manufacturer, and model number.
   5. A complete list of finishes and sample graphics, including custom art work and custom graphics (if applicable).
   6. List of parts inventory to provide manufacturer recommended service and maintenance of the Work.

C. Shop Drawings shall include the following:

1. Floor plan drawings indicating device locations with device legends.
2. System riser diagram with all devices, wire runs, and wire designations.
3. Schematic block diagrams for each System showing all equipment, interconnects, data flow, etc.
4. Wiring diagrams for each subsystem defining the interconnection of all inputs and outputs for all equipment.
5. Wiring diagram of electric locking mechanical.
6. Fabrication shop drawings for all custom equipment (if applicable).
7. Plans and elevations of the security console(s) and equipment racks quantifying all equipment to be mounted therein.
8. Elevations of security closet layouts showing panel locations, power supply locations, conduit, wire ways, wire molds, and all other equipment.
9. The Contractor shall submit samples of any equipment components upon request of the Owner.
10. Samples submitted shall be the latest version of equipment.
11. It is the responsibility of the Contractor to confirm all dimensions, quantities, and the coordination of materials and products supplied by the Contractor with other trades. Approval of shop drawings containing errors does not relieve the Contractor from making corrections at their expense.

1.10 QUALITY ASSURANCE

A. Contractor Qualifications.
   1. Work specified herein shall be the responsibility of a single Security Contractor. Bid submission shall document a minimum of five (5) years experience in the fabrication, assembly, and installation of Systems of similar complexity as specified herein. The documentation shall include the names, locations, and points of contact for at least three (3) installations of the type and complexity specified herein.
   2. The Contractor shall have local in-house engineering and project management capabilities consistent with the requirements of the Work.
   3. By submitting a bid, the Contractor thereby certifies that it is qualified in all areas pertaining to, directly or indirectly, the Work. In the event the Contractor becomes unable to complete the Work in accordance with the Contract Documents, or the satisfaction of the Owner, it shall be the responsibility of the Contractor to retain the services of applicable manufacturers' representatives to expeditiously complete the Work in accordance with the Owner's construction schedule with no additional cost to the Owner.
   4. The Contractor shall maintain, or establish and maintain, a fully staffed office including a service center capable of providing maintenance and service to the Project. The Contractor shall staff the service center with factory trained technicians and adequately equip the office to provide emergency service within four (4) hours after being called, 24 hours per day.
   5. The Contractor shall provide factory-certified technicians to install, commission, and maintain the Work. All installing personnel shall be licensed as required by local and/or state jurisdictions.

6. The Contractor shall ensure compliance with, and have a thorough understanding of, all local codes and contract conditions pertaining to this Project.
7. The Contractor shall maintain an inventory of spare parts and other items critical to System operation and as necessary to meet the emergency service requirements of this Project within the local service center.

B. Product Standards
1. All equipment and materials for contained herein shall be the products of recognized manufacturers and shall be new.
2. New equipment and materials shall:
   a. Be Underwriters Laboratories, Inc. (U.L.) listed and approved where specifically called for; or where normally subject to such U.L. labeling and/or listing services.
   b. Be clearly labeled identifying make, model, and manufacturer.
   c. Be without blemish or defect.
   d. Be products that meet with the acceptance of the agency inspecting the security Systems work.
3. It is the intent of these specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "approved equal" are used, the substituted item must conform in all respects to the specified item. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.
4. Substituted equipment or optional equipment, where permitted and approved, must conform to space requirements. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related Systems as a result of substitutions shall be made at the Contractor's expense.
5. The approval of shop drawings, or other information submitted in accordance with the requirements herein before specified, does not ensure that the Security Consultant, Architect, or the Owner attests to the dimensional accuracy, dimensional suitability of the material, or mechanical performance of equipment. Approval of shop drawings does not invalidate the Drawings and Specifications.
6. Substitutions of SMS equipment shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular catalogued item carried by the manufacturer.
7. Manufacturers Recommendations: Where installation procedures of any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations may be cause for rejection of the material.

8. The Contractor shall provide a complete fit-out of the security closets for review by the Consultant and Owner prior to continuing with the installation of the other security closets. The closet fit-out shall include all cabinets, conduit, blocks, patch panels, frames, labels, etc.
9. The Contractor shall provide a complete fit-out of all command center equipment for review by the Security Consultant and Owner. The fit-out shall include all devices, console layouts, furniture, labeling, cable support, etc.
10. Within the Specifications, certain manufacturers have been listed. These manufacturers are listed for example purposes (unless followed by "No Exceptions"). The Contractor may substitute manufacturers and models that may be more cost effective or readily available than that specified. However, all substitutions shall meet or exceed the specified functional and technical requirements. Acceptance of such substitutions is at the discretion of the Owner.
11. All exterior devices shall be sealed and protected against all weather conditions consistent with the region including heat, cold, moisture, dust, etc.

1.11 WARRANTY AND MAINTENANCE

A. Security Contractor shall provide an 18 month warranty for all Work. The warranty shall cover all Work, Systems, and subsystems against defects in materials and workmanship. The Work as specified herein, including all materials and labor, but excepting any existing devices and equipment which are incorporated in the completed Work, shall be warranted to be free from defects in design, workmanship, and materials. Further, the Contractor shall warrant that the completed Systems, including all components (except those, which are existing or provided by others), are of sufficient size and capacity to fulfill the requirements of the Specifications.

B. The warranty shall be valid for a period of 18 months following the date of System acceptance by the Owner. System acceptance shall commence when all parts, components, sub-Systems, and Systems have been tested, shown to be working in accordance with the Specification, and approved by the Owner.

C. Nothing contained in the Contract Documents shall be construed to establish a shorter period of limitation with respect to any other obligation, which the Contractor might have under the Contract Documents or any manufacturer's warranty. The establishment of the time period of one and one half (1 ½) year after the date of final acceptance of the Work or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents, relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which its obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to its obligations other than specifically to correct the Work or equipment.

D. Warranty Service:
   1. In the event that defects in the materials and/or workmanship are identified during the warranty period, the Contractor shall provide all labor and materials as may be required for prompt correction of the defect.

2. During the warranty period, the Contractor shall, upon receipt of a request for service form the Owner, deploy service personnel to the Owner's premises within four hours to initiate corrective action.
3. All warranty service and repair work shall be performed by personnel, who have been trained, certified and is experienced in the operation and maintenance of the installed System(s).
4. Unless otherwise requested by the Owner, warranty service shall be performed during normal business hours (8:00 AM to 4:00 PM), Monday through Friday, exclusive of Holidays. In the event that the Owner requests warranty service to be performed during other than normal business hours, the Contractor shall be compensated for such service at 150% of his normal hourly service rates as listed in the bid proposal for this project.
5. Warranty service shall include the replacement of all parts and/or components as required to restore normal System operation. In the event that the System parts or components must be removed for repair, it shall be the responsibility of the Contractor to furnish and install temporary parts and/or components as required to restore normal System operation until the repaired parts or components can be repaired and re-installed.
6. It shall be the responsibility of the Contractor to maintain an inventory of spare parts or to arrange for manufacturer parts support as required ensuring correction of all critical component failures or malfunctions within 48 hours of the Owner's request for service. Critical parts shall be defined as those, which govern or affect the normal operation of more than one field device.
7. The Contractor's warranty obligation shall include correction of any software/firmware defects, which may be identified during the warranty period. Any failure of the software/firmware to perform as specified by the software/firmware manufacturer at the time of final acceptance shall be defined as a software/firmware error.
8. In the event that the Contractor determines and successfully demonstrates to the Owner that service or repairs are required as a result of misuse, abuse, or abnormal wear and tear, the Contractor shall be compensated for such service or repairs at the Contractor's hourly rates as listed in the bid proposal for the Project. Similarly, such compensation to the Contractor shall apply in the event that repairs are required for devices and equipment not provided by the Contractor but incorporated in the completed Systems.
9. Immediately following the completion of a warranty repair or service call, the Contractor's service personnel shall submit a written report to the Owner which details the service work performed, the cause of the trouble, and any outstanding work which is required to restore complete and normal operation.

E. The Owner reserves the right to expand or add to the System during the warranty period using firm(s) other than the Contractor for such expansion without affecting the Contractor's responsibilities, provided that the expansion is done by a firm which is an authorized dealer or agent for the equipment or System being expanded.
F. The Contractor shall perform preventative maintenance during the warranty period as part of the warranty service. The Contractor shall submit a list of items to be included in the

preventative maintenance program and the service to be performed. Preventative maintenance shall include, but not be limited to, the following:

1. Annual Preventative Maintenance:
    a. Test and adjust System sensors.
2. Semi-Annual Preventive Maintenance
    a. Inspect, test, clean, and adjust UPS. Replace batteries as necessary.
    b. Inspect and clean all DGPs.
    c. Inspect, test, and clean power supplies. Replace batteries as necessary.
    d. Inspect, clean and vacuum all consoles and equipment racks.
    e. Test and adjust all CCTV System pan, tilt, zoom, and preset functions. Inspect, clean, and adjust CCTV System matrix switcher and multiplexers.
3. Quarterly Preventive Maintenance
    a. Inspect and clean the SMS file server, printers, and System workstations. Perform hardware, firmware, software, and disk drive maintenance as required to ensure optimum performance.
    b. Run SMS diagnostics and perform file maintenance to insure optimal performance.
    c. Inspect, clean, and adjust digital video recorders.
    d. Clean all camera housings.
    e. Visually observe all camera and monitor displays and adjust as needed for optimal performance.

G. Include a manufacturer's software maintenance agreement as part of the Warranty. This agreement shall include all software updates, revisions, telephone service assistance, and training for any changes in operation.

H. Provide written notice to the Owner documenting any Work performed during the warranty period, including any preventative maintenance Work performed.

I. Provide loaner equipment that is fully compatible with the SMS for any equipment not field repairable.

J. Loaner equipment for components that must be shipped to/from the manufacturer or distributor shall be on site and operational within 48 hours of the component failure. Furnish lists of equipment that will require shipment from the manufacturer or distributor and lead times associated with that equipment.

K. Repair or Replacement Service
    1. Repair or replacement service during the warranty period shall be performed in accordance with the following schedule:
        a. Schedule A: 7 days, 24 hours per day with a four (4) hour response time.
        b. Schedule B: 8:00 AM — 4:00 PM on business days, excluding holidays, with a four (4) hour response time.
    2. Schedule A shall apply for major System components including, but not limited to, the file servers, System workstations, DGPs, intercom exchange and master stations, CCTV equipment, and the uninterruptible power System.
    3. Schedule B shall apply for all other components and devices.

4. As part of the proposal submission, the Contractor shall include a labor rate schedule for any warranty service required during hours not covered under schedule B.

L. Failure to Perform Service
   1. Schedule A Components: The Contractor shall provide 14 days of additional total System warranty (at no additional cost to the Owner) for every two (2) consecutive days of System or device failure.
   2. Schedule B Components: The Contractor shall provide seven (7) days of additional total System warranty (at no additional cost to the Owner) for every two (2) consecutive days of System or device failure.
   3. If the Contractor is unable to restore System operation during the warranty period within two (2) business days of a System failure, the Owner reserves the right to require the Contractor to provide on-site manufacturer's service technicians at no cost to the Owner.

M. If the Contractor is unable to restore System operation during the warranty period within two (2) business days of a System failure, the Owner reserves the right to require the Contractor to provide on-site manufacturer's service technicians at no cost to the Owner.

N. Provide on-line software maintenance and support during the warranty period including all software and hardware (including telephone modems as required). Modem access to the System shall be password protected and controlled by the Owner.

1.12 EXTENDED MAINTENANCE

A. Provide as part of the bid submission a quote for annual costs for the second through fifth years for an extended maintenance agreement to provide repair service including all parts and labor and a preventative maintenance program on the System. Provide a list of all items, schedules, and services included in the preventative maintenance program with the bid. Pricing shall be formatted to provide the Owner with the yearly breakdown of costs.

B. The extended maintenance agreement shall include a periodic preventative maintenance program. Submit a list of items to be included in the periodic preventative maintenance program. This program shall be at least as comprehensive as the program provided under the warranty service.

END OF SECTION 1

2.0 PRODUCTS

2.1 ACCESS CONTROL AND ALARM MONITORING SYSTEM

A. System Overview

1. The system must be the Owner's existing system, no exceptions. The contractor must verify the current version of software and firmware being utilized by the university and provide the most current version of each. Currently the university is utilizing a Software House C-Cure 800 System, v8.2, Model 40, no exceptions. Data Gather Panels (DGPs) shall be Software House iStar Pro with 64MB of memory including all necessary input/output modules, no exceptions.

2. The System shall incorporate supervised input and relay output modules necessary to accommodate all System components.

3. All DGP connections to the existing system shall be coordinated with the Owner.

4. All associated system components must emanate from the same iStar Panel. All door contacts, card readers, door latch relays, audible devices, and any other input/output associated with a door shall be on the same iStar panel.

5. Types of areas/items include but are not limited to:

    a. Exterior doors: exterior doors : All doors shall have electric strikes and door contacts for automatic lock and unlock capability.
    b. classroom doors
    c. network closets
    d. AED cabinets
    e. Delayed egress doors
    f. Handicapped door with automatic door operators
    g. Alarm contact for roof hatches and other exterior doors
    h. Lab doors
    i. Offices
    j. Storage
    k. Automatic openers (see later section)
    l. Parking gates
    m. 24 hour computer labs

6. Event Linking

a. Event linking shall tie an activity on one controller to the triggering of an action on the same or different controller. The Server Controller shall support three types of event linking:

1) Local Event Linking: When the source device and the target device are linked through an activity on the same iStar, local event linking shall occur.

2) Cluster Event Linking: When the source device and the target device being linked are on different controllers in the same cluster, cluster event linking shall occur. The transmission of the action request from one controller to another shall occur (routed through the master controller) with no System Server intervention.

3) Global Event Linking: When the source device and the target device being linked are on different clusters, global event linking shall occur. This cross-cluster linking will require that the action request be routed through the System Server. The event link definitions shall be created on the System Server and shall be downloaded to the appropriate iStars. The System Server shall also insure that the event link definitions are valid and that there are no recursive links.

b. Action Scheduling: The system software shall provide an action scheduling service that will execute actions on devices residing on the same or other controllers at a predefined time, frequency and time interval. The action definitions shall be the same System Server-defined actions utilized by event linking. The actions and the action schedule shall be defined by the System Server software and shall be downloaded to the appropriate controllers.

c. Offline/Online Reporting: The system shall provide a mechanism to report activities to the System Server for display, reporting and archiving. If a System Server is not currently connected to the cluster of controllers, the activity reports will be buffered until the System Server reconnects to the cluster. Should the user-configured, activity buffer limit be exceeded before the System Server reconnects, the first in first out rule shall apply.

B. Data Gathering Panels

1. All iStar Pro panels must be upgraded to the latest version of firmware that the Owner is using to ensure uniformity. iStar panels will communicate via the LAN utilizing the onboard Ethernet communication port. Each iStar panel will receive an IP address, and be programmed as the Master. All Panels shall be battery backed up. Panels shall be mounted in a secured area with a climate controlled environment. STAR0016W-64ANPS, no exceptions.

2. All panels shall include an AS0100CAB, APC power supply cable.

3. A DGP program sheet that must be completed prior to installation of the system so that the panel inputs and outputs are clearly/properly labeled.

4. All inputs on the System shall be normally closed.

5. All Inputs on the System shall be supervised, no exceptions.

6. All DGPs shall be mounted in secure locations, typically in the telecommunications and network closets.

C. Power Supplies

1. Power supplies shall be mounted in the same location as the DGPs.

2. The DGP Power Supply shall be dedicated to the DGP and shall not provide power for locks or any other low voltage device.

3. Each iSTAR™ Pro shall accept a regulated input voltage of 11.5VDC to 13.8VDC and generate appropriate voltage levels for on-board use as required. The maximum power required shall be calculated based on the number of readers and other auxiliary devices connected to the iStar not to exceed 5A at 12VDC. All power outputs to external devices shall be current limited by the iStar.

4. Power is to be hardwired to the DGPs. The security system shall be on a dedicated circuit, and tied in to the emergency generator system.

5. DGPs and peripheral devices shall be supplied with battery back-up for a minimum of twelve (12) hours.

    a. Please be cognizant of all penetrations into the power supplies, as the bottom of the enclosures must be kept clear in order to accommodate the batteries.

6. Power fail and low battery inputs shall be normally open, and wired from the apS and Altronix battery backup power supply outputs to report A/C power fail and low battery conditions.

7. Power supplies shall include:

    a. Altronix AL1024ULACM (24VDC at 10 AMP UL Listed), no exceptions.

    b. Software House apS AS00063-01, no exceptions.

8. Batteries shall be genesis by ENERSYS NP series, 12VDC/&AH for use with power supply/chargers, no exceptions.

9. Batteries shall be tested upon installation to verify that the voltage and current capacity conform to allowable limits. A battery schedule shall be submitted upon completion of the work to the Owner detailing the voltage and current of each battery used in the installation.

10. Installation Date shall be indicated and labeled on each battery.

11. Each Power Supply shall be housed in a locking steel enclosure designed for surface mounting. The housing shall include a tamper switch to sense the removal or opening of the enclosure cover.

12. All power supplies, DGPs, and power distribution cabinets shall be keyed alike.

D. Card Reader

1. General

   a. Card Readers shall be mounted on the strike side of the door. Mounting location shall be 48" from the floor to the top of the reader and 12" from the frame of the door.

   b. All Card Readers shall be grounded and bonded to the head end with a 14awg copper conductor green insulation via a female disconnect, no exceptions.

      1) Acceptable Manufactures:

         a) Panduit DNF14-110-C, no exceptions.

2. Acceptable Manufacturers: Sensormatic RM Series, lndala RM2-PI and RM2L-PI, no exceptions.

   a. Card Readers installed on the exterior of the building shall include a card reader heater kit: 130-915, no exceptions.

   b. All gaskets which are included with each reader shall be installed behind the card reader's mount plate.

   c. Flat head counter sunk screws shall be used to mount the reader mount plate, no exceptions.

   d. Security screws provided with the card reader shall be used, no exceptions.

3. Non Main Entry Exterior Door card reader manufacturer: Indala Flexpass Black Arch Wallswitch Proximity reader FP4527A

4. System Operation:

   i. Ingress (Functions: Exterior; Storeroom)
      1. Authorized users shall present card and pin, and C*cure system shall release electric trim and allow users to ingress.

ii. Forced Door
    1. If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
        a. Local Audible Device Shall Sound.

iii. Held Door
    1. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
        a. Local Audible Device Shall Sound

iv. Egress (Functions: Exterior; Storeroom)
    1. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.

v. Forced Door
    1. If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
        a. Local Audible Device Shall Sound.

vi. Held Door
    1. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
        a. Local Audible Device Shall Sound.

vii. Ingress/Disarming (Function: Classroom/Intrusion Zones) [All areas with a Break Glass shall be programmed this was, but it is not limited to those areas]
    1. Authorized users shall present card and pin, and C*cure system shall release electric trim and allow users to ingress.
    2. System shall be programmed as an Intrusion Zone and shall include an active “ARM” input which will toggle the doors into the room to remain unlocked.
    3. Break Glass: shall have two outputs
        a. Breaking the glass shall activate the device which will physically drop power [Locking the doors] locally via appropriate RIB relay (i.e. with enough relays to drop every lock into the area).
        b. Breaking the glass shall activate the device which will be tied to an input on the corresponding iStar panel and trigger an event that notifies the University Police that an “Emergency has been reported in that area.”
        c. Please note that each entry into the area will need to have electrified hardware and a separate wiring schema will need to

be developed specific to the environment in which it will be securing.

4. Forced Door
    a. If door is opened with key override, or without presenting Card and PIN then the access control system shall activate a "forced door event" which will be received at University police dispatch.
        i. Local Audible Device Shall Sound.
5. Held Door
    a. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a "Held door event" which will be received at University police dispatch.
        i. Local Audible Device Shall Sound

i. Egress/Arming (Function: Classroom/Intrusion Zones)) [All areas with a Break Glass shall be programmed this was, but it is not limited to those areas]
    a. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.
    b. System shall be programmed as an Intrusion Zone and shall include an active "ARM" input which will toggle the doors locked and unlocked.
    c. Authorized users shall close all doors into the area and present card and pin, and C*cure system shall lock electric trim and secure area.

2. All Exterior Door that are not considered "Main Entrances" (i.e. have been specified to include an RM series Reader with Keypad) shall have a Card Reader which is Prox only, and shall serve as an indicator that the door is unlocked (Solid Green), Locked (Solid Red), or for authorized user s only to gain entry into the building (i.e. Police Department).
    a. Operation:
        i. Ingres/Egress Unlocked:
            1. When the building is Unlocked the card reader will remain solid green and users may enter and exit without triggering an alarmed event.
        ii. Ingress (when Locked) (Exterior Prox Only)
            1. Authorized users shall present card, and C*cure system shall release electric trim and allow users to ingress.
                a. Forced Door
                    i. If door is opened with key override then the access control system shall activate a "forced door event" which will be received at University police dispatch.
                        1. Local Audible Device Shall Sound.
                b. Held Door

i. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
1. Local Audible Device Shall Sound

iii. Egress (When Locked) (Exterior Prox Only)
1. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.
a. Forced Door
i. If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
1. Local Audible Device Shall Sound.
b. Held Door
i. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
1. Local Audible Device Shall Sound.

a.

E. Local Audible Device

1. All card reader locations shall have a local audible device that should activate upon forced and held event activations.

2. The Local Audible Device shall be installed on the wall above the door 90” to the top of the box, and/or at least 4” below finished ceiling height.

3. Tone 3 shall be utilized, no exceptions.

4. Local Audible Device shall be 80 - 88 dB @ 12 - 24 VDC.

5. Local Audible Device

a. WBOX Technologies 0E-1GANGCHIM, no exceptions.

6. Audible Device 3-Tone Chime WBOX Technologies: 0E-1GANGCHIM

iv. All card reader locations with a Door Contact shall have a local audible device that should activate upon forced and held event activations.

v. The Local Audible Device shall be installed on the wall above the door 90" to the top of the box, and/or at least 4" below finished ceiling height.
vi. Local Audible Device shall be 80 - 88 dB @ 12 - 24 VDC.
vii. Trigger 3 shall be used as the tone for alarms on the C*cure system.

F. Request-To-Exit Device

1. The Request-To-Exit shall be installed in the exit device, or electromechanical lockset, no exceptions.

2. Refer to drawings for device type and location.

   a. Corbin Russwin M92, no exceptions.

G. Key Switch Door Alarm Unit

1. Provide a Key Switch Door Alarm Units as indicated on the drawings.

2. Door alarm units shall be able to accept the university's existing keyway.

3. Key Switch Door alarm units shall be Model ES4200K4, or ES4300A-K3-T1 as manufactured by Designed Security, Inc., no exceptions.

H. Door Position Switches

1. Provide normally closed (N/C) magnetic door position switches to monitor the open/closed status of doors as specified herein and as indicated on the Drawings.

2. Metal doors with a "U" trac shall use squeeze fit rare earth magnets.

   a. Acceptable Manufacturer: GE 1840, no exceptions.

3. Concealed Door Position Switch

   a. All Door Position Switches shall be 1" in diameter, no exceptions.

   b. All Door Position Switches shall be installed on top of frame 4" on center from the strike side of the frame, no exceptions.

   c. Acceptable Manufacturers: GE Interlogix 1076 Series.

4. Flush Bolt Monitors

   a. Provide normally closed (N/C) Flush Bolt monitoring switches to monitor the latch of an inactive double door.

      1) Von Duprin 4670-T1 MON STRIKE US26D, No exceptions.

5. Overhead Door/Gate Position Switch

    a. Provide armored cable from the switch location to the associated junction box in order to conceal and protect the wire, no exceptions.

    b. Acceptable Manufacturers: GE Interlogix 2500 Series, or approved equal.

6. Tamper Switch

    a. Provide normally closed tamper switches to monitor the secure status of all DGPs, power supplies, and power distribution units.

    b. Include the number of tamper switches in the total alarm input figures.

    c. Minimum Specifications:

        1) Type: Plunger.

        2) Configuration: N/C.

        3) Mounting: Within cabinet with no outside access to fasteners.

    d. Acceptable Manufacturers: GE Interlogix 3010, or approved equal.

7. Duress Alarms

    a. Provide desk-mounted personnel duress alarms with normally closed alarm output contacts as indicated on the Drawings.

    b. Activation of these alarms shall initiate an alarm event on the ACAMS. Local alarms will be silent with no visual indication of activation.

    c. Upon activation, the duress alarm will remain active until which time it is reset by key. No other form of deactivation shall be provided.

    d. Locate desk mounted duress buttons below counter tops or in the knee space of desks in an accessible location. Verify the exact location with the Owner.

    e. Minimum Specifications:

        1) Activation: Pull button.

        2) Alarm output: DPDT contacts.

        3) Reset method: Key.

        4) Mounting: Surface-mount as indicated on Drawings.

    f. Acceptable Manufacturers: Ademco model 269R, no exceptions.

g. Cable shall be protected by GE Interlogix 1980 Stainless Steel Flex Cable, or approved equal.

8. Emergency Break Glass Station (Interior Classroom Function Locking Mechanism)

   a. Provide locking mechanism on interior, strike side of classroom door to allow for locking of the strike in an emergency situation. This includes junction boxes for aesthetic mounting of the devices, and must adhere to ADA guidelines for height.

   b. Activation of these devices will allow for the physical locking of the strike as well as initiate an alarm event on the ACAMS. Local alarms will be silent with no visual indication of activation.

   c. Physical locking shall be provided by utilizing an auxiliary RIB relay that will drop power to the fail secure locksets into the area, as well as, supply power to failsafe locksets into the area.

   d. Break Glass shall be mounted on the strike side of the door 48" from the floor to the top of the unit, and within 12" from the door frame.

   e. Break Glass shall be blue in color, no exceptions.

   f. Break Glass and have white silk screened custom wording on the device itself as follows:

      1) Above Glass: "DOOR LOCK," no exceptions.

      2) Below Glass: "BREAK GLASS IN EMERGENCY," no exceptions.

   g. Acceptable Manufacturer:

      1) Security Door Controls break glass model 491, no exceptions.

9. Electrical Power Transfer

   a. Provide an Electrical Power Transfer where applicable, for integration of power and Request-To-Exit monitoring to and from the exit device hardware. A power transfer is to be utilized in lieu of an electrified hinge for delayed egress, electromechanical lockset, and electrified panic device applications.

      1) Acceptable Manufacturers:

      2) Von Duprin EPT-10 finish SP28, no exceptions.

   b. An electrified hinge shall be provided where appropriate, for integration of power to the Electromechanical Lockset from the door frame. A electrified hinge shall be provided in lieu of a power transfer on all electromechanical locksets. An electrified hinge shall not

be used in delayed egress and electrified panic device applications. Electrified Hinge shall provide power and request-to-exit signals to and from electromechanical lockset. The use of Quick Connect shall be required.

1) Acceptable Manufacturers:

a) McKinney t4A3788CC8 ELC HINGE 4.5x4.5 QC 26D with Stanley Prep per application, no exceptions.

10. Electromechanical locksets

a. All Electromechanical locksets shall be fail-secure, no exceptions.

b. All electromechanical locksets shall be 24VDC, no exceptions.

c. High Amperage Inrush Hardware required Power Supplies shall be Corbin Russwin 782, no exceptions.

d. All Electromechanical locksets shall fit the removable core keying system of the Owner.

e. All Electromechanical locksets shall be installed so that the dead latch mechanism of the latch engages upon the door securing, no exceptions.

f. All Electromechanical lockset trim shall be of Newport design, no exceptions.

g. Acceptable Manufacturers:

1) Corbin Russwin ML20900 M92 ECL Series, no exceptions.

a) Shall have a built in request to exit monitor.

2) Corbin Russwin CL33905 NZD M92 626, no exceptions.

3) Corbin Russwin CL3357 NZD M92 626, no exceptions.

4) Corbin Russwin ED5200 (N9905) M94 M92 M99 630, no exceptions.

5) Corbin Russwin ED5200 (N9905) M92 M99 MELR 630, no exceptions.

a) This device shall be supplied with an earth ground, no exceptions.

11. Delayed Egress Locking Devices

a. All Delayed Egress Locking Devices shall be fail-secure, no exceptions.

b. All Delayed Egress Locking Devices shall be 24VDC, no exceptions.

c. All Delayed Egress Locking Devices shall fit the removable core keying system of the Owner.

d. All Delayed Egress Locking Devices shall be installed so that the dead latch mechanism of the latch engages upon the door securing, no exceptions.

e. All Delayed Egress Locking Devices trim shall be of Newport design, no exceptions.

f. Acceptable Manufacturers

1) Corbin Russwin ED5200AD (N9905) M51 M88 M92 M99 630, no exceptions.

12. Handicapped door with automatic door operator interface
    a. All access controlled handicapped doors with automatic door operators shall be integrated into the SMS.
    b. All handicapped doors with automatic door operators shall have an interface board separate from the SMS.
    c. All handicapped door automatic door operator interface board shall be supplied with a dedicated fused power source with battery back-up and tied into the emergency generator system.
    d. In an application where there are two automatic door operators controlling the same egress/ingress both operators shall work in conjunction with each other. The doors shall work in succession with the specific environmental conditions, and shall be coordinated with the Owner.
    e. All interior ADA activation buttons shall be activated with a Card Reader controlled by the SMS.
    f. The ingress handicapped door operator activation button shall not be active when the doors are locked, and shall only become active upon authorized access through the SMS. The SMS shall have a dedicated output for this purpose.
    g. All egress door operator activation buttons shall send a request-to-exit signal to the SMS.
    h. All egress door operators shall be integrated with the SMS relay that controls the locking mechanism so that the relay “unlocks” the door upon activation.
    i. Acceptable Manufacturers:
        1) MS Sedco TDM Universal Time Delay Module, or Equivalent.

2.2 VIDEO INTERCOM COMMUNICATIONS SYSTEM

A. General

1. The Contractor shall provide a video intercom system to facilitate entry through the service entry/loading dock area as indicated on the Drawings and specified herein.

2. The IC System shall provide the following:

    a. Two-way signaling and voice communication between master stations and substations as indicated on the Drawings.

    b. Telephone quality communication at substations and master stations for both handset and speakerphone conversation.

    c. Master stations shall provide means to remotely release door lock.

B. IC Master Stations

1. General

    a. Provide master stations as indicated on the Drawings. Master stations shall be Aiphone Model LEF-5 with MYH-CU video monitor, or approved equal.

C. IC Exterior Substation

1. General

    a. Provide an exterior substation as indicated on the Drawings.

    b. The substation shall consist of a call button, speaker in integrated CCTV camera in a wall mount, vandal resistant enclosure.

2. Acceptable Manufacturers:

    a. As Per the Intercom Communications System manufacturer’s recommendations.

2.3 WIRE AND CABLE

A. General Requirements:

1. Provide wire and cable as required to install the Security System as indicated on the Drawings and specified herein.

2. All wire and cable shall be Underwriter's Laboratories (UL) listed, and shall meet all national, state, and local code requirements for its application.

3. All wire and cable shall meet individual system or subsystem manufacturer Specifications.

4. All wire and cable shall be plenum type cable and shall conform to the minimum requirements of Insulated Cable Engineers Association (ICEA) Standards.

5. Wire and cable shall comply with the applicable requirements of the National Electrical Code (NEC), latest edition, in regards to cable construction and usage.

6. The conductors of wires shall be stranded copper, and have conductivity in accordance with the standardization rules of the Institute of Electrical and Electronics Engineers, Inc. (IEEE). The conductor and each strand shall be round and free of kinks and defects.

7. All cable carrying data or voice transmissions shall be shielded. All other cable shall be shielded where necessary for interference-free signals.

8. Insulation shall be rated for a minimum of 300V.

9. Color-coding shall be accomplished by using solidly colored insulation.

10. Grounding conductors shall be insulated, and be colored solid green as required by the National Electric Code (NEC).

B. Wire Types and Sizes:

1. Signal Cable (Non-Power): Wire size shall be a minimum of 20 AWG, twisted, shielded, stranded, insulated, and jacketed.

2. Signal Cable (Low Voltage Power): Wire size shall be a minimum of 18 AWG, stranded, insulated, and jacketed.

   a. Wire size shall be a minimum of 18 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs less than 500 feet.

   b. Wire size shall be a minimum of 16 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs in excess of 500 feet, but less than 750 feet.

   c. Wire size shall be a minimum of 14 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs in excess of 750 feet, but less than 1,250 feet.

   d. Each access control point shall include at the minimum the following cables and conductors ran from the DGP Security Closet and labeled as such:

      1) Card Reader cable shall be royal blue, no exceptions.

         a) This cable shall consist of three pairs of 18AWG conductors, each of which shall be individually shielded and consist of a drain (3) drains in total, no exceptions.

         b) The colors of the pairs of conductors shall be Red/Black (Power), White/Black (Data), and Green/Black (Spare), no exceptions.

      2) Door Latch Relay 1 cable shall be gray, no exceptions.

         a) This cable shall consist of (4) 18AWG conductors, no exceptions.

         b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.

3) Door Latch Relay 2 cable shall be white, no exceptions.
   a) This cable shall consist of (4) 18AWG conductors, no exceptions.
   b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
4) Request-To-Exit cable shall be green, no exceptions.
   a) This cable shall be 20AWG shielded and consist of 4 conductors, no exceptions.
   b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
5) Audible Device cable shall be yellow, no exceptions.
   a) This cable shall be 20AWG shielded and consist of 4 conductors, no exceptions.
   b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
6) Emergency Door Lock cable shall be orange, no exceptions.
   a) This cable Shall be 20AWG shielded and consist of two pairs.
   b) The colors of the pairs of wires shall be Red/Black (Spare) and Green/White (Alarm Signal), no exception.
7) Grounding Conductor 14AWG.

3. Coaxial Cable:
   a. RG-59U with a minimum center conductor of 20 AWG solid, bare copper and overall bare copper braided shield shall be used for cable runs less than 500 feet.
   b. Plenum rated.

2.4 INTERFACES

A. SMS/Fire Alarm System

1. General - Interface with the fire alarm System to provide the following:
   a. Auxiliary monitoring of the normally closed general fire alarm contacts from the SMS file server/workstations.
   b. Auxiliary monitoring of the normally closed System trouble alarm contacts from the SMS file server/workstations.
   c. Auxiliary monitoring of the manual unlock key-switch position from the SMS file server/workstations.

d. Automatic release of fail-safe locking devices during a building fire alarm condition and/or upon activation of the manual unlock key-switch.

2. Functional

a. Auxiliary Monitoring of the Fire Alarm System

1) The SMS shall provide auxiliary monitoring of the alarm and trouble states of the building fire alarm System.

2) Activation of a fire alarm or trouble condition shall cause an alarm indication on the SMS Workstation.

b. Interface Terminal Cabinet

1) To provide for Security System/Fire Alarm System interface, the Contractor shall provide one terminal cabinet in the Fire Command Center. The terminal cabinet shall contain all terminals required to interface the Fire Alarm System to the SMS.

2) The interface terminal cabinet shall be a lockable continuous hinge cover NEMA Type 4 enclosure. The cover of the enclosure shall be labeled to identify its function.

3) The Contractor shall provide dual screw barrier-type terminal strips for each interface point within the interface terminal cabinet. Label all terminals to identify their function.

4) The Contractor shall provide all conduit, and wiring required for the installation of the terminal cabinet, traveling cables and interfacing to the Fire Alarm System.

5) Provide all wiring from the interface terminal cabinet to the SMS.

B. Delayed Egress Doors

1. Functional

a. Delayed Egress shall be integrated to operate with University's C*Cure access control system.
1) A door position switch shall be installed to monitor the state of the door. The University's C*cure system shall receive an alarm from the delayed egress door when the door is opened.
2) The University's C*cure system shall receive an alarm from the delayed egress device when the Alarm Cycle is activated.
3) The University's C*cure system shall receive an alarm from the door if the door is opened once the Alarm Cycle is complete and the device has released.
4) The University's C*cure system shall have the ability to remotely reset an alarm from the delayed egress device.

b. Delayed Egress Devices shall be integrated with the FACP and release allowing free egress upon FACP activation.

2. Delayed Egress Devices shall annunciate at the front/information desk.

C. SMS/Automatic Doors

1. Functional

a. Handicapped door with automatic door operator interface

1) All access controlled handicapped doors with automatic door operators shall be integrated into the SMS.

2) All handicapped doors with automatic door operators shall have an interface board separate from the SMS.

3) All handicapped door automatic door operator interface board shall be supplied with a dedicated fused power source with battery back-up and tied into the emergency generator system.

4) In an application where there are two automatic door operators controlling the same egress/ingress both operators shall work in conjunction with each other. The doors shall work in succession with the specific environmental conditions, and shall be coordinated with the Owner.

5) The ingress handicapped door operator activation button shall not be active when the doors are locked, and shall only become active upon authorized access through the SMS. The SMS shall have a dedicated output for this purpose.

6) All egress door operator activation buttons shall send a request-to-exit signal to the SMS.

7) Egress shall require a card reader that personnel with proper credentials from the SMS may present their credential to the reader which will activate the interior ADA operator activation button. Otherwise, the interior ADA operator activation button will deactivated

8) All egress door operators shall be integrated with the SMS relay that controls the locking mechanism so that the relay “unlocks” the door upon activation.

9) Acceptable Manufacturers:
   a) Camden door controls CX-SA-1 door sequencer, or approved equal.

b. SMS Monitoring The Open/Closed Status of Automatic Doors:

   1) The SMS shall provide for monitoring of the open/closed status of automatic doors as indicated on the Drawings.

   2) Monitoring of the open/closed status of automatic doors shall be facilitated through door position switches provided by the Contractor.

c. Remote control of Card Reader Controlled Automatic Doors:

   1) Provide for remote control of card reader controlled automatic doors.

   2) Provide door release pushbuttons at door control panels as specified herein and as indicated on the Drawings.

d. Interface Terminal Cabinet:

   1) To provide for Security System/automatic door operator interface, the automatic door contractor shall provide one interface terminal cabinet for each automatic door. The interface terminal cabinet shall contain all interface terminals required for each automatic door operation described herein.

   2) The interface terminal cabinet shall be a lockable continuous hinge cover NEMA Type 4 enclosure. The cover of the enclosure shall be labeled to identify its function.

   3) The automatic door contractor shall provide dual screw barrier-type terminal strips for each interface point within the interface terminal cabinet. Two separate terminals shall be provided for each interface point to prevent ground loops. Label all terminals to identify their function.

   4) The Contractor shall provide any control logic and relays required to interface the door operator to the dry contact closures (rated for 2 Amps at 24VDC) provided by the SMS.

   5) The Contractor shall provide all conduit, power, and wiring required for the installation of the terminal cabinet and interfacing to the automatic sliding door.

   6) The Contractor shall provide all wiring from the interface terminal cabinet to the SMS.

   7) Interface terminal cabinets shall be located as indicated on the Drawings.

END OF PART 2

3.0 EXECUTION

3.1 LANGUAGE USAGE

A. English language shall be used throughout the security system, signage, labels, voice messages, instructions, manuals, software, and graphic displays.

3.2 INSTALLATION

A. Site Inspections

1. Continuously verify that the site conditions are in agreement with the Contract Documents and the design package. Submit a report to the Owner documenting changes to the site or conditions that affect the performance of the System to be installed. For those changes or conditions, which affect System installation or performance, provide (with the report) specification sheets, or written functional requirements to support the findings, and a cost estimate to correct the deficiency. No deficiency shall be corrected without written permission from the Owner.

2. Specific mounting locations, exact wire and cable runs, and conduit routing have not been specified or delineated on the Drawings. Coordinate all aspects of the Work with the Owner.

B. Coordination

1. Coordinate with the Owner to ensure that adequate conduit is provided and that equipment back-boxes are adequate for System installation.

2. Coordinate with the Owner to ensure that adequate power has been provided and properly located for the security System equipment.

3. Coordinate with the Owner to ensure that doors and doorframes are properly prepared for electric locking hardware and door position switches.

4. Coordinate locations of all devices with the Owner prior to installation.

5. Coordinate and verify the location of each piece of rack-mounted equipment with the Owner.

6. Coordinate custom SMS report requirements with the Owner. Submit report formats to the Owner for review and acceptance.

7. Coordinate all initial database partitioning and setup with the Owner prior to initial programming and cardholder data entry.

8. Coordinate final camera locations, desired views, and camera housing and mount requirements with the Owner prior to installation.

9. Coordinate camera housing and mount finishes with the (Owner prior to installation.

10. Coordinate finishes and colors of all equipment with the Owner. Submit all finish and graphics for all equipment in public areas to the Owner for approval prior to installation.

C. General

1. Verify acceptance of each type of specified request-to-exit hardware for each application with local life safety code officials.

2. Verify fail-safe and fail-secure lock requirements with the Owner.

3. Contractor or equipment manufacturer logos or names shall not be visible on equipment in public areas.

4. Provide tamper proof fasteners for all equipment in public areas. Fastener finish shall match equipment finish.

D. Equipment: Provide equipment as indicated on the Drawings and specified herein. Additional specific installation requirements are as follows:

1. Security Equipment Room and DGP Locations

a. All equipment shall be on a dedicated circuit and tied to emergency generator.

b. Configure security equipment as indicated in the Drawings.

c. Wire all power supply power fail alarm contacts in each equipment room as a single alarm input to the SMS.

d. Wire each power supply low battery alarm contact as individual alarm inputs to the SMS.

2. DGPs

a. Configure the System such that devices can be connected to spare input points, output points and card reader inputs on the DGP without requiring reconfiguration of the SMS.

3. Card Readers

a. Wire card reader LEDs to indicate valid and invalid card reads, and door locked and unlocked conditions. All card reader LED indicators shall operate identically.

4. Electric Locking Mechanisms

a. Interface with all electric locking mechanisms.

b. Wire electric locking mechanisms as indicated by the manufacturer.

c. Wire fail-safe electric locking mechanisms in accordance with local codes.

d. Wire fail-secure electric locking mechanisms and power supplies such that a fire alarm condition or building power failure shall not affect operation of the lock.

5. Delayed Egress Locking Devices

a. Interface with all delayed egress locking devices.

b. Wire delayed egress locking devices as indicated by the manufacturer.

c. Wire delayed egress locking devices for fail-safe operation in accordance with local codes.

d. Interface with a normally closed supervised alarm contacts that shall open upon activation of the unlock timer and report to the System Workstation.

e. Interface with sounder bypass control contacts. Wire SMS control output contacts to bypass sounder by System Workstation.

f. Interface with lock control contacts activated by System Workstation and/or time schedule. Wire SMS control output contacts to lock/unlock devices by time schedule and/or System Workstation.

6. Fire Alarm Interface

a. Connect (hard wire) fail-safe electric and time delay locking mechanical to the building fire alarm System for fail-safe release upon any fire alarm.

b. Interface with a single low voltage/low current normally closed dry contact from the fire alarm System provided by the fire alarm contractor in the Fire Command Center (FCC). The contact shall open on any fire alarm condition.

c. Provide all additional UL listed fail-safe relays and power supplies necessary to interface to this contact and unlock all fail-safe doors.

d. Connect fail-safe relays and power supplies to standard building power. Connection of fail-safe devices to emergency or UPS power shall not be acceptable.

e. Reference the Drawings for fire alarm interface requirements.

3.3 WIRING TECHNIQUES

A. Furnish and install all SMS wire and cable with the exception of traveling cable for elevator control and monitoring.

B. Provide code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where the penetrations are made by or used for installation of the SMS.

C. Coordinate the routing of wire and cable requiring isolation from power, radio frequency (RF), electromagnetic interference (EMI), telephone, etc. with the Owner.

D. Run all wire and cable continuous from device location to the final point of termination. No mid-run cable splices shall be allowed.

E. Where splicing and/or patching of coaxial cable are deemed necessary, it shall be accomplished through equalization and/or distribution amplifiers. Provide power for the amplifiers as required. The exact location of all equalization/distribution amplifiers (as applicable) shall be indicated on the Record Drawings.

F. Furnish and install all coaxial cable such that ample slack is supplied at the device terminating end of the cable to compensate for any final field modifications in camera location. The extra cable (approximately three meters) shall be bundled and wrapped.

G. At no time shall any coaxial cable be subjected to a bend less than a 150 mm radius.

H. Wire and cable within DGPs, power distribution cabinets and other security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to the equipment within the enclosure. All wire and cable shall be bundled and tied. Ties shall be similar to T&B TyRap cable ties.

I. Provide heat-shrink to insulate all wire splices and connections. The use of electrical tape for splices and connections shall not be acceptable.

J. Visually inspect all wire and cable for faulty insulation prior to installation.

K. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on Wire and Cable.

L. Make connections with solder-less devices, mechanically and electrically secured in accordance with the manufacturers' recommendations. Wire nuts shall not be an acceptable means of connecting wire and cable.

M. Neatly bundle and wrap all horizontally run (above accessible ceilings and not within conduit) wire and cable at three-meter intervals. Provide supports as required. All supports shall be UL listed for the application.

N. All System wiring within vertical riser shafts (as required) shall be bundled, wrapped and tied to the structure at three-meter intervals in order to isolate it from other wire and cable within the

shaft. Additionally, all wire and cable within the shaft shall be supported at least every two floors using Greenlee Slack Grips (Split Mesh Lace Closing) or approved equal. Provide all personnel and equipment necessary to install and support the cable. All equipment shall be UL listed for the application.

3.4 Grounding

A. Minimum one (1) 24 lug grounding bar per DGP location.

B. #6 Conductor green stranded copper conductor to be tied to telecommunications grounding bus with approved lug.

C. All sleeve penetrations within head end equipment room shall have bonding bushings and shall be incorporated with the grounding conductor for the DGP.

D. #14 grounding conductor shall be terminated on the grounding bar of the DGP.

E. All shielded wiring drains shall be bonded and terminated to ground within the DGP with approved ground lug.

3.5 CONDUIT, BOXES, AND RACEWAYS

A. Install all conduit necessary for a complete installation, but not provided for in the Security Conduit Drawings, in finished areas concealed in chases, furrings, concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.

B. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, Workmanlike installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets, or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.

C. All conduit shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.

D. All required inserts shall be drilled-in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.

E. Swab out and remove all burrs from conduit before any wires are pulled.

F. Layout and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the covering of the pipe crossed.

G. Provide fire stops where conduits penetrate fire rated walls and/or floors.

H. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Owner.

3.6 POWER REQUIREMENTS

A. 120VAC power dedicated to security and on generator backup shall be provided by the electrical contractor for the Security System as indicated on the Security Device and Conduit Drawings. Coordinate with the Owner to establish locations of security dedicated 120VAC circuits.

B. Connect to the AC power (provided by electrical contractor) and provide UL listed power supplies and transformers to distribute low voltage power to the System components as required.

C. Provide hinged cover terminal cabinets with tamper switches for all power supplies, transformers, and power distribution terminal strips. Provide all conduit and wiring from the AC power facilities to the terminal cabinets.

D. Surge Protection

1. Provide protection against spikes, surges, noise, and other line problems for all System equipment and components.

2. Protect all exterior video, control, power, signal cables, and conductors against power surges. Video surge protectors shall not attenuate or reduce video and sync signals under normal conditions. Each surge protector shall be UL Listed.

3.7 LABELED DOORS AND FRAMES

A. In no instance shall any UL labeled door or frame be drilled, cut, penetrated, or modified in any way.

B. The Contractor shall be responsible for replacing any labeled door or frame that is modified without written approval from the Owner.

3.8 LABELING

A. Label all controls as necessary to agree with their function.

B. Mark all Wire and Cable in common at both ends using a permanent method such as self-laminating cable marking tape. The tags shall be attached to the wire and in an accessible location so that they can easily be read. Tags shall be installed when wire and cables are installed. Labeling shall agree with Record Documentation.

C. Place wire identification numbers at each end of the conductor involved by using sleeve type, heat shrinkable markers. The markers shall be installed so as to be readable from left to right or top to bottom.

D. Mark all connectors with common designations for mating connectors. The connector designations shall be indicated on the Record Drawings.

E. Coil all spare conductors in the device back-box, panel wire way, or troth. These conductors shall be neatly bundled and tagged.

3.9 TRAINING

A. Training on system installation shall not be required unless otherwise noted by Owner.

3.10 SYSTEM START-UP

A. The Work shall be complete and ready to operate prior to final acceptance.

B. Load the entire initial user database into all programmable Systems up to the day of beneficial use of the System. The Owner shall assist in establishing procedural guidelines and in defining terminology and conditions unique to the Owner's operation.

3.11 SUBSTANTIAL COMPLETION

A. In order to qualify for the Owner’s consideration of Substantial Completion, the Work must, at a minimum, meet the following requirements:

1. All alarm points, access control points, CCTV cameras, and intercom substations must be installed, programmed and fully operational.

2. All sub-System interfaces must be complete and operational.

B. Substantial Completion shall NOT be construed as final acceptance of the Work.

3.12 SYSTEM ACCEPTANCE

A. Final acceptance testing of the Work will be conducted by the Owner, Contractor, and/or Architect.

B. Prior to any final acceptance testing, the Contractor shall submit two (2) sets of preliminary Record Drawings to the Owner. The preliminary Record Drawings are to be used by the Owner to conduct the System final test.

C. The Contractor shall submit a report matrix indicating completion or delinquency for each item included in the Specification and all subsequent addenda and bulletins as part of the Work. Should work on any item be under way, but not yet fully complete, indicate the extent (or lack thereof) of completion to date, and the proposed date of completion.

D. Conduct a complete test of the entire System and provide the Owner with a written report on the results of that test. During the course of this test, place the integrated System in service and calibrate and test all equipment.

E. Fully complete a Security Systems Readiness Checklist prior to the test of the System. The checklist shall accompany the written certification to the Owner that the installed complete System has been calibrated, tested, and is fully functional as specified herein.

1. Security System Readiness Checklist — The Contractor shall indicate completion of the listed items. All items are required to be complete before a final inspection of the System. If for some reason the Contractor is unable to fully comply with any of the listed conditions, a written statement describing the exception is to be submitted with the checklist for review.

Task Description		**Contractor Certification**
a.	Required interfaces to other building Systems have been completed and are functional. Other building Systems may include:	☐
	Fire System	☐
	Elevator System	☐
	Overhead Doors	☐
	Automatic Door Operators	☐
	Delayed Egress	☐
b.	Initial owner users of the System have been entered and passwords assigned, including one Owner user at the "Administrator" level.	☐
c.	Initial input, output, and control information has been loaded into the system. This includes items such as :	☐
	DGP description and address	☐
	Input/Output descriptions	☐
	Door Descriptions	☐
	Alarm Events	☐
	Alarm Priorities	☐
	Alarm Messages	☐
	Card Reader Identification	☐
	Intrusion Zones	☐
	Intrusion Zone Input/Output(s)	☐
	Clearances	☐
d.	all text, messages, and descriptors have been coordinated with the Owner prior to loading.	☐

e.	The required number of access cards have been delivered to the Owner.	☐
f.	Initial access cardholders have been entered into the System.	☐
g.	On-screen alphanumeric identification of each camera has been completed on all Systems elements. Identification schemes have been coordinated with the Owner.	☐
h.	Programming and set-up of all DVRs, multiplexers, Network Client, etc. has been completed.	☐
i.	All cover plates have been furnished and installed on junction boxes, wire ways, etc. and have proper connectors and bushings. All wiring contained therin has been propely bundled, labeled, and wrapped. Excess wiring has been removed.	☐
j.	Installation of all power supplies, control panels, interface panels, batteries, etc. are installed and fully functional. Wire contained therin has been propely bundled, labeled, and wrapped.	☐
k.	Tamper switches have been installed in each cabinet and activated on all card readers as required and are functionally reporting to the System.	☐
l.	All cables, wires, terminals and other conductors have been labeled. Spare conductors have been labeled and neatly coiled and bundled in appropriate cabinets and wire ways.	☐
m.	All panel controls have been properly labeled. Such labeling has been coordinated with the Owner.	☐
n.	All alarm events have been tested and operate normally. This includes Door Forced, Door Held, etc.	☐
o.	All requrired System training has been completed.	☐
p.	Draft as-built documentation, including wiring diagrams, point charts, device location Drawings, panel diagrams, etc. as defined in the Request For Bid, are available for use during the final inspection.	☐

q. System operation and set-up manuals, and functional descriptions have been provided to the Owner.	☐
r. All equipment has been installed in all racks and consoles as shown on the detail Drawings or per Owners request.	☐
s. Charts or diagrams have been have been provided in each rack, cabinet, and panel defining wire routing and interconnections.	☐
t. All equipment has been completely programmed and is operational.	☐
u. The Contractor has made provisions for all equipment (i.e. two-way radios, etc.) and personnel necessary to conduct the final inspection.	☐
. All Low Battery and A/C Fail panel supervision inputs have been properly wired and report to the System.	☐
All alarm events have been tested and operate normally. This includes Door Forced, Door Held, Intrusion Zones etc.	☐
System operation and set-up manuals, and functional descriptions have been provided to the Owner	☐
All Electormechanical Deadlatches engage when doors are closed	☐

F. Deliver a report describing the results of functional tests, burn-in tests, diagnostics, calibrations, corrections, and repairs including written certification to the Owner that the installed complete System has been calibrated, tested, and are fully functional as specified herein.

G. Prior to the final acceptance test, coordinate with the Owner for security related construction clean-up requirements. Security equipment closets and similar areas should be free of accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, remove all waste materials, rubbish, the Contractor's and it's subcontractors' tools, construction equipment, machinery, and all surplus materials.

H. Upon written notification from the Contractor that the System is completely installed, integrated, and operational, and the burn-in testing completed, the Owner will conduct a final acceptance test of the entire System.

I. During the course of the final acceptance test by the Owner, the Contractor shall be responsible for demonstrating that, without exception, the completed and integrated System complies with the contract requirements. All physical and functional requirements of the project shall be demonstrated and shown. This demonstration will begin by comparing "as built" conditions of the System to requirements outlined in the Specification, item by item. Following the Specification compliance review, all System head-end equipment will be evaluated.

J. In order to sufficiently demonstrate the System's functionality, the console operator on duty and his/her superior may be requested to perform certain daily operations inherent to the System.

1. As all of these operations depend heavily on the training outlined within the Specification, the Contractor shall have completed all of the required training prior to initiation of the final acceptance test.

K. The functionality of the various interfaces between Systems will be tested. This testing will include, but not be limited to the following:

1. Correct CCTV Camera call-up on certain alarms within the SMS.

2. Generation of alarms from related Systems failure.

3. Fire alarm system fail-safe lock release.

4. Control of any externally controlled devices and/or database System(s).

L. Following the System head-end equipment and console review, the installation of all field devices will be inspected. Areas examined will include general neatness and quality of installations, complete functionality of each individual device, and mounting, back box and conduit requirements compliance.

M. All equipment shall be fully operational during testing procedures. The Contractor shall provide all personnel, equipment, and supplies necessary to perform all site testing. A minimum of two (2) employees familiar with the System for the final acceptance test shall be present during the testing. One employee shall be responsible for monitoring and verifying alarms while the other will be required to demonstrate the function of each device. Supply at least two (2) two-way radios for use during the test. A manufacturer's representative may be present on site to answer any questions that may be beyond the technical capability of the Contractor's employees, if the Contractor so elects or by specific request of the Architect or Owner, at no charge to the Architect or Owner.

N. Upon successful completion of the final acceptance test (or subsequent punch list retest) the Owner will issue a letter of final acceptance.

O. The Owner retains the right to suspend and/or terminate testing at any time when the System fails to perform as specified. In the event that it becomes necessary to suspend the test, all of the Owner's/Architect's fees and expenses related to the suspended test will be deducted from the Contractor's retainage. Furthermore, in the event it becomes necessary to suspend the test, the Contractor shall work diligently to complete/repair all outstanding items to the condition specified in the Specification and as indicated on the Drawings. The Contractor shall supply the Owner with a detailed completion schedule outlining phase-by-phase completion dates and a tentative date for a subsequent punch list retest. During the final acceptance test, no adjustments, repairs, or modifications to the System will be conducted without the permission of the Owner.

3.13 RECORD DOCUMENTATION

A. Record Documentation shall include all information required in the Pre-fabrication Submittals but revised to reflect "as installed" conditions.

B. General Description and Requirements

1. Submit Record Documentation in accordance with the Owner's construction schedule.

2. Record Documentation shall consist of Record Drawings and Operation and Maintenance Manuals.

3. Provide a letter of transmittal with Record Documentation identifying the name of the Project, Contractor’s name, date submitted for review, and a list of items transmitted.

4. Prior to the final acceptance of the Work, submit two draft sets of the Record Drawings portion of Record Documentation to the Owner. The draft copy shall be used during the final acceptance testing by the Owner.

5. Update all record documentation to reflect changes or modifications made during final acceptance testing as required and submit three blue/black lines and one reproducible set.

C. Record Drawings - Produce all Record" as-built" Drawings using the latest version of AutoCAD. Record drawings shall, at a minimum, include the following:

1. Floor plan drawings indicating device locations, with device legends indicating manufacturers and model numbers for each device.

2. Floor plan drawings indicating wire routing, wire routing shall be delineated in straight line runs and be tagged with cable identification and terminal strip numbers to coincide with the installation.

3. Mounting details for all equipment and hardware.

4. Functional block diagrams for each subsystem.

5. Wiring details showing rack elevations, equipment wiring and terminations, and inter- rack wiring.

6. Wiring diagrams for all custom circuitry including interfaces to various control output controlled devices, i.e. overhead doors, automatic sliding doors, parking gate operators, fire alarm system interface, etc.

7. Wiring diagrams for each DGP, wiring diagrams shall be identical to those laminated and located with each DGP.

8. Typical point-to-point wiring diagrams for each piece of equipment and groups of equipment within the System.

9. Layout details for each riser location, including security panels, power supplies, junction boxes, conduit, and any other security related equipment.

D. Operation and Maintenance Manuals

1. Operation and Maintenance Manuals shall apply to all security related devices, equipment and software modules.

2. Operation and Maintenance Manuals shall be formatted as follows:

   a. Bind each manual in a hard-back loose-leaf binder.

   b. Identify each manual's contents on the cover.

   c. Provide a table of contents and tabulated sheets for each manual. Place tab sheets at the beginning of each chapter or section and at the beginning of each appendix if applicable.

   d. Any hardware manual demonstrating more than one model number of device on any one page shall be clearly marked as to delineate which model has been implemented in the Work.

3. Operation and Maintenance Manuals shall include, at a minimum, the following:

   a. Operational description of each subsystem.

   b. Detailed programming descriptions for each subsystem.

   c. Explanations of subsystem interrelationships.

   d. Electrical schematics for each piece of equipment specified.

   e. Power-up and power-down procedures for each subsystem.

   f. Description of all diagnostic procedures.

g. A menu tree for each subsystem.

h. Setup procedures for each component of the subsystems.

i. A list of manufacturers, their local representatives, and subcontractors that have performed Work on the Project.

j. Installation and service manuals for each piece of equipment.

k. Maintenance schedules for all installed components.

4. Operation and Maintenance Manuals shall include a separate section for each software program incorporated into the Project. The software section shall include, at a minimum, the following information:

a. Definitions of all software related terms and functions.

b. Description of required sequences.

c. Directory of all disk files.

d. Description of all communications protocols, including data formats, command characters, and a sample of each type of data transfer.

e. Instructions for manufacturer supplied report generation.

f. Instructions for custom report generation.

g. Database format and data entry requirements.

E. Procedure for Resubmitting

1. Make corrections or changes in O & M and/or Record Drawings as required by the Owner and resubmit when the Architect's stamp requires re-submittal.

2. Clearly identify changes made other than those specifically requested by the Owner when resubmitting Record Drawings. Changes shall be clouded or similarly highlighted as coordinated with the Owner. Only changes that have been specifically requested by the Owner or have been clouded by the Contractor will be reviewed on re-submittals.

3. Any drawing sheets added to the re-submittal shall be clearly identified and clouded, and shall not change the sheet numbering scheme for previously issued Record Drawings.

4. The Contractor shall be responsible for any delays caused by the re-submittal process.

5. Re-submittal Review Fees

a. If the Owner rejects the Contractor's Record Submittal (Rejected, Revise, and resubmit) more than two times, the Owner will be compensated for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment.

END OF SECTION 3

Card Access:

1. All RM Series Card Readers shall be grounded with a 14awg copper conductor green insulation bonded to the Head End Location via a female disconnect, no exceptions.

    a. Panduit DNF14-110-C, no exceptions.
2. Audible Device 3-Tone Chime WBOX Technologies: 0E-1GANGCHIM
    i. All card reader locations with a Door Contact shall have a local audible device that should activate upon forced and held event activations.
    ii. The Local Audible Device shall be installed on the wall above the door 90" to the top of the box, and/or at least 4" below finished ceiling height.
    iii. Local Audible Device shall be 80 - 88 dB @ 12 - 24 VDC.
    iv. Trigger 3 shall be used as the tone for alarms on the C*cure system.
3. Operation
    i. Ingress (Functions: Exterior; Storeroom)
        1. Authorized users shall present card and pin, and C*cure system shall release electric trim and allow users to ingress.
    ii. Forced Door
        1. If door is opened with key override then the access control system shall activate a "forced door event" which will be received at University police dispatch.
            a. Local Audible Device Shall Sound.
    iii. Held Door
        1. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a "Held door event" which will be received at University police dispatch.
            a. Local Audible Device Shall Sound
    iv. Egress (Functions: Exterior; Storeroom)
        1. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.
    v. Forced Door
        1. If door is opened with key override then the access control system shall activate a "forced door event" which will be received at University police dispatch.
            a. Local Audible Device Shall Sound.
    vi. Held Door
        1. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a "Held door event" which will be received at University police dispatch.
            a. Local Audible Device Shall Sound.

vii. Ingress/Disarming (Function: Classroom/Intrusion Zones) [All areas with a Break Glass shall be programmed this was, but it is not limited to those areas]
    1. Authorized users shall present card and pin, and C*cure system shall release electric trim and allow users to ingress.
    2. System shall be programmed as an Intrusion Zone and shall include an active "ARM" input which will toggle the doors into the room to remain unlocked.
    3. Break Glass: shall have two outputs
        a. Breaking the glass shall activate the device which will physically drop power [Locking the doors] locally via appropriate RIB relay (i.e. with enough relays to drop every lock into the area).
        b. Breaking the glass shall activate the device which will be tied to an input on the corresponding iStar panel and trigger an event that notifies the University Police that an "Emergency has been reported in that area."
        c. Please note that each entry into the area will need to have electrified hardware and a separate wiring schema will need to be developed specific to the environment in which it will be securing.
    4. Forced Door
        a. If door is opened with key override, or without presenting Card and PIN then the access control system shall activate a "forced door event" which will be received at University police dispatch.
            i. Local Audible Device Shall Sound.
    5. Held Door
        a. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a "Held door event" which will be received at University police dispatch.
            i. Local Audible Device Shall Sound

i. Egress/Arming (Function: Classroom/Intrusion Zones)) [All areas with a Break Glass shall be programmed this was, but it is not limited to those areas]
    a. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.
    b. System shall be programmed as an Intrusion Zone and shall include an active "ARM" input which will toggle the doors locked and unlocked.
    c. Authorized users shall close all doors into the area and present card and pin, and C*cure system shall lock electric trim and secure area.

4. All Exterior Door that are not considered “Main Entrances” (i.e. have been specified to include an RM series Reader with Keypad) shall have a Card Reader which is Prox only, and shall serve as an indicator that the door is unlocked (Solid Green), Locked (Solid Red), or for authorized user s only to gain entry into the building (i.e. Police Department).
    a. Operation:
        i. Ingres/Egress Unlocked:
            1. When the building is Unlocked the card reader will remain solid green and users may enter and exit without triggering an alarmed event.
        ii. Ingress (when Locked) (Exterior Prox Only)
            1. Authorized users shall present card, and C*cure system shall release electric trim and allow users to ingress.
                a. Forced Door
                    i. If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
                        1. Local Audible Device Shall Sound.
                b. Held Door
                    i. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
                        1. Local Audible Device Shall Sound
        iii. Egress (When Locked) (Exterior Prox Only)
            1. Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*cure access control system. The access control system will not go into an alarm and allow a valid egress.
                a. Forced Door
                    i. If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
                        1. Local Audible Device Shall Sound.
                b. Held Door
                    i. If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
                        1. Local Audible Device Shall Sound.

Handicapped door with automatic door operator interface

a. All access controlled handicapped doors with automatic door operators shall be integrated into the SMS.

b. All handicapped doors with automatic door operators shall have an interface board separate from the SMS which allows for timed sequencing between activating the Access Control System Request-To-Exit input; Exit Devices EMLR; and Automatic Door Operator.

c. All handicapped door automatic door operator interface boards shall be supplied with a dedicated fused power source with battery back-up and tied into the emergency generator system.

d. In an application where there are two automatic door operators controlling the same egress/ingress both operators shall work in conjunction with each other. The doors shall work in succession with the specific environmental conditions, and shall be coordinated with the Owner.

e. The ingress handicapped door operator activation button shall not be active when the doors are locked, and shall only become active upon activation of the electrified trim. There shall be a RIB relay that is powered by the electrified trim and shall activate the exterior ingress button. f. All egress door operator activation buttons shall send a request-to-exit signal to the SMS.

g. All egress door operators shall be integrated with the EMLR Device on the exit devices and the Power supply that controls the locking mechanism so that the button “unlocks” the door upon activation.

h. Both Automatic door activation buttons (i.e. inside and outside) shall be activated when the building is unlocked.

Note

All associated system components must emanate from the same iStar Panel. All door contacts, card readers, door latch relays, audible devices, and any other input/output associated with a door shall be on the same iStar panel.