



## REQUEST FOR PROPOSALS (RFP)

Department of Administration  
County of Dane, Wisconsin

COUNTY AGENCY

Clerk of Courts

RFP NUMBER

**#116100**

RFP TITLE

### **Dane County Medical Examiner and 911 Center Audio Visual Equipment and Installation**

PURPOSE

The purpose of this document is to provide interested parties with information to enable them to prepare and submit a proposal for [the Dane County Medical Examiner and 911 center audiovisual equipment upgrade](#).

DEADLINE FOR  
RFP SUBMISSIONS

2:00 P.M. Central Time

**November 3, 2016**

**LATE, FAXED, ELECTRONIC MAIL OR UNSIGNED PROPOSALS WILL BE REJECTED**

SUBMIT RFP TO  
THIS ADDRESS

DANE COUNTY PURCHASING DIVISION  
ROOM 425 CITY- COUNTY BUILDING  
210 MARTIN LUTHER KING JR BLVD  
MADISON, WI 53703-3345

VENDOR  
CONFERENCE

Wednesday, October 19, 2016 at 9:30 a.m.  
East District Campus, 3111 Luds Ln, McFarland, WI

SPECIAL  
INSTRUCTIONS

- ☐ **Label the lower left corner of your sealed submittal package with the RFP number**
- ☐ **Place the Signature Affidavit as the first page of your proposal**
- ☐ **Submit one original and ( 3 ) copies of your technical proposal**
- ☐ **Submit one original and ( 1 ) copies of your cost proposal**
- ☐ **Submit one complete electronic copy in Microsoft Word or PDF format burned to a flash drive, CD or DVD**

DIRECT ALL INQUIRES  
TO

<b>NAME</b>	Carolyn A. Clow
<b>TITLE</b>	Purchasing Agent
<b>PHONE #</b>	608/266-4966
<b>FAX #</b>	608/266-4425
<b>EMAIL</b>	<a href="mailto:clow.carolyn@countyofdane.com">clow.carolyn@countyofdane.com</a>
<b>WEB SITE</b>	<a href="http://www.danepurchasing.com">www.danepurchasing.com</a>

DATE RFP ISSUED: **September 12, 2016**

RFP BLANK REVISED 9/12

RFP NO. 116100

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## 1.0 GENERAL INFORMATION

### 1.1 Introduction

The purpose of this document is to provide interested parties with information to enable them to prepare and submit a proposal for Dane County Medical Examiner and 911 Center Audiovisual Equipment and Installation.

The County intends to use the results of this process to award a contract(s) or issuance of purchase order for the product(s) and or services(s) stated above.

The contract resulting from this RFP will be administered by Dane County, Clerk of Courts Office.

The contract administrator will be Carolyn Ninedorf.

This Request for Proposal (RFP) is issued on behalf of Dane County by the Purchasing Division, which is the sole point of contact for the County during the procurement process.

### 1.2 Scope of the Project

1.2.1 Dane County is seeking a qualified AV Integrator to provide installation services for the new Medical Examiner Office and 911 Center. The goal of the upgrade are:

1. Provide state-of-the-art digital AV systems for conference and training rooms.

1.2.2 To meet the objective to upgrade the AV systems a single, unified plan has been developed. This plan consists of technical requirements outlined in narrative form in section 5 of this RFP combined with one-line documents attached separately. Together the narrative and one-lines constitute the requirements that must be met.

1. Price increases, inflation, cost of new technology or new products for both phases should all be factored into the bidder's price.
2. Bidders should note that the facility is in the final stages of completion therefore the project will require immediate attention..

1.2.3 The AV system needs to do the following:

1. Permit presentation of digital material using digital devices on high-definition projectors and screens
2. Provide user interfaces such as HDMI to permit digital connections

3. Audio systems to permit additional microphones
4. Provide assisted listening systems.
5. Provide a mobile cart
6. Provide projector and screen for HD resolutions and aspect ratios
7. Provide video conferencing capabilities, cameras and interfaces

1.2.4 Access to Facility.

1. Integrator will need to coordinate access to rooms with Dane County
2. Integrator may need to alter work schedules, work after hours, work partial days or in other ways accommodate the expedited schedule

1.3 Definitions

The following definitions are used throughout the RFP.

**County** means Dane County

**County Agency** means Department /Division utilizing the service or product

**Proposer/vendor** means a firm submitting a proposal in response to this RFP.

**Contractor** means proposer awarded the contract.

1.4 Clarification of the specifications

All inquiries concerning this RFP must be directed to the **person indicated on the cover page** of the RFP Document. (electronic mail is the preferred method)

Any questions concerning this RFP must be submitted in writing by mail, fax or e-mail on or before the stated date on the **Calendar of Events** (see Section 1.6)

Proposers are expected to raise any questions, exceptions, or additions they have concerning the RFP document at this point in the RFP process. If a proposer discovers any significant ambiguity, error, conflict, discrepancy, omission, or other deficiency in this RFP, the proposer should immediately notify the contact person of such error and request modification or clarification of the RFP document.

**Mailing Address:**

**Dane County Purchasing Division  
Room 425 City-County Bldg.  
210 Martin Luther King Jr. Blvd  
Madison, WI 53703-3345**

Proposers are prohibited from communicating directly with any employee of Dane County, except as described herein. No County employee or representative other than those individuals listed as County contacts in this RFP is authorized to provide any information or respond to any question or

inquiry concerning this RFP.

#### 1.5 Addendums and/or Revisions

In the event that it becomes necessary to provide additional clarifying data or information, or to revise any part of this RFP, revisions/amendments and/or supplements will be posted on the Purchasing Division web site at [www.danepurchasing.com](http://www.danepurchasing.com)

It shall be the responsibility of the proposers to regularly monitor the Purchasing Division web site for any such postings. Proposers must acknowledge the receipt / review of any addendum(s) at the bottom of the RFP Cover Page /Signature Affidavit.

Each proposal shall stipulate that it is predicated upon the terms and conditions of this RFP and any supplements or revisions thereof.

#### 1.6 Calendar of Events

Listed below are specific and estimated dates and times of actions related to this RFP. The actions with specific dates must be completed as indicated unless otherwise changed by the County. In the event that the County finds it necessary to change any of the specific dates and times in the calendar of events listed below, it will do so by issuing a supplement to this RFP and posting such supplement on the Dane County web site at [www.danepurchasing.com](http://www.danepurchasing.com) . There may or may not be a formal notification issued for changes in the estimated dates and times.

DATE	EVENT
October 12, 2016	Date of issue of the RFP
October 19, 2016, 9:30 a.m.	Vendor conference
October 26, 2016	Last day for submitting written inquiries (2:00 p.m. Central Time)
October 28, 2016	Supplements or revisions to the RFP posted on the Purchasing Division web site at <a href="http://www.danepurchasing.com">www.danepurchasing.com</a>
November 3, 2016	Proposals due from vendors
November 2016	Oral presentation by invited vendors, if needed
November 2016	Notification of intent to award sent to vendors
November 2016	Contract start date

#### 1.7 Vendor Conference

A **mandatory** vendor conference will be held to respond to written questions and to provide any needed additional instruction to vendors on the submission of proposals. All vendors who intend to respond to the RFP **shall** to attend the vendor conference. If a vendor fails to attend the conference and submits a proposal, the proposal will be rejected.

**Date:** Wednesday, October 19, 2016

**Time:** 9:30 a.m.

**Location:** East District Campus, 3111 Luds Ln, McFarland, WI

## 1.8 Contract Term and Funding

The contract shall be effective on the date indicated on the purchase order or the contract execution date and shall run through December 31, 2016.

## 1.9 Reasonable Accommodations

The County will provide reasonable accommodations, including the provision of informational material in an alternative format, for qualified individuals with disabilities upon request. If you need accommodations at a proposal opening/vendor conference, contact the Purchasing Division at (608) 266-4131 (voice) or Wisconsin Relay (711).

## 2.0 PREPARING AND SUBMITTING A PROPOSAL

### 2.1 General Instructions

The evaluation and selection of a contractor and the contract will be based on the information submitted in the proposal plus references and any required on-site visits or oral interview presentations. Failure to respond to each of the requirements in the RFP may be the basis for rejecting a response.

Elaborate proposals (e.g. expensive artwork) beyond that sufficient to present a complete and effective proposal, are not necessary or desired.

### 2.2 Proprietary Information

All restrictions on the use of data contained within a proposal and all confidential information must be clearly stated on the attached "Designation of Confidential and Proprietary Information" form. Proprietary information submitted in a proposal, or in response to the RFP, will be handled in accordance with the applicable Wisconsin State Statute(s).

To the extent permitted by law, it is the intention of Dane County to withhold the contents of the proposal from public view until such times as competitive or bargaining reasons no longer require non-disclosure, in the opinion of Dane County. At that time, all proposals will be available for review in accordance with the Wisconsin Open Records Law.

### 2.3 Incurring Costs

Dane County is not liable for any cost incurred by proposers in replying to this RFP.

### 2.4 Vendor Registration

**All proposers wishing to submit a proposal must be a paid registered**

**vendor with Dane County.** Prior to the RFP opening, you can complete a registration form online by visiting our web site at [www.danepurchasing.com](http://www.danepurchasing.com), or you can obtain a Vendor Registration Form by calling 608.266.4131. Your completed Vendor Registration Form and Registration Fee must be received for your bid to be considered for an award.

## 2.5 Submittal Instructions

Proposals must be received in by the County Purchasing Division by the specified time stated on the cover page. All proposals must be time-stamped in by the Purchasing Division by the stated time. Proposals not so stamped will not be accepted. Proposals received in response to this solicitation will not be returned to the proposers.

All proposals must be packaged, sealed and show the following information on the outside of the package:

- ☐ Proposer's name and address
- ☐ Request for proposal title
- ☐ Request for proposal number
- ☐ Proposal due date

## 2.6 Required Copies

Proposers must submit **an original and the required number of copies** of all materials required for acceptance as instructed on the cover page of the RFP (Special Instructions).

All hard copies of the proposal must be on 8.5"x11" individually securely bound. **In addition, proposers must submit one complete electronic copy in Microsoft Word or PDF format burned to a flash drive, CD or DVD.**

## 2.7 Proposal Organization and Format

Proposals should be organized and presented in the order and by the number assigned in the RFP. Proposals must be organized with the following headings and subheadings. Each heading and subheading should be separated by tabs or otherwise clearly marked. The RFP sections which should be submitted or responded to are:

- Introduction (See Section 4 of this RFP)
- Response to general requirements (See Section 4 of this RFP)
  - Organizational qualifications
  - Staff qualifications and Facilities
  - References
- Response to technical requirements (See Section 5 of this RFP)
- Cost proposal (See Section 6 of this RFP)
- Required forms (See Section 8 of this RFP)

[Attachment A](#)      [Signature Affidavit](#)



Attachment B	Vendor Registration Certification
Attachment C	Reference Data Sheet
Attachment D	Designation of Confidential and Proprietary Information
Attachment E	Fair Labor Practices Certification
Attachment F	Vendor Data Sheet
Attachment G	Cost Summary Page

- Appendices (Additional Information the proposer submits)

## 2.8 Multiple Proposals

Multiple proposals from a vendor will be permissible, however each proposal must conform fully to the requirements for proposal submission. Each such proposal must be separately submitted and labeled as Proposal #1, Proposal #2, etc.

## 2.9 Oral Presentations and Site Visits

Top ranked selected proposers may be required to make oral interview presentations and/or site visits to supplement their proposals, if requested by the County. The County will make every reasonable attempt to schedule each presentation at a time and location that is agreeable to the proposer. Failure of a proposer to conduct a presentation to the County on the date scheduled may result in rejection of the vendor's proposal.

# 3.0 PROPOSAL SELECTION AND AWARD PROCESS

## 3.1 Preliminary Evaluation

The proposals will first be reviewed to determine if requirements in Section 2.0 are met, and if additional mandatory requirements are met. (see Section 4.0). Failure to meet mandatory requirements will result in the proposal being rejected. In the event that all vendors do not meet one or more of the mandatory requirements, the County reserves the right to continue the evaluation of the proposals and to select the proposal which most closely meets the requirements specified in this RFP.

## 3.2 Proposal Scoring

Accepted proposals will be reviewed by an evaluation team and scored against the stated criteria. This scoring will determine the ranking of vendors based upon their written proposals. If the team determines that it is in the best interest of the County to require oral presentations, the highest ranking vendors will be invited to make such presentations. Those vendors that participate in the interview process will then be scored, and the final ranking will be made based upon those scores.

## 3.3 Right to Reject Proposals and Negotiate Contract Terms

The County reserves the right to reject any and all proposals and to negotiate the terms of the contract, including the award amount, with the selected proposer prior to entering into a contract. If contract negotiations cannot be concluded successfully with the highest scoring proposer, the County may negotiate a contract with the next highest scoring proposer.

### 3.4 Evaluation Criteria

The proposals will be scored using the following criteria:

	<u>Description</u>	<u>Percent</u>
1.	General requirements	25
a	Organization capabilities and staff qualifications (Sections 4.2 & 4.3)	
2.	Technical requirements	25
a	Bill of materials, detailed one line diagram, timeline and project approach (Section 5)	
3.	Cost	<u>50</u>
	TOTAL	100

### 3.5 Award and Final Offers

The award will be granted in one of two ways. The award may be granted to the highest scoring responsive and responsible proposer. Alternatively, the highest scoring proposer or proposers may be requested to submit final and best offers. If final and best offers are requested, they will be evaluated against the stated criteria, scored and ranked. The award will then be granted to the highest scoring proposer.

### 3.6 Notification of Intent to Award

As a courtesy, the County may send a notification of award memo to responding vendors at the time of the award.

## 4.0 GENERAL PROPOSAL REQUIREMENTS

### 4.1 Introduction

Provide a one page letter of interest in the project. Include a brief description of company history, mission, expertise and availability.

### 4.2 Organization Capabilities

Describe the firm's experience and capabilities in providing similar

services to those required. Be specific and identify projects, dates, and results. Provide no fewer than three and no more than six similar projects.

If your company belongs to any industry trade groups or is certified by trade groups or manufacturers, list the certifications.

#### 4.3 Staff Qualifications

Provide resumes describing the educational and work experiences for each of the key staff who would be assigned to the project.

Provide industry certifications from InfoComm, BICSI or other trade organizations.

Provide manufacturer certifications (not merely training courses but actual certifications recognized by the manufacturer or industry).

It is required that the bidder have at least one Infocomm CTS-I or CTS-D assigned to this project.

Indicate AV system control programming capabilities and experience.

#### 4.4 Proposer References

Proposers must include in their RFPs a list of organizations, including points of contact (name, address, and telephone number), which can be used as references for work performed in the area of service required. Selected organizations may be contacted to determine the quality of work performed and personnel assigned to the project.

#### 4.5 Mandatory Requirements

The following general requirements are mandatory and must be complied with. Provide a narrative describing how the firm meets the following requirements:

4.5.1 Staff having CTS-I or CTS-D certification

4.5.2 Be certified by the manufacturer for the control system products to be installed.

### 5.0 TECHNICAL REQUIREMENTS

#### 5.1 Overview of technical requirements

The requirements noted below are of a summary nature. For specific requirements regarding products and installation, refer to the accompanying drawings and specification 27 40 00- Appendix 1.

Provide a bill of materials (with line item costs, if possible) and a detailed one line diagram, as well as an overview of the timeline and project approach that the firm will use for the project.

One (1) ceiling-mounted projector with associated ceiling-recessed electric projection screen.

Two (2) wall-mounted, Owner-furnished, contractor-installed 55" flat panel displays.

Three (3) wall-mounted AV input plates.

Each input plate will provide VGA + 3.5mm and HDMI input connectivity.

One (1) wall-mounted touch-screen control panel mounted at the front of the room.

One (1) ceiling-mounted camera and two (2) ceiling mounted microphones will support audio and video conferencing via 'soft' codec (Skype, Lync, etc.) on an OFE PC mounted in the equipment rack.

One (1) AV bridge to encode AV signals for use with a 'soft' codec.

One (1) audio digital signal processor (DSP) for audio routing and interface with the building phone system.

One (1) AV network switch for control communication.

Distributed overhead loudspeakers will provide audio playback.

One (1) equipment rack will be mounted in Storage 106A.

This rack will house the AV equipment for both Conference Room 106 as well as the Autopsy head end equipment.

Autopsy 130 / Decomposition Autopsy 132 / Autopsy Briefing 131A / Body Viewing 131B:

These systems will provide communication between each autopsy space and its adjacent viewing area. Each autopsy station will have a ceiling-mounted loudspeaker and a ceiling mounted microphone. A water resistant mute switch will be mounted at each autopsy station to mute audio from the associated overhead microphone. Each viewing area will have a ceiling-mounted loudspeaker and a desktop push-to-talk microphone (PTT).

The AV equipment will include (but not necessarily be limited to):

One (1) audio DSP with IO unit and room control panel.

Room control panel to be mounted at the equipment rack to allow level adjustment.

Mobile Collaboration display:

The mobile collaboration display will provide interactivity and local/remote collaboration. The 57" diagonal display will be mounted on a wheeled cart and will feature an integrated Windows PC, camera, microphone array, and loudspeakers.

Dane County 911 Center AV Systems:

911 Center 155 / Break Out 156:

The 911 Center 155 and Break Out 156 AV systems will support general presentations as well as audio conferencing and recording. The room will

be configured so that any content can be displayed on any or all display devices.

The AV equipment will include (but not necessarily be limited to):

One (1) ceiling-mounted projector with associated ceiling-recessed electric projection screen.

Projection Screen:

Projection screen to be equipped with built-in low voltage control interface.

Four (2) wall-mounted, 82" flat panel displays.

One (1) wall-mounted 65" flat panel display.

Three (3) wall-mounted AV input plates.

Each input plate will provide VGA + 3.5mm and HDMI input connectivity.

One (1) floor-mounted input plate.

One (1) wall-mounted touch-screen control panel mounted at the front of the room.

One (1) ceiling-mounted camera to enable presenter IMAG and recording.

One (1) audio digital signal processor (DSP) for audio routing

One (1) AV network switch for signal distribution and communication.

Distributed overhead loudspeakers will provide audio playback.

One (1) network video recorder (NVR) to allow recording and playback.

One (1) Owner-Furnished PC with six (6) video outputs.

The six (6) outputs will be routed to the video distribution system and available to be shown on any/all display devices.

One (1) 4-channel windowing processor.

The windowing processor will allow four (4) sources to be displayed in one image simultaneously.

One (1) desktop gooseneck microphone.

One (1) wireless microphone with one (1) handheld, and one (1) beltpack transmitter (only one transmitter can be used at a time)

## 6.0 COST PROPOSAL

### 6.1 General Instructions on Submitting Cost Proposals

Proposers must submit an original and the required number of copies of the cost proposal as instructed on the **cover page of the RFP** (Special Instructions).

Cost proposal should be submitted in a separate envelope labeled **Cost Proposal** with the written proposal. (Refer to Cost Proposal Form.)

The proposal will be scored using a standard quantitative calculation where the most cost criteria points will be awarded to the proposal with the lowest cost.

### 6.2 Format for Submitting Cost Proposals

Submit cost proposal on Attachment G. Include costing information on the bill of materials if possible.

### 6.3 Fixed Price Period

All prices, costs, and conditions outlined in the proposal shall remain fixed and valid for acceptance for 90 days starting on the due date for proposals.

## 7.0 SPECIAL CONTRACT TERMS AND CONDITIONS

### 7.1 Living Wage Requirement

All employees working on this project are covered by the Dane County Living Wage Ordinance Section 25.015 (d). See Section 28.0 Standard Terms and Conditions. The minimum living wage rate for 2014 is \$11.34 and for 2015 is \$11.47. The successful proposer will be required to sign a Living Wage Certification upon completion of the contract. Details are available on the Dane County Purchasing Division web site at [www.co.dane.wi.us/purch/purch.htm](http://www.co.dane.wi.us/purch/purch.htm)

### 7.2 Domestic Partner Equal Benefits Requirement

The contractor [or grant beneficiary] agrees to provide the same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or the cash equivalent if such a benefit cannot reasonably be provided. The contractor [or grant beneficiary] agrees to make available for County inspection the contractor's payroll records relating to employees providing services on or under this contract or subcontract [or grant]. If any payroll records of a contractor [or grant beneficiary] contain any false, misleading or fraudulent information, or if a contractor [or grant beneficiary] fails to comply with the provisions of s. 25.016, D. C. Ords., the contract compliance officer may withhold payments on the contract; terminate, cancel or suspend the contract in whole or in part; or, after a due process hearing, deny the contractor the right to participate in bidding on future County contracts for a period of one year after the first violation is found and for a period of three years after a second or subsequent violation is found

### 7.3 Local Purchasing Ordinance

Under County ordinances, a Local Vendor is defined as a supplier or provider of equipment, materials, supplies or services that has an established place of business within the County of Dane. An established place of business means a physical office, plant or other facility. A post office box address does not qualify a vendor as a Local Vendor.

County ordinance provides that a local vendor automatically receive five points toward the evaluation score and vendors located within the counties adjacent to Dane County (Columbia, Dodge, Green, Iowa, Jefferson, Rock, Sauk) automatically receive two points toward the evaluation score.

#### 7.4 Dane County Sustainability Principles

On October 18, 2012, the Dane County Board of Supervisors adopted Resolution 103, 2012-2013 establishing the following sustainability principles for the county:

- Reduce and eventually eliminate Dane County government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;
- Reduce and eventually eliminate Dane County government's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances;
- Reduce and eventually eliminate Dane County government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems); and
- Reduce and eventually eliminate Dane County government's contribution to conditions that undermine people's ability to meet their basic human needs.

#### 8.0 REQUIRED FORMS

The following forms must be completed and submitted with the proposal in accordance with the instructions given in Section 2.0. Blank forms are attached.

Attachment A	Signature Affidavit
Attachment B	Vendor Registration Certification
Attachment C	Reference Data Sheet
Attachment D	Designation of Confidential and Proprietary Information
Attachment E	Fair Labor Practices Certification
Attachment F	Vendor Data Sheet
Attachment G	Cost Summary Page

**RFP COVER PAGE  
SIGNATURE AFFIDAVIT**

**NAME OF FIRM:**

In signing this proposal, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a proposal; that this proposal has been independently arrived at without collusion with any other proposer, competitor or potential competitor; that this proposal has not been knowingly disclosed prior to the opening of proposals to any other proposer or competitor; that the above statement is accurate under penalty of perjury.

The undersigned, submitting this proposal hereby agrees with all the terms, conditions, and specifications required by the County in this Request for Proposal, and declares that the attached proposal and pricing are in conformity therewith.

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Title**

\_\_\_\_\_  
**Name (type or print**

\_\_\_\_\_  
**Date**

☐ **Addendums** -This firm hereby acknowledges receipt / review of the following addendum(s) (If any)

Addendum #\_\_\_\_\_ Addendum #\_\_\_\_\_Addendum #\_\_\_\_\_Addendum #\_\_\_\_\_



**VENDOR REGISTRATION CERTIFICATION**

Per Dane County Ordinance, Section 62.15, "Any person desiring to bid on any county contract must register with the purchasing manager and pay an annual registration fee of \$20."

Your completed Vendor Registration Form and Registration Fee must be received for your bid to be considered for an award. Your bid/proposal may not be evaluated for failure to comply with this provision.

Complete a registration form online by visiting our web site at [www.danepurchasing.com](http://www.danepurchasing.com). You will be prompted to create a username and a password and you will receive a confirmation message, then log back in and complete the registration. Once your registration is complete you will receive a second confirmation. Retain your user name and password for ease of re-registration in future years.

Payment may be made via credit card on-line or by check in the mail or in person at the Purchasing Division office. If paying by check make check payable to Dane County Treasurer and indicate your federal identification number (FIN) on the subject line.

**CERTIFICATION**

The undersigned, for and on behalf of the **PROPOSER, BIDDER OR APPLICANT** named herein, certifies as follows:

- ☐ This firm is a paid, registered vendor with Dane County in accordance with the bid terms and conditions.

Vendor Number # \_\_\_\_\_

Paid until \_\_\_\_\_

Date Signed: \_\_\_\_\_

\_\_\_\_\_  
Officer or Authorized Agent

\_\_\_\_\_  
Business Name

<b>REFERENCE DATA SHEET</b>		
Provide company name, address, contact person, telephone number, and appropriate information on the product(s) and/or service(s) used for three (3) or more installations/services with requirements similar to those included in this solicitation document		
<b>NAME OF FIRM:</b>		
<b>STREET ADDRESS:</b>		
<b>CITY, STATE, ZIP</b>		
<b>CONTACT PERSON:</b>		<b>EMAIL:</b>
<b>PHONE #:</b>		<b>FAX #:</b>
<b>Product(s) and/or Service(s) Used:</b>		
<b>NAME OF FIRM:</b>		
<b>STREET ADDRESS:</b>		
<b>CITY, STATE, ZIP</b>		
<b>CONTACT PERSON:</b>		<b>EMAIL:</b>
<b>PHONE #:</b>		<b>FAX #:</b>
<b>Product(s) and/or Service(s) Used:</b>		
<b>NAME OF FIRM:</b>		
<b>STREET ADDRESS:</b>		
<b>CITY, STATE, ZIP</b>		
<b>CONTACT PERSON:</b>		<b>EMAIL:</b>
<b>PHONE #:</b>		<b>FAX #:</b>
<b>Product(s) and/or Service(s) Used:</b>		

<b>Designation of Confidential and Proprietary Information</b>		
<p>The attached material submitted in response to this Proposal includes proprietary and confidential information which qualifies as a trade secret, as provided in Sect 19.36(5), Wisconsin State Statutes, or is otherwise material that can be kept confidential under the Wisconsin Open Records law. As such, we ask that certain pages, as indicated below, of this proposal response be treated as confidential material and not be released without our written approval. Attach additional sheets if needed.</p>		
Section	Page Number	Topic

Check mark : \_\_\_\_\_ This firm is not designating any information as proprietary and confidential witch qualifies as trade secrete.

**Prices always become public information when proposals are opened, and therefore cannot be designated as confidential.**

Other information cannot be kept confidential unless it is a trade secret. Trade secret is defined in Sect. 134(80)(1)(c) Wis. State Statutes, as follows: "Trade secret" means information, including a formula, pattern, compilation, program, device, method technique or process to which all of the following apply:

1. The information derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use.
2. The information is the subject of efforts to maintain its secrecy that are reasonable under the circumstances.

**In the event the Designation of Confidentiality of this information is challenged, the undersigned hereby agrees to provide legal counsel or other necessary assistance to defend the Designation of Confidentiality.**

Failure to include this form in the proposal response may mean that all information provided as part of the proposal response will be open to examination or copying. The County considers other markings of confidential in the proposal document to be insufficient. The undersigned agree to hold the County harmless for any damages arising out of the release of any material unless they are specifically identified above.

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Title**

\_\_\_\_\_  
**Name (type or print**

\_\_\_\_\_  
**Date**

**FAIR LABOR PRACTICES CERTIFICATION  
Dane County Ordinance 25.11(28)**

The undersigned, for and on behalf of the PROPOSER, BIDDER OR APPLICANT named herein, certifies as follows:

1. That he or she is an officer or duly authorized agent of the above-referenced PROPOSER, BIDDER OR APPLICANT, which has submitted a proposal, bid or application for a contract with the county of Dane.

That PROPOSER, BIDDER OR APPLICANT has: (Check One)

\_\_\_\_\_ not been found by the National Labor Relations Board ("NLRB") or the Wisconsin Employment Relations Commission ("WERC") to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the date this Certification is signed.

\_\_\_\_\_ been found by the National Labor Relations Board ("NLRB") or the Wisconsin Employment Relations Commission ("WERC") to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the date this Certification is signed

Date Signed: \_\_\_\_\_

\_\_\_\_\_  
Officer or Authorized Agent

\_\_\_\_\_  
Business Name

**NOTE: You can find information regarding the violations described above at:**  
[www.nlr.gov](http://www.nlr.gov) and <http://werc.wi.gov>.

**For Reference Dane County Ord. 28.11 (28) is as follows:**

**(28) BIDDER RESPONSIBILITY. (a)** Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The purchasing manager shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder's responsibility to perform the contract.

If you indicated that you have been found by the NLRB or WERC to have such a violation, you must include a copy of any relevant information regarding such violation with your proposal, bid or application.

## VENDOR DATA SHEET / LOCAL PURCHASING PROVISIONS

This address will be used to determine local purchasing preference and the mailing address where County purchase orders/contracts will be mailed:

1. **Company Name:**

ADDRESS:

CITY:

COUNTY:

STATE:

ZIP+4:

TEL:

TOLL FREE TEL:

FAX:

2. **Contact person in the event there are questions about your bid/proposal**

NAME

TITLE:

TEL

TOLL FREE TEL

FAX

E-MAIL

3. **Local Vendor:**

Are you claiming a local purchasing preference under DCO 25.11(8) based on your response to section 1 of this form?

- ☐ **No** – continue on to the next page  
☐ **Yes** – complete the remainder of this form

Indicate if your firm/company has an established place of business located in any of the following Wisconsin Counties. An established place of business means a physical office, plant or other facility. A post office box address does not qualify a vendor as a Local Vendor. DCO 25.04(7h)

**Select one:**

We are claiming a 10% preference as a Dane County Business

☐ **Dane County**

We are claiming a 5% preference as a business located in a county adjacent to Dane County

☐ **Columbia County**

☐ **Dodge County**

☐ **Green County**

☐ **Iowa County**

☐ **Jefferson County**

☐ **Rock County**

☐ **Sauk County**

REVISED 9/12

## COST / FINANCIAL PROPOSAL

NAME OF FIRM:

Price: \$\_\_\_\_\_

**Service contract** to include pricing for five years following the initial one year warranty period. Please detail what is included with this service contract.

Year One – included, warranty period

Year Two     \$\_\_\_\_\_

Year Three    \$\_\_\_\_\_

**Maintenance** to include hourly rates for ongoing maintenance and repairs, outside of the service contract, including a markup for parts. Pricing for five years is requested.

Parts discount from list        \_\_\_\_\_%

Year	Hourly Rate	Overtime Rate
One	\$	\$
Two	\$	\$
Three	\$	\$
Four	\$	\$
Five	\$	\$

## STANDARD TERMS AND CONDITIONS

(Request For Bids/Proposals/Contracts)

Dane County Purchasing Division

Rev. 11/13

1.0 **APPLICABILITY:** The terms and conditions set forth in this document apply to Requests for Proposals (RFP), Bids and all other transactions whereby the County of Dane acquires goods or services, or both.

1.1 **ENTIRE AGREEMENT:** These Standard Terms and Conditions shall apply to any contract, including any purchase order, awarded as a result of this request. Special requirements of a resulting contract may also apply. Said written contract with referenced parts and attachments shall constitute the entire agreement, and no other terms and conditions in any document, acceptance, or acknowledgment shall be effective or binding unless expressly agreed to in writing by the County. Unless otherwise stated in the agreement, these standard terms conditions supersede any other terms and/or conditions applicable to this agreement.

1.2 **DEFINITIONS:** As used herein, "vendor" includes a provider of goods or services, or both, who is responding to an RFP or a bid, and "bid" includes a response to either an RFP or a bid.

2.0 **SPECIFICATIONS:** The specifications herein are the minimum acceptable. When specific manufacturer and model numbers are used, they are to establish a design, type of construction, quality, functional capability or performance level, or any combination thereof, desired. When alternates are proposed, they must be identified by manufacturer, stock number, and such other information necessary to establish equivalency. Dane County shall be the sole judge of equivalency. Vendors are cautioned to avoid proposing alternates to the specifications that may result in rejection of their bid.

3.0 **DEVIATIONS AND EXCEPTIONS:** Deviations and exceptions from terms, conditions, or specifications shall be described fully on the vendor's letterhead, signed, and attached to the bid. In the absence of such statement, the bid shall be accepted as in strict compliance with all terms, conditions, and specifications and vendor shall be held liable for injury resulting from any deviation.

4.0 **QUALITY:** Unless otherwise indicated in the request, all material shall be first quality. No pre-owned, obsolete, discontinued or defective materials may be used.

5.0 **QUANTITIES:** The quantities shown herein are based on estimated needs. The County reserves the right to increase or decrease quantities to meet actual needs.

6.0 **DELIVERY:** Deliveries shall be FOB destination freight prepaid and included unless otherwise specified. County will reject shipments sent C.O.D. or freight collect.

7.0 **PRICING:** Unit prices shown on the bid shall be the price per unit of sale as stated on the request or contract. For any given item, the quantity multiplied by the unit price shall establish the extended price, the unit price shall govern in the bid evaluation and contract administration.

7.1 Prices established in continuing agreements and term contracts may be lowered due to market conditions, but prices  
RFP NO. 116100

shall not be subject to increase for the term specified in the award. Vendor shall submit proposed increases to the contracting department thirty (30) calendar days before the proposed effective date of the price increase. Proposed increases shall be limited to fully documented cost increases to the vendor that are demonstrated to be industry wide. Price increases may not be granted unless they are expressed in bid documents and contracts or agreements.

7.2 Submission of a bid constitutes bidder's certification that no financial or personal relationship exists between the bidder and any county official or employee except as specially set forth in writing attached to and made a part of the bid. The successful bidder shall disclose any such relationship which develops during the term of the contract.

8.0 **ACCEPTANCE-REJECTION:** Dane County reserves the right to accept or reject any or all bids, to waive any technicality in any bid submitted and to accept any part of a bid as deemed to be in the best interests of the County. Submission of a proposal or a bid constitutes the making of an offer to contract and gives the County an option valid for 60 days after the date of submission to the County.

8.1 Bids **MUST** be dated and time stamped by the Dane County Purchasing Division Office on or before the date and time that the bid is due. Bids deposited or time stamped in another office will be rejected. Actual receipt in the office of the purchasing division is necessary; timely deposit in the mail system is not sufficient. THERE WILL BE NO EXCEPTIONS TO THIS POLICY.

9.0 **METHOD OF AWARD:** Award shall be made to the lowest responsible responsive vendor conforming to specifications, terms, and conditions, or to the most advantageous bid submitted to the County on a quality versus price basis.

10.0 **ORDERING/ACCEPTANCE:** Written notice of award to a vendor in the form of a purchase order or other document, mailed or delivered to the address shown on the bid will be considered sufficient notice of acceptance of bid. A formal contract containing all provisions of the contract signed by both parties shall be used when required by the Dane County Purchasing Division.

11.0 **PAYMENT TERMS AND INVOICING:** Unless otherwise agreed, Dane County will pay properly submitted vendor invoices within thirty (30) days of receipt of goods and services. Payment will not be made until goods or services are delivered, installed (if required), and accepted as specified. Invoices presented for payment must be submitted in accordance with instructions contained on the purchase order.

11.1 **NO WAIVER OF DEFAULT:** In no event shall the making of any payment or acceptance of any service or product required by this Agreement constitute or be construed as a waiver by County of any breach of the covenants of the Agreement or a waiver of any default of the successful vendor, and the making of any such payment or acceptance of any such service or product by County while any such default or breach

shall exist shall in no way impair or prejudice the right of County with respect to recovery of damages or other remedy as a result of such breach or default.

12.0 TAXES: The County and its departments are exempt from payment of all federal tax and Wisconsin state and local taxes on its purchases except Wisconsin excise taxes as described below. The State of Wisconsin Department of Revenue has issued tax exempt number ES41279 to Dane County.

12.1 The County is required to pay the Wisconsin excise or occupation tax on its purchase of beer, liquor, wine, cigarettes, tobacco products, motor vehicle fuel and general aviation fuel. The County is exempt from Wisconsin sales or use tax on these purchases. The County may be subject to other states' taxes on its purchases in that state depending on the laws of that state. Vendors performing construction activities are required to pay state use tax on the cost of materials.

13.0 GUARANTEED DELIVERY: Failure of the vendor to adhere to delivery schedules as specified or to promptly replace rejected materials shall render the vendor liable for all costs in excess of the contract price when alternate procurement is necessary. Excess costs shall include administrative costs.

14.0 APPLICABLE LAW AND VENUE: This contract shall be governed under the laws of the State of Wisconsin, and venue for any legal action between the parties shall be in Dane County Circuit Court. The vendor shall at all times comply with and observe all federal and state laws, local laws, ordinances, and regulations which are in effect during the period of this contract and which in any manner affect the work or its conduct.

15.0 ASSIGNMENT: No right or duty in whole or in part of the vendor under this contract may be assigned or delegated without the prior written consent of Dane County.

16.0 NONDISCRIMINATION/AFFIRMATIVE ACTION: During the term of this Agreement the vendor agrees, in accordance with sec. 111.321, Wis. Stats., and Chapter 19 of the Dane County Code of Ordinances, not to discriminate against any person, whether an applicant or recipient of services, an employee or applicant for employment, on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force or any other reserve component of the military forces of the United States, or political beliefs. The vendor shall provide a harassment-free work environment. These provisions shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, including apprenticeships, rates of pay or other forms of compensation.

16.1 Vendors who have twenty (20) or more employees and a contract of twenty thousand dollars (\$20,000) or more must submit a written affirmative action plan to the County's Contract Compliance Officer within fifteen (15) working days of the effective date of the contract. The County may elect to accept a copy of the current affirmative action plan filed with and approved by a federal, state or local government unit.

16.2 The vendor agrees to post in conspicuous places, available for employees and applicants for employment, notices

setting forth the provisions of this Agreement as they relate to affirmative action and nondiscrimination.

16.3 Failure to comply with these Terms and Conditions may result in the vendor being debarred, termination of the contract and/or withholding of payment.

16.4 The vendor agrees to furnish all information and reports required by Dane County's Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, D.C. Ords. and the provisions of this Agreement.

16.5 *Americans with Disabilities Act*: The vendor agrees to the requirements of the ADA, providing for physical and programmatic access to service delivery and treatment in all programs and activities.

17.0 PATENT, COPYRIGHT AND TRADEMARK INFRINGEMENT: The vendor guarantees goods sold to the County were manufactured or produced in accordance with applicable federal labor laws, and that the sale or use of the articles described herein do not infringe any patent, copyright or trademark. The vendor covenants that it will, at its own expense, defend every suit which shall be brought against the County (provided that such vendor is promptly notified of such suit, and all papers therein are delivered to it) for any alleged infringement of any patent, copyright or trademark by reason of the sale or use of such articles, and agrees that it will pay all costs, damages, and profits recoverable in any such suit.

18.0 SAFETY REQUIREMENTS: All materials, equipment, and supplies provided to the County must fully comply with all safety requirements as set forth by the Wisconsin Department of Commerce and all applicable OSHA Standards.

18.1 MATERIAL SAFETY DATA SHEET: If any item(s) on an order(s) resulting from this award(s) is a hazardous chemical, as defined under 29 CFR 1910.1200, provide one (1) copy of the Material Safety Data Sheet for each item with the shipped container(s) and one (1) copy with the invoice(s).

19.0 WARRANTY: Unless specifically expressed otherwise in writing, goods and equipment purchased as a result of this request shall be warranted against defects by the vendor for one (1) year from date of receipt. An equipment manufacturer's standard warranty shall apply as a minimum and must be honored by the vendor. The time limitation in this paragraph does not apply to the warranty provided in paragraph 27.0.

## 20.0 INDEMNIFICATION & INSURANCE.

20.1. PROVIDER shall indemnify, hold harmless and defend COUNTY, its boards, commissions, agencies, officers, employees and representatives against any and all liability, loss (including, but not limited to, property damage, bodily injury and loss of life), damages, costs or expenses which COUNTY, its officers, employees, agencies, boards, commissions and representatives may sustain, incur or be required to pay by reason of PROVIDER furnishing the services or goods required to be provided under this Agreement, provided, however, that the provisions of this paragraph shall not apply to liabilities, losses, charges, costs, or expenses caused by or resulting from the acts or omissions of COUNTY, its agencies, boards, commissions, officers, employees or representatives. The obligations of



PROVIDER under this paragraph shall survive the expiration or termination of this Agreement.

20.2. In order to protect itself and COUNTY, its officers, boards, commissions, agencies, agents, volunteers, employees and representatives under the indemnity provisions of the subparagraph above, PROVIDER shall, at PROVIDER's own expense, obtain and at all times during the term of this Agreement keep in full force and effect the insurance coverages, limits, and endorsements listed below. When obtaining required insurance under this Agreement and otherwise, PROVIDER agrees to preserve COUNTY's subrogation rights in all such matters that may arise that are covered by PROVIDER's insurance. Neither these requirements nor the COUNTY's review or acceptance of PROVIDER's certificates of insurance is intended to limit or qualify the liabilities or obligations assumed by the PROVIDER under this Agreement. The County expressly reserves the right to require higher or lower insurance limits where County deems necessary.

20.2.1. Commercial General Liability.

PROVIDER agrees to maintain Commercial General Liability insurance at a limit of not less than \$1,000,000 per occurrence. Coverage shall include, but not be limited to, Bodily Injury and Property Damage to Third Parties, Contractual Liability, Personal Injury and Advertising Injury Liability, Premises-Operations, Independent PROVIDERS and Subcontractors, and Fire Legal Liability. The policy shall not exclude Explosion, Collapse, and Underground Property Damage Liability Coverage. The policy shall list DANE COUNTY as an Additional Insured.

20.2.2. Commercial/Business Automobile Liability.

PROVIDER agrees to maintain Commercial/Business Automobile Liability insurance at a limit of not less than \$1,000,000 Each Occurrence. PROVIDER further agrees coverage shall include liability for Owned, Non-Owned & Hired automobiles. In the event PROVIDER does not own automobiles, PROVIDER agrees to maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

20.2.3. Environmental Impairment (Pollution) Liability

PROVIDER agrees to maintain Environmental Impairment (Pollution) Liability insurance at a limit of not less than \$1,000,000 per occurrence for bodily injury, property damage, and environmental cleanup costs caused by pollution conditions, both sudden and non-sudden. This requirement can be satisfied by either a separate environmental liability policy or through a modification to the Commercial General Liability policy. Evidence of either must be provided.

20.2.4. Workers' Compensation.

PROVIDER agrees to maintain Workers Compensation insurance at Wisconsin statutory limits.

20.2.5. Umbrella or Excess Liability.

PROVIDER may satisfy the minimum liability limits required above for Commercial General Liability and Business Auto Liability under an Umbrella or Excess Liability policy. There is no minimum Per Occurrence limit of liability under the Umbrella or Excess Liability; however, the Annual Aggregate limit shall not be less than the highest "Each Occurrence" limit for the Commercial General Liability and Business Auto Liability. PROVIDER agrees to list DANE COUNTY as an "Additional Insured" on its Umbrella or Excess Liability policy.

20.3. Upon execution of this Agreement, PROVIDER shall furnish COUNTY with a Certificate of Insurance listing COUNTY as an additional insured and, upon request, certified copies of the required insurance policies. If PROVIDER's insurance is underwritten on a Claims-Made basis, the Retroactive Date shall be prior to or coincide with the date of this Agreement, the Certificate of Insurance shall state that professional malpractice or errors and omissions coverage, if the services being provided are professional services coverage is Claims-Made and indicate the Retroactive Date, PROVIDER shall maintain coverage for the duration of this Agreement and for six (6) years following the completion of this Agreement. PROVIDER shall furnish COUNTY, annually on the policy renewal date, a Certificate of Insurance as evidence of coverage. It is further agreed that PROVIDER shall furnish the COUNTY with a 30-day notice of aggregate erosion, in advance of the Retroactive Date, cancellation, or renewal. It is also agreed that on Claims-Made policies, either PROVIDER or COUNTY may invoke the tail option on behalf of the other party and that the Extended Reporting Period premium shall be paid by PROVIDER. In the event any action, suit or other proceeding is brought against COUNTY upon any matter herein indemnified against, COUNTY shall give reasonable notice thereof to PROVIDER and shall cooperate with PROVIDER's attorneys in the defense of the action, suit or other proceeding. PROVIDER shall furnish evidence of adequate Worker's Compensation Insurance. In case of any sublet of work under this Agreement, PROVIDER shall furnish evidence that each and every subcontractor has in force and effect insurance policies providing coverage identical to that required of PROVIDER. In case of any sublet of work under this Agreement, PROVIDER shall furnish evidence that each and every subcontractor has in force and effect insurance policies providing coverage identical to that required of PROVIDER.

20.4. The parties do hereby expressly agree that COUNTY, acting at its sole option and through its Risk Manager, may waive any and all requirements contained in this Agreement, such waiver to be in writing only. Such waiver may include or be limited to a reduction in the amount of coverage required above. The extent of waiver shall be determined solely by COUNTY's Risk Manager taking into account the nature of the work and other factors relevant to COUNTY's exposure, if any, under this Agreement.

21.0 CANCELLATION: County reserves the right to terminate any Agreement due to non-appropriation of funds or failure of performance by the vendor. This paragraph shall not relieve County of its responsibility to pay for services or goods provided or furnished to County prior to the effective date of termination.

22.0 PUBLIC RECORDS ACCESS: It is the intention of the County to maintain an open and public process in the solicitation, submission, review, and approval of procurement activities. Bid openings are public unless otherwise specified. Records are not available for public inspection prior to issuance of the notice of intent to award or the award of the contract. Bid results may be obtained by visiting the Dane County Purchasing Office Monday – Friday, between 8:00 a.m. and 4:00 p.m. Prior appointment is advisable.

22.1 PROPRIETARY INFORMATION: If the vendor asserts any of its books and records of its business practices and other matters collectively constitute a trade secret as that term is defined in s. 134.90(1)(c), Wis. Stats., County will not release

such records to the public without first notifying the vendor of the request for the records and affording the vendor an opportunity to challenge in a court of competent jurisdiction the requester's right to access such records. The entire burden of maintaining and defending the trade secret designation shall be upon the vendor. The vendor acknowledges and agrees that if the vendor shall fail, in a timely manner, to initiate legal action to defend the trade secret designation or be unsuccessful in its defense of that designation, County shall be obligated to and will release the records.

22.2 Any material submitted by the vendor in response to this request that the vendor considers confidential and proprietary information and which vendor believes qualifies as a trade secret, as provided in section 19.36(5), Wis. Stats., must be identified on a designation of Confidential and Proprietary Information form. Pricing will not be held confidential after award of contract.

22.3 Data contained in a bid, all documentation provided therein, and innovations developed as a result of the contracted commodities or services cannot be copyrighted or patented. All data, documentation, and innovations shall be the property of the County.

23.0 RECYCLED MATERIALS: Dane County is required to purchase products incorporating recycled materials whenever technically and economically feasible. Vendors are encouraged to bid products with recycled content which meet specifications.

24.0 PROMOTIONAL ADVERTISING: Reference to or use of Dane County, any of its departments or sub-units, or any county official or employee for commercial promotion is prohibited.

25.0 ANTITRUST ASSIGNMENT: The vendor and the County of Dane recognize that in actual economic practice, overcharges resulting from antitrust violation are in fact usually borne by the Purchaser. Therefore, the successful vendor hereby assigns to the County of Dane any and all claims for such overcharges as to goods, materials or services purchased in connection with this contract.

26.0 RECORDKEEPING AND RECORD RETENTION-PUBLIC WORKS CONTRACTS: The successful bidder on a public works contract shall comply with the State of Wisconsin prevailing wage scale and shall establish and maintain adequate payroll records for all labor utilized as well as records for expenditures relating to all subcontracts, materialmen and suppliers. All records must be kept in accordance with generally accepted accounting procedures. The County shall have the right to audit, review, examine, copy, and transcribe any such records or documents. The vendor will retain all documents applicable to the contract for a period of not less than three (3) years after final payment is made.

26.1 RECORDKEEPING AND RECORD RETENTION-COST REIMBURSEMENT CONTRACTS: Where payment to the vendor is based on the vendor's costs, vendor shall establish and maintain adequate records of all expenditures incurred under the contract. All records must be kept in accordance with generally accepted accounting procedures. The County contracting agency shall have the right to audit, review, examine, copy, and transcribe any pertinent records or documents relating to any contract resulting from this bid/proposal held by the vendor. The vendor will retain all documents applicable to the

contract for a period of not less than three (3) years after final payment is made.

27.0 LIVING WAGE REQUIREMENT: The vendor shall, where appropriate, comply with the County's Living Wage requirements as set forth in section 25.015, Dane County Ordinances.

27.01 In the event its payroll records contain any false, misleading or fraudulent information, or if the vendor fails to comply with the provisions of s. 25.015, D.C. Ords., the County may withhold payments on the contract, terminate, cancel or suspend the contract in whole or in part, or, after a due process hearing, deny the vendor the right to participate in bidding on future County contracts for a period of one (1) year after the first violation is found and for a period of three (3) years after a second violation is found.

27.02 Bidders are exempt from the requirement of this section if:

- The maximum value of services to be provided is less than \$5,000;
- The bid involves only the sale of goods to the County;
- The bid is for professional services;
- The bid is for a public works contract where wages are regulated under s. 62.293, Wis. Stats.;
- The bidder is a school district, a municipality, or other unit of government;
- The service to be provided is residential services at an established per bed rate;
- The bidder's employees are persons with disabilities working in employment programs and the successful bidder holds a current sub-minimum wage certificate issued by the U.S. Department of Labor or where such a certificate could be issued but for the fact that the employer is paying a wage higher than the minimum wage;
- The bidder is an individual providing services to a family member; or
- The bidder's employees are student interns.

27.03 COMPLIANCE WITH FAIR LABOR STANDARDS. During the term of this Agreement, PROVIDER shall report to the County Contract Compliance Officer, within ten (10) days, any allegations to, or findings by the National Labor Relations Board (NLRB) or Wisconsin Employment Relations commission (WERC) that PROVIDER has violated a statute or regulation regarding labor standards or relations within the seven years prior to entering this Agreement. If an investigation by the Contract Compliance Officer results in a final determination that the matter adversely affects PROVIDER'S responsibilities under this Agreement, and which recommends termination, suspension or cancellation of this agreement, the County may take such action.

27.04 PROVIDER may appeal any adverse finding by the Contract Compliance Officer as set forth in sec. 25.015(11)(c) through (e).

27.05 PROVIDER shall post the following statement in a prominent place visible to employees: "As a condition of receiving and maintaining a contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation for union organizing.



**SECTION 27 05 00**  
**COMMON WORK RESULTS FOR COMMUNICATIONS SYSTEMS**

**PART 1 – GENERAL**

**1.01 SCOPE OF WORK**

- A. Base Bid: It is the intent of these specifications to provide complete and workable telecommunications systems – including all parts lists, operating instructions and wiring diagrams, as shown on the accompanying plans and as specified herein except such parts as are specifically exempted herein. Provide all necessary supervision, coordination, labor, materials, equipment, fixtures, drayage, hoisting, tools, transportation, plant services and facilities, machinery and connections to utilities for the installation of complete and operable telecommunications systems. If details or special conditions are required in addition to those shown on drawings, provide all material and equipment usually furnished with such systems or required to complete their installation, whether noted in plans and specification or not.
- B. Materials and labor shall be new (unless noted otherwise), first class and workmanlike and shall be subject at all times to the A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.
- C. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. The drawings provide design intent. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.
- D. Because of the scale of the Drawings, certain basic items, such as, pipe fittings, duct fittings, access panels, and sleeves, may not be shown. Where such items are required by Code or by other Sections, or where required for proper installation of the Work, such items shall be included, whether shown or not.
- E. In the event of any inconsistencies between the specifications, drawings, contract documents, applicable laws, statutes, ordinances, building codes, rules and regulations, the contractor shall provide the better quality or greater quantity of work and comply with or conform its work to the most stringent legal or contractual requirements.
- F. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Architect/Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Architect/Engineer.
- G. Equipment Specification may not deal individually with minute items required, such as, components, parts, controls, and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required to make the system operational, they shall be included by the supplier of the equipment at no additional cost, whether or not specifically called for.
- H. Equipment, materials and accessories for communications systems as shown and noted on the drawings including but not limited to the following:
  - 1. A complete raceway system including conduit, outlet box, pull boxes, junction boxes, sleeves and hangers. This work may be separated out for completion by the Division 26 contractor. Should conduit or electrical work be required, notify the Owner or Engineer immediately. It is expected that the project will utilize existing conduit and raceway systems.
  - 2. Complete Audio Visual cabling and equipment system including all horizontal cables.
  - 3. Communications distribution equipment including patch panels, innerduct, terminations and cabinets.
  - 4. Maintaining of all communications and other low voltage connections outside of or passing through the work area to other areas.
  - 5. All cutting and patching to accomplish wiring tasks.
  - 6. All conduit penetrations (sleeves) through walls and floors and complete fire stopping of penetrations per standards of a national testing laboratory.
  - 7. New wiring devices, jacks and cover plates.
  - 8. Complete testing, certification and creation of as-builts for all locations.

## **1.02 SECTION INCLUDES**

- A. This section includes information common to two or more technical communications specification sections or items that are of a general nature, not conveniently fitting into other technical sections.
  - 1. Submittals
  - 2. Construction Verification Checklists
  - 3. Functional Performance Tests
  - 4. Reference Standards
  - 5. Quality Assurance
  - 6. Guarantee
  - 7. Work By Owner
  - 8. Operation And Maintenance Instructions
  - 9. Record Documents
  - 10. Continuity Of Existing Services
  - 11. Protection Of Finished Surfaces
  - 12. Sealing And Firestopping
  - 13. Regulatory Requirements
  - 14. Certificates And Inspections
  - 15. Coordination
  - 16. Sleeves And Openings
  - 17. Omissions
  - 18. Definitions
  - 19. Project/Site Conditions
  - 20. Work Sequence And Scheduling
  - 21. Salvage Materials
  - 22. Performance Testing
  - 23. Description
  - 24. Dimensions And Define Locations
  - 25. Training
  - 26. Identification
  - 27. Demolition
  - 28. Cutting And Patching
  - 29. Building Access
  - 30. Equipment Access
  - 31. Housekeeping And Clean Up
  - 32. Cable Installation
  - 33. Testing
  - 34. Systems Checklist

## **1.03 RELATED WORK**

- A. Applicable provisions of Division 1 govern work under this section.
- B. This section is applies to all Division 27 sections.
- C. Section 27 40 00 – Audio-Visual Systems
- D. This work is also subject to all requirements of NEC and FCC wherever applicable to work under this section.

## **1.04 SUBMITTALS**

- A. Submit shop drawings for equipment under each section per requirements listed in that section.
- B. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Do not submit hard copies of web pages. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.
- C. On request from the A/E, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

- D. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.
- E. The submittals must be approved before fabrication is authorized.
- F. Provide electronic copies of all submittals for review.
- G. Provide one-line drawings (or modify bid documents) to reflect actual installation plans and equipment.
- H. Submit sample of construction verification checklist and sample of functional performance tests, forms, or criteria.

#### **1.05 CONSTRUCTION VERIFICATION CHECKLISTS**

- A. Contractor is responsible for utilizing the construction verification checklists recommended under these specifications.

#### **1.06 FUNCTIONAL PERFORMANCE TESTS**

- A. Contractor is responsible for utilizing functional performance test procedures to verify the proper function of all equipment.

#### **1.07 REFERENCE STANDARDS**

- A. Abbreviations of standards organizations referenced in this and other sections are as follows:
  - 1. ANSI American National Standards Institute
  - 2. ASTM American Society for Testing and Materials
  - 3. EPA Environmental Protection Agency
  - 4. ETL Electrical Testing Laboratories, Inc.
  - 5. IEEE Institute of Electrical and Electronics Engineers
  - 6. IES Illuminating Engineering Society
  - 7. ISA Instrument Society of America
  - 8. NBS National Bureau of Standards
  - 9. NEC National Electric Code
  - 10. NEMA National Electrical Manufacturers Association
  - 11. NESC National Electrical Safety Code
  - 12. NFPA National Fire Protection Association
  - 13. UL Underwriters Laboratories Inc.

#### **1.08 QUALITY ASSURANCE**

- A. Substitution of Materials: Refer to Division 1 for equals and substitutions.
  - 1. Where the following conflicts with Division 1, the requirements of Division 1 shall govern.
  - 2. If the Contractor wishes to submit an alternate to the named manufacturers for any equipment, he may submit a voluntary alternative minimum 7 days prior to bid, stating the manufacturer's name, model number, written, detailed product data.
  - 3. Where materials or equipment are specified by name the proposed material or equipment must be identical to the specified material or equipment in all characteristics of quality, function and serviceability, regardless of application in the Project and, in addition, when the Architect deems that aesthetic significance is important, the equal material or equipment must be identical in all characteristics of visual appearance, design, color and texture. Any proposed equal shall be submitted to Architect/Engineer for prior approval, which Architect/Engineer may approve or disapprove in its sole discretion. Work performed or constructed with unapproved equals is at Contractor's risk and any required correction of work incorporating unapproved equals shall be at Contractor's sole cost and expense.
  - 4. In all instances, Contractor shall assume full responsibility for proof of equality of the statute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer. Approval by the Architect/Engineer of equipment other than the specified does NOT relieve Contractor of this responsibility.
- B. All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

- C. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system, including, but not limited to, coordination with other trades and any required changes by other trades and for obtaining the intended performance from the system into which these items are placed.
- D. General:
  - 1. Audio Visual, Cable and Equipment Manufacturer(s) shall be a company specializing in communications cable, accessories and/or equipment with minimum of 5 years documented experience in producing cable, accessories and/or equipment similar to those specified herein.
- E. Contractor Qualifications:
  - 1. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all cable and equipment installation and termination.
  - 2. Contractor shall have been in this business for minimum of 5 years and completed 4 projects of magnitude specified in the following sections.
  - 3. Provide as-built documentation indicating actual locations and labels of all station jacks, changes in cable schedules and changes in rack mounted equipment. See specifications for other labeling requirements.

#### **1.09 GUARANTEE**

- A. Refer to Division 1 for Guarantees and Warranties. In addition to the requirements in Division 1, this Contractor shall meet the following requirements.
- B. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.
- C. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.
- D. Contractor further guarantees to replace and make good at his own expense, including travel time, all defects, which may develop within 1 year after final payment and acceptance by the Architect/Engineer, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

#### **1.10 WORK BY OWNER**

- A. Owner will provide assistance as required for access to facility, advice regarding features and functions and touch panel appearance preferences
- B. Owner will provide electrical power and conduit as required
- C. Owner will provide cutting and routing of existing wood tables and casework as required and as directed by AV vendor to fit AV equipment

#### **1.11 OPERATION AND MAINTENANCE INSTRUCTIONS**

- A. Refer to Division 1 for all operations and maintenance instructions.
- B. In addition to the general content specified under Division 1 supply the following additional documentation:
  - 1. Copies of all approved submittals along with approval letters
  - 2. Certificates
  - 3. Warranties
  - 4. Operation manual documents to assist the Owner to maintain all systems
  - 5. Records of test performed to certify compliance with system and manufacturer requirements
  - 6. Full equipment cut sheets including brands, makes, models, supplier (retailer) and manufacturer information (name, phone, e-mail, website, contact name), one-line diagrams, cable connections, system architecture
  - 7. Contractor information (name, phone, e-mail, website, contact name)
  - 8. Systems checklist (refer to Part 3 below)

#### **1.12 RECORD DOCUMENTS**

- A. Refer to Division 1 for record documents.
- B. In addition to the general content specified under Division, follow the following procedures.

1. During the progress of the work, Contractor shall maintain a current (daily) record set of the drawings and specifications, indicating thereon all work installed at variance with such Contract Documents including, without limitation, work covered by Addenda, Field Work Orders, Change Orders and Engineers additional instructions, interpretations and clarification. All changes or deviations from the original layout of the work and all critical dimensions of buried or concealed work shall be recorded. It shall be Contractor's responsibility to assure that said record sets are complete, accurate and up-to-date, Engineer shall have the right to inspect and review such record sets.
2. At the completion of the work, Contractor shall indicated on record sets all record changes and such additional details necessary or appropriate to provide a complete reference document for use by Engineer. If variations and details cannot be shown clearly thereon, the Contractor shall prepare supplemental drawings adequate to impart the information. The foregoing drawings collectively shall constitute the "Record" drawings for the work.
3. All indication on "Record" drawings shall be executed in a legible manner at Contractor's cost, using methods and legend presentations compatible with the overall scheme of the record drawings with respect to scale, drawing sheet sizes and sequential indexing. All changes shall be marked clearly in red and clouded.
4. Engineer may review Contractor's "Record" drawings and notify Contractor of observed discrepancies or deviations. Contractor shall promptly correct discrepancies, deviations or illegible markups at Contractor's expense and resubmit revised drawings for Engineer review
5. Contractor shall provide final electronic record drawings to the Owner through the Engineer.
6. Engineer will provide final electronic record drawings to the Owner based on Contractor's markups.

#### **1.13 CONTINUITY OF EXISTING SERVICES**

- A. Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.
- B. Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services or providing temporary service. Each interruption shall be for as short a duration as possible.
- C. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.
- D. This Contractor shall restore any circuit interruption as a result of this work to proper operation as soon as possible. Note that institutional operations are on a seven day week schedule.
- E. Contractor shall coordinate with Owner for access to the various rooms which may be in use at various times.

#### **1.14 PROTECTION OF FINISHED SURFACES**

- A. Refer to Division 1 for protection of finished services.
- B. Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" per Division 1.

#### **1.15 SEALING AND FIRESTOPPING**

- A. Sealing and firestopping of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and firestopping. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.
- B. Contractor shall request current life safety drawings from the Architect/Owner.



#### **1.16 REGULATORY REQUIREMENTS**

- A. Comply with requirements of Wisconsin Administrative Code and local Authority Having Jurisdiction (AHJ) regarding materials and installation.

#### **1.17 CERTIFICATES AND INSPECTIONS**

- A. Refer to Division 1 for permits, regulations, utilities and taxes.
- B. Obtain and pay for all required State or local installation inspections except those provided by the Architect/Engineer in accordance with State Code. Deliver originals of these certificates to the Owner. Include copies of the certificates in the Operating and Maintenance Instructions.
- C. Coordinate and provide inspections as required by the Authority Having Jurisdiction over the site.

#### **1.18 COORDINATION**

- A. It shall be the responsibility of each Contractor to coordinate and consult with each other to determine space requirements and to determine that adequate space for servicing is provided for all equipment whether furnished by the Contractor or others. The General Contractor shall have final decision on all space priority conflicts among Contractors. All space priority conflicts shall be brought to the attention of the Architect/Engineer and Owner's Representative.
- B. Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum, and such interruptions shall occur only when system is not required, if possible. If not possible, Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services, or providing temporary service. Each interruption shall be for as short a duration as possible.
- C. Cooperation among all Contractors shall be required. Any Work that is installed without cooperating or coordinating with other Contractors and is in conflict shall be removed and reinstalled at that particular Contractor's cost. No cost additions to the Project will be considered due to a Contractor's lack of participation in the cooperation and coordination process. The following list of items of Work shall be the priority of order for all Contractors:
  - 1. Structure
  - 2. Recessed light fixtures
  - 3. Gravity-flow systems for sanitary, storm, steam and steam condensate piping
  - 4. Ductwork and appurtenances
  - 5. Electrical and low voltage cable tray
  - 6. Plumbing vent piping
  - 7. Fire protection (sprinkler system)
  - 8. HVAC piping
  - 9. Medical gas piping
  - 10. Gas piping, process piping and domestic water
  - 11. Electrical conduit and low voltage conduit
  - 12. Control air lines or conduit
- D. The above list, in descending order, is the precedence assigned the Work items for space priority. Gravity-flow systems have first priority.
- E. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panelboards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment.
- F. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
- G. Any installed work that is not coordinated and interferes with another contractor's work shall be removed or relocated at the installing contractor's expense.
- H. Prior to start of Construction, the General Contractor shall schedule a meeting with all of the Contractors responsible for the work items listed above. The purpose of the meeting is to introduce the coordination program and to determine its implementation in relation to the progress schedule.

- I. At the initial Coordination Meeting, the Mechanical Contractor / Ventilating Contractor shall provide to the General Contractor outline drawings at 1/4" scale indicating column centerlines, interior partition locations, and ceiling heights. The General Contractor shall verify all information shown on these drawings and relay any changes in the information to the Ventilation Contractor to be reflected on the Drawings. The Ventilating Contractor, with reference and consideration to the Structural, Heating, Electrical, Fire Protection, and Plumbing Drawings, shall draw to scale his proposed installation showing duct sizes, equipment layouts, and dimensions from column lines and from finished floors to bottom of ducts. Ductwork shall be maintained as tightly as possible to the underside of floor slabs and/or beams. For congested areas the Ventilating Contractor shall, in addition, prepare Drawings in section view. During this phase of the program, it shall be the Electrical Contractor's responsibility to furnish the Ventilating Contractor with recessed lighting installation and clearance requirements. This information shall be outlined on the Drawings by the Ventilating Contractor.
- J. The ductwork layouts shall be produced in sequence as mandated by the Project Schedule. The earliest area indicated in the Schedule shall receive the first effort, etc.
- K. When the Ductwork Drawings for the earliest scheduled area have been completed (time limitation as determined at the initial coordination meeting), the Ventilating Contractor shall provide the General Contractor with one set of drawings for each participant in the effort. The General Contractor will distribute the drawings to the participating Contractors for their use in drawing thereon the major components of their proposed installation using the general scheme shown on the Contract Drawings as a guide.
- L. The major components to be indicated include (but are not limited to) the following:
  - 1. Structure
  - 2. Roof drain leaders
  - 3. Above 3" waste piping
  - 4. Sprinkler mains
  - 5. Heating hot water mains
  - 6. Chilled water mains
  - 7. Conveying systems
  - 8. Significant conduit runs
  - 9. Cable trays
  - 10. Contract ceiling heights
  - 11. Soffits
  - 12. Access points
  - 13. Fire wall penetrations
  - 14. Steam and condensate mains
  - 15. Gas, water, and process piping
- M. Information delineated shall be distance from column centerlines, pipe/equipment size, and distance from finished floor to bottom of pipe/equipment and hangers. Included on the Drawings shall be piping layout with hanger locations and hanger point loads. This information shall be developed satisfactorily enough to allow the Structural Engineer to verify the adequacy of the structural system for the projected loads. The hanger locations may have to be moved depending on the structural system review. No hanger shall be fabricated and/or installed until the hanger locations are reviewed and accepted by the Architect/Engineer.
- N. Within a period not to exceed two weeks after distribution of the drawings, the General Contractor will schedule a meeting with the Architect/Engineer and participating Contractors at which time areas of conflict shall be resolved. The drawings shall be overlaid to identify areas of conflict. All parties shall then cooperate in resolving the conflicts. Records of the agreements shall be entered on the Ventilating Contractor's drawings, acknowledged by all participants by signature in space provided for this purpose, and two copies distributed to all involved parties. All coordination drawing preparation and reproduction costs shall be borne by the Ventilating Contractor. The above drawings, review, and coordination process shall be repeated until all areas on the Project have been coordinated.
- O. In the event a Contractor fails to cooperate in the Coordination Program, they shall be held responsible for all costs incurred for adjustments to the work of others made necessary to accommodate the uncooperative Contractor's installations.

### **1.19 SLEEVES AND OPENINGS**

- A. Openings required in new or existing construction that may be necessary for the installation of new work shall be provided by the respective contractor and all patching and repairing shall be done by workmen competent in the trade required, at the expense of the respective contractor. The respective contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of the Architect/Engineer so as to avoid damaging the structural system.

### **1.20 OMISSIONS**

- A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the A/E to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

### **1.21 DEFINITIONS**

- A. Backbone Cabling - Cables connecting TRs from lower level to upper level or between TRs. Term also applies to outside plant cabling between buildings.
- B. BEF - Building Entrance facility - Voice, data and video services are brought from the street into building in this room.
- C. Cable - Assembly of one or more conductors or optical fibers within enveloping sheath, constructed so as to permit use of conductors singly or in groups.
- D. Cable Link - Includes SIO, station cable and termination hardware in TR.
- E. Cable Channel - Same as Cable Link, plus patch cords at SIO and in TR.
- F. Consolidation Point - Also known as zone distribution box (ZDB). Intermediate point having multiple terminations between SIO and TR to simplify moves, adds and changes, bringing final terminations closer to SIOs.
- G. Cross-Connect - Group of connection points, wall or rack mounted, used to mechanically terminate and administer building wiring.
- H. Entrance Room (ER) - A combination of BEF and MDF in one room. All building voice, data and video services are distributed to TRs on all levels from this room. Cables to all outlying campus buildings are terminated and distributed from the ER. ERs are on floor 2.
- I. Faceplate - a covering placed over a recessed back box that contains one or more openings to house individual jacks.
- J. Horizontal Cabling - Cables connecting SIOs to TRs.
- K. Jack - a single outlet consisting of a single connector attached to a single cable assembly. Multiple jacks may be installed into a single faceplate.
- L. MDF - Main Distribution Frame - Same as BEF or ER.
- M. OFCI - Owner furnished, contractor installed.
- N. OFOI - Owner furnished, owner installed
- O. CFCI - Contractor furnished, contractor installed
- P. OSP - Outside Plant (refers to equipment, conduit and installation contractor provided under separate contract to provide equipment beyond five feet from B2 building foundation).
- Q. The term "provide" includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract and the performance of all duties thereby upon the Contractor.
- R. RU - Rack Unit - Each RU is 1.75" high.
- S. SIO - Standard Information Outlet - A device assembly located in work area on which horizontal cabling terminates and which can receive modular connectors. Depending on the immediate context, an SIO may refer to either a faceplate configuration (i.e., an SIO having two standard data jacks - SIO = faceplate) or in other cases may refer to a single jack (i.e. SIO = one jack). In some cases, as in item T below, the distinction is irrelevant.
- T. Telecommunications - Any transmission, emission, or reception of signs, signals, writings images, sounds or information of any nature by wire, radio, visual, optical or other electromagnetic systems.
- U. TR - Telecommunications Room - Room used to cross connect backbone cable to horizontal station cable out to SIOs. May house network electronics. Also houses equipment for other systems such as

- CCTV and Access Control. Interchangeable with term IDF (Intermediate Distribution Facility). Usually one per floor to accommodate SIOs on that same floor.
- V. MTR – Main Telecommunications Room – Same as IDF but usually larger and located on a lower floor to consolidate riser cables from multiple TRs. May also function as a building entrance facility to receive cables from outside service providers. Interchangeable with term MDF (Main Distribution Facility).
  - W. UTP – Unshielded Twisted Pair Cabling

#### **1.22 PROJECT/SITE CONDITIONS**

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of A/E before proceeding.
- C. Tools, materials and equipment shall be confined to areas designated by the Owner's project representative.

#### **1.23 WORK SEQUENCE AND SCHEDULING**

- A. Install work in phases to accommodate Owner's occupancy requirements. During the construction period coordinate schedule and operations with Owner's Construction Representatives.

#### **1.24 SALVAGE MATERIALS**

- A. No materials removed from this project shall be reused (except as specifically noted below). All materials removed shall become the property of and shall be disposed of by the Contractor.

#### **1.25 PERFORMANCE TESTING**

- A. Each system included in project scope shall be tested to verify performance.
- B. Systems that require a performance warranty (such as data cable) shall be tested to comply with manufacturer's requirements in order to obtain the system warranty.
- C. Some systems have specific testing procedures (fiber optic cable).
- D. Systems not having specific testing criteria shall utilize the Systems Checklist described in Part 3 below.

#### **1.26 DESCRIPTION**

- A. Structured cabling system is a complete collective configuration of cabling and associated hardware on a premises which, when installed, provides a comprehensive telecommunications infrastructure. Systems shall include backbone and station data, voice, and video and fiber optic cable as indicated on drawings.
- B. Cables and equipment shall be provided, tested, and terminated, including proper grounding and bonding.
- C. Voice Service is carried on copper cable, backbone data services are carried on fiber optic cable, and television service is carried on coaxial cable and copper cable.
- D. Telecommunication distribution consists of Telecommunications Rooms (TR), fiber optic backbone, category 3 or voice grade copper backbone, category 6 copper data station cable, wall and floor box outlets, cable tray and conduit.
- E. TRs are located throughout facility.
- F. No UTP station cable link shall be longer than 90 meters.
- G. Cabling system is intended to be a "universal" system with no distinction between voice and data.
- H. Cabling to be plenum rated where noted and where environment dictates plenum rated cabling.
- I. Systems shall be delivered in complete functioning condition.
- J. Coordinate with owner as required to obtain owner furnished items.

#### **1.27 DIMENSIONS AND DEFINITE LOCATIONS**

- A. The Drawings depicting Work show approximate locations. The exact location of equipment and devices shall be established in the field in accordance with instructions from the Owner. Consideration shall be given to construction features, equipment of other trades, and requirements of the equipment proper.

- B. The Contractor shall refer to Shop Drawings and submittal drawings for all equipment requiring electrical connections to verify rough-in and connection locations.
- C. Unless specifically stated to the contrary, no Drawing by scale shall be used as a dimension to Work by. Dimensions noted on the Drawings are subject, in each case, to measurements of adjacent or previously completed Work and all such measurements necessary shall be taken before undertaking any Work dependent upon them.

## **1.28 TRAINING**

- A. The contractor shall have the following responsibilities:
  - 1. Provide a training plan sixty days before the planned training covering the following elements:
    - a. Equipment
    - b. Intended audience
    - c. Location of training
    - d. Objectives
    - e. Subjects covered (description, duration of discussion, special methods, etc.)
    - f. Duration of training on each subject
    - g. Instructor for each subject
    - h. Methods (classroom lecture, manufacturer's quality video, site walk-through, actual operational demonstrations, written handouts, etc.).
  - 2. Provide designated owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment that makes up the system.
  - 3. Training shall normally start with classroom sessions followed by hands-on demonstration/training on each piece of equipment.
  - 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated at another scheduled time, if necessary.
  - 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
  - 6. The controls contractor shall attend sessions other than the controls training, as specified, to discuss the interaction of the controls system as it relates to the equipment being discussed.
  - 7. The training sessions shall follow the outline in the table of contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
  - 8. Training shall include:
    - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
    - b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include startup, operation in all modes possible, shutdown, seasonal changeover and any emergency procedures.
    - c. Discussion of relevant health and safety issues and concerns.
    - d. Discussion of warranties and guarantees.
    - e. Common troubleshooting problems and solutions.
    - f. Explanatory information included in the O&M manuals.
    - g. Discussion of any peculiarities of equipment installation or operation.
    - h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
    - i. Hands-on training shall include startup, operation in all modes possible, including manual, shut-down, alarms, power failure and any emergency procedures, and preventative maintenance for all pieces of equipment.
  - 9. The contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls not controlled by the central control system.

- B. Video recording of the training sessions will be provided by the contractor and added to the O&M manuals. In addition, factory training videos identifying key troubleshooting, repair, service and/or replacement techniques shall be provided and reviewed with the owner.
- C. Provide a minimum of 8 hours of instruction.
- D. Provide additional training as specified in other specification sections for specific equipment.

## **PART 2 – PRODUCTS**

### **2.01 IDENTIFICATION**

- A. All new cables shall be identified by cable type, pair count, function and/or destination to assist owner with future identification.

### **2.02 SEALING AND FIRESTOPPING**

- A. Fire And/Or Smoke Rated Penetrations:
  - 1. Manufacturers:
    - a. 3M, STI/SpecSeal, Tremco, Hilti
    - b. All firestopping systems shall be by the same manufacturer.
  - 2. Submittals:
    - a. Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.
  - 3. Product:
    - a. Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Owner and the Authority Having Jurisdiction (AHJ).
    - b. Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.
    - c. Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.
    - d. All sealants shall meet the intent of LEED® VOC requirements, <250 g/L VOC contents (less H<sub>2</sub>O and exempt solvents).
- B. Non-Rated Penetrations:
  - 1. Conduit Penetrations Through Below Grade Walls:
    - a. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.
  - 2. Conduit and Cable Tray Penetrations:
    - a. At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

## **PART 3 – EXECUTION**

### **3.01 DEMOLITION**

- A. Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.

- B. All pipe, fixtures, equipment, wiring and associated conduit, insulation and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the owner for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.
- C. All contractors requiring the personnel/ material hoist and or temporary construction elevator (i.e. new elevators, temporarily protected) at times other than outlined in the temporary facilities specifications will make arrangements directly with the general contractor. The general contractor is responsible for all coordination and scheduling of the use of any hoisting equipment so the flow of the project is smoothly maintained and all workers have access to the work areas to perform their work and deliver material to the areas needed according to the project schedule.
- D. If any contractor's work requires the removal and replacement of any finished materials including but not limited to such materials as ceiling tiles, wall finishes, cabinets, doors, flooring, windows, etc. after those items are installed, each contractor will be responsible, at no additional cost to the owner, to replace any damaged, soiled or lost materials with new materials to match the existing materials and those materials damaged.

### **3.02 CUTTING AND PATCHING**

- A. Contractor shall coordinate the placing of openings in the new structure as required for the installation of Contractor's work.
- B. Contractor shall furnish to the Owner or General Contractor the accurate locations and sizes for required openings in the new work, but this shall not relieve each Contractor of the responsibility of checking to assure that properly sized openings are provided. When additional patching is required due to the Contractor's failure to inspect this work, then the Contractor shall make arrangements for the patching required to properly close the openings to include patch painting, and the Contractor shall pay any additional cost incurred in this respect.
- C. If cutting and patching of the new structure is made necessary due to the Contractor's failure to install piping, ducts, sleeves, or equipment on schedule, or due to the Contractor's failure to furnish on schedule the information required for the leaving of openings, then it shall be the Contractor's responsibility to make arrangements and obtain approval from the General Contractor and Architect/Engineer for this cutting and patching, and the Contractor shall pay any additional cost incurred in this respect. The Contractor shall also reimburse the Owner for any additional costs incurred to the Architect/Engineer for additional services caused by the Contractor in this respect.
- D. The Contractor shall provide cutting and patching and patch painting in the existing structure as required for the installation of his Work and shall furnish lintels and supports as required for openings. Cutting of structural support members will not be permitted without prior approval of the Architect/Engineer. Extent of cutting shall be minimized; use core drills, power saws, or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsmen skilled in the respective craft required.
- E. **For this project the only anticipated cutting and patching required is for possible projector mount relocation and addition of new touch panel wall displays in Jury Room. It is expected that the AV contractor will self-perform these operations.**
- F. **The exception is the addition of routed slots for new cable cubbies in wood table tops. This cutting function will be performed by the owner.**

### **3.03 BUILDING ACCESS**

- A. Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.
- B. Because many areas are working courtrooms, access will need to be carefully coordinated with the Owner. This could mean a delay in certain operations. Contractor shall account for such delays and coordination in their bid. In exchange for possible delays, the Owner agrees not to hold the contractor to an unreasonably short schedule.

### **3.04 EQUIPMENT ACCESS**

- A. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish the access doors to the General Contractor and reimburse the General Contractor for installation of those access doors.

### **3.05 COORDINATION**

- A. The Contractor shall cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.
- B. The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed heating units installed in/on architectural surfaces. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls and other structural components as they are constructed.
- C. Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.
- D. Coordinate with Division 27 and 28 contractors and equipment vendors for proper location, quantity and capacity of all required conduits, back boxes, device rings and power supplies required to support systems specified.

### **3.06 SEALING AND FIRESTOPPING**

- A. The Contractor shall refer to building life safety drawings for all smoke and fire rates in addition to the mechanical drawings. Any discrepancies shall be brought to the attention of the Architect/Engineer before final addendum.
- B. Fire and/or Smoke Penetrations:
  - 1. Install approved product in accordance with the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.
  - 2. Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.
- C. Non-Rated Surfaces:
  - 1. When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.
  - 2. Install escutcheons or floor/ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces for this paragraph include only those rooms with finished ceilings and the penetration occurs below the ceiling.
  - 3. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance with the manufacturer's instructions. Install so that the bolts used to tighten the seal are accessible from the interior of the building or vault.
  - 4. At interior partitions, conduit penetrations are required to be sealed for all clean rooms, laboratories, and most hospital spaces, computer rooms, dormitory rooms, tele/data/com rooms and similar spaces where the room pressure or odor transmission must be controlled. Apply sealant to both sides of the penetration in such a manner that the annular space between the conduit sleeve and the conduit is completely filled.

### **3.07 HOUSEKEEPING AND CLEAN UP**

- A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

### **3.08 CABLE INSTALLATION**



- A. Furnish all required installation tools to facilitate cable pulling without damage to cable jacket.
- B. During pulling operation adequate number of workers shall be present to allow cable observation at all points of raceway entry and exit, as well as to feed cable and operate pulling machinery.
- C. Pull cables in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 Standards.
- D. Recommended pulling tensions and bending radii shall not be exceeded.
- E. Any cables bent or kinked to radius less than recommended dimension are not allowed and shall be replaced at no expense to Owner.
- F. Pull all cable by hand unless installation conditions require mechanical assistance.
- G. Where mechanical assistance is used, ensure that maximum tensile load for cable is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of "break-away" or other approved method.
- H. Install cable in conduit or metal raceway system (cable tray or equivalent) in public areas and as designated on plans. Certain routes may require cable to be run outside of cable tray.
- I. All routing shall be kept clear of other trades work and supported utilizing j-hooks.
- J. J-hook cable supports shall be installed in accordance with manufacturers' installation requirements.
- K. Provision of j-hooks is not indicated on drawings. Contractor is responsible to provide j-hooks along any route where cable tray or conduit is not available. Change orders for j-hooks will not be accepted even if cable routes must change due to lack of cable tray, avoidance of structures or other utilities or route changes due to cable length problems. All jack symbols shall assume provision of cable support including j-hooks, cable tray or conduit.
- L. Change orders for additional j-hooks, conduits or cable tray will not be accepted for route changes or changes in cable length unless pre-authorized by engineer.
- M. Cable should be provided within cable tray wherever possible and practical. Cable tray may be indicated on project documents along major routes only. Some cable may need to take alternate routes outside of cable tray to reach destination in order to stay within the cable length limit. Where installed cable does not follow cable tray, contractor shall plan for all required j-hooks and sleeves to accommodate alternate routes. Example: during bidding contractor assumes certain cables will follow cable tray route. But during installation it is discovered that route causes cable to be over the length limit, forcing another route. The alternate route requires additional J-hooks and sleeves that were not planned during bidding. Since neither the owner nor engineer provide explicit directions for routing of every cable, and since the project scope or jack quantity did not change, the contractor shall take responsibility for measuring and planning of all cable routes and provision of all support and sleeve devices as required without incurring additional charges to the project.
- N. Spacing of J-hook cable supports shall be minimum every 4 ft. or in accordance with cable manufacturers' specifications, whichever distance is shorter. Under raised floor provide every 2 ft. or on every vertical support.
- O. J-hook fill capacities shall be:
  - 1. 1" diameter, 16 UTP 4 pair cables.
  - 2. 2" diameter, 50 UTP 4 pair cables.
  - 3. 4" diameter, 80 UTP 4 pair cables.
- P. Cable in MDF/TR shall be routed and supported utilizing "D-type" mounting rings, J-hooks and overhead cable runway.
- Q. Use of circular bridle rings made of round stock is not acceptable for cable support. Any support device must have a flat bottom (such as j-hooks) to adequately support cable without deforming cable at point of support.
- R. Repair damage to interior spaces caused by installation of cable, raceway or other hardware, Repairs must match preexisting color and finish of walls, floors and ceilings.
- S. Replace contractor-damaged ceiling tiles to match color, size, style and texture.
- T. Avoid abrasion and other damage to cables during installation. Any cable having visible abrasions that have worn through the outer sheath shall be replaced at contractor's expense, whether the cable passes the certification test, or not.
- U. Provide plastic bushings on the end of every conduit or sleeve that is utilized for cable. Use of conduits or sleeves WITHOUT the provision of plastic bushings to protect the end of the conduit may be cause for removal and replacement of all cables utilizing that conduit or sleeve.
- V. Pulling lubricant may be used and shall:
  - 1. Be non-injurious to cable jacket and other materials used.

- 2. Not harden or become adhesive with age.
- W. Pull cord (200 lb. minimum) shall be installed with cable installed in conduit and innerduct.
- X. Provide to Engineer, prior to installation, drawings showing proposed installation for approval.
- Y. Install cables splice-free unless otherwise specified.
- Z. Cabling shall be neatly laced, dressed and supported.

### **3.09 TESTING**

- A. Contractor shall:
  - 1. Submit schedule for acceptance testing. Representatives of Owner and/or Engineer may witness test procedures.
  - 2. Notify Owner and Engineer a minimum of 2 days in advance to allow for such participation.
  - 3. Conduct tests during course of construction when identifiable portion of installation is complete. Alternatively, testing can be conducted after entire installation is complete if this does not delay the project schedule.
  - 4. Describe test procedures prior to testing and submit sample test form to Engineer. Submit 3 record copies, and one electronic copy in CSV format, of results of tests to Engineer for approval.
  - 5. Alternatively, Contractor may submit proprietary electronic format test results, including software to access and print results. Software shall be Windows™ compatible.
- B. Testing shall be completed and accepted by Owner and Engineer before Owner furnished equipment and cross connects are installed.
- C. Test results shall be provided to manufacturer in order to obtain complete cable system warranty within 30 days of project completion. Provide original warranty certificate to owner and one copy to engineer.
- D. Provide as-built jack plans and other as-built documentation as determined by field labeling or other changes to project documents.
- E. The contractor is responsible to assure that all individual components and integrated systems (especially electronic systems) are fully functioning and in good working order before notifying Engineer or Owner for acceptance testing, inspection or final punch list completion.

### **3.10 SYSTEMS CHECKLIST**

- A. For all systems having an electronic equipment component (active electronics) a system checklist shall be developed and utilized by the contractor.
- B. The systems checklist shall make note of all major electronic components and systems.
- C. It shall utilize a simple method to make notations of the equipment, that they
  - 1. Function individually as designed
  - 2. Have been calibrated or adjusted
  - 3. Function as an integrated system with other components
- D. The checklist shall be utilized in the field by the contractor and filled out appropriately prior to contracting owner or engineer to witness tests, provide inspections or complete final punch list.
- E. The checklist shall have a signature line for three entities: Contractor/supervisor, owner and engineer.
- F. A completed, signed checklist (by Contractor) shall be presented to the engineer prior to performing the punch list and prior to final owner sign-off or project completion.
- G. Examples of systems that might require a checklist: Access Control, Closed Circuit TV system (security cameras), Audio-Visual systems, Area of Rescue, Digital Signage, Nurse Call and other system that utilizes active electronics.
- H. It is the responsibility of the Contractor, not the Engineer or Owner, to assure that all systems function according to the design intent of the project documents and according to all manufacturer's recommendations prior to project completion. The Systems Checklist shall be utilized by the Contractor and presented to the Engineer or Owner as verification that all systems have been tested, adjusted and are in good working order.
- I. The Systems Checklist shall be included as part of the Operations and Maintenance manual to be submitted at project completion.

END OF SECTION

**SECTION 27 40 00**  
**AUDIO-VISUAL SYSTEMS**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Equipment Standards
- B. Cabling
- C. Conduit Requirements

**1.02 RELATED WORK**

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 specification sections apply to the work of this section.

**1.03 SUBMITTALS**

- A. Conform to requirements in Division 1 and Section 27 05 00.
- B. Three (3) printed sets of completed shop drawings shall be provided for consultant's approval. In addition, drawings may be provided in electronic form (.DWG format) on CD. **CONTRACTOR SHALL NOT PROCURE EQUIPMENT OR BEGIN WORK ON THIS PROJECT UNTIL SHOP DRAWINGS HAVE BEEN SUBMITTED AND APPROVED.**
- C. Submittal documents must be provided within 30 days of award of contract, or sooner if necessary to comply with construction schedule. Contractor is solely responsible for all costs resulting from delay in providing shop drawings in a timely manner.
- D. These submittals or shop drawings shall include:
  - 1. A complete equipment list of all components including quantities.
  - 2. Manufacturer's catalog specification cuts and printed descriptive literature on all components being provided.
  - 3. A complete list of all cable runs including termination locations and numbers/identification schedule.
  - 4. Schematic drawings of all system wiring. The diagrams shall show schematic wiring of the equipment and all connections to be made to devices. Terminal connections in the equipment shall be numbered to correspond to the diagrams for use in making connections. Wiring diagrams shall be coordinated so that terminal numbering, circuit designation and equipment or device designations are the same on all drawings. All drawings must be submitted and approved by the Consultant before fabrication starts, but such approval will not waive any specification requirements unless so specifically stated. Final approval will be made after checking the equipment when operated in the field. For submittals, all of the above drawings shall be made on 24" x 36" reproducible media.
  - 5. Speaker and projector, mounting details. Manufacturer cut sheets are acceptable.
  - 6. Page-by-page screen shots of AV touch panel control(s). Narrative or matrix describing programming functions, routing functions and utility controls. This submittal must be provided 90 days prior to installation and programming. This submittal constitutes a "proposal" of intent. The owner will review and provide feedback and coordination for final programming and user interface controls.

**1.04 PERFORMANCE TESTING**

- A. Testing of all installed cable and equipment shall be performed by the contractor as soon as practical after equipment is installed.
- B. All cable and equipment shall be tested with state-of-the-art, industry standard test equipment by personnel properly trained to operate equipment.
- C. Testing shall be accomplished before notifying Engineer of substantial completion and before punch list is performed.
- D. A performance checklist shall be created by contractor to document operation and testing of all equipment. Checklist shall be delivered to Engineer prior to punch list and project acceptance.

## 1.05 WORK INCLUDES

- A. The scope of work covered under this Section includes but is not limited to:
  - 1. All labor, materials, equipment, tools and services required to perform all work and services for execution, installation and completion of all Audio-Visual (AV) work including all parts lists, operating instructions, and wiring diagrams shown on the drawings and as specified and completely coordinated with all other trades. Equipment and installation labor as noted on the Contract Documents for a fully functional system. Miscellaneous components, hardware, interconnections and terminations required for proper operation of all systems.
  - 2. All components or systems indicated on the Contract Documents.
  - 3. The Installing Contractor shall be responsible for the following:
    - a. Verification of accuracy and completeness of equipment lists, dimensions, mounting details and equipment compatibility
    - b. Accurate documentation of the system operation and installation.
    - c. One year warranty of the equipment and installation.
    - d. Test equipment, tools, ladders, lifts and scaffolding required for installation.
    - e. Daily and final cleanup of debris caused by installation.
    - f. Quality Control / Commissioning of system
    - g. End user training and training manuals
- B. All supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete communications installation.
  - 1. Complete and in operative condition and to approval of Architect/Engineer, materials described herein and shown on drawings.
  - 2. Coordination with other trades as required.
  - 3. Complete adherence to equipment manufacturer's recommendations to assure complete, optimal operation. Contractor shall notify Engineer where such recommendations appear to contradict project documents.
  - 4. Equipment, materials and accessories for communications systems as shown and noted on the drawings including but not limited to the following:
    - a. A complete raceway system including conduit, outlet box, pull boxes, junction boxes, sleeves and hangers. This work may be separated out for completion by the Division 26 contractor. This contractor shall coordinate with the GC and Division 26 contractor to assure conduit and power is provided where required for all AV systems.
    - b. Maintaining of all communications and other low voltage connections outside of or passing through the work area to other areas (if work is a renovation).
    - c. All cutting and patching to accomplish wiring tasks.
    - d. All conduit penetrations through walls and floors and complete fire stopping of penetrations per standards of a national testing laboratory.
    - e. Creation of new cable pathways through areas where no pathway currently exists.
    - f. New wiring devices, jacks and cover plates.
    - g. Complete testing, certification and creation of as-builts for all equipment locations.
- C. Furnish all materials and labor to provide complete and professionally installed systems in working order. Programming and functionality of the AV systems will be the responsibility of the AV Contractor(s). The AV Contractor(s) is expected to work in conjunction with the Owner's Staff to complete the system installation to owner's satisfaction.
- D. AV Contractor(s) shall provide any and all connectors, hardware, transformers, power supplies, rack panels, interfaces, fasteners, wire harnessing materials, bushings and any other incidentals required for complete and proper functioning of this system whether specifically listed or not. Provide proper projector lens as required for application, screen size and throw.
- E. Where conflicts exist between drawings and specifications, the contractor must bring the discrepancies to the project AE's attention no later than ten (10) days before the bid due date, or, if noticed after the bid award, prior to installation of equipment. Contractor shall deliver a completely functioning system regardless of discrepancies in the documents.
- F. In the case of a manufacturer discontinuing the manufacture of a certain piece of equipment required by this project, the contractor shall provide a new submittal for a new product that is the newer version of the discontinued product from the same manufacturer.

- G. Manufacturer's warranties to be in full effect for a minimum of one (1) year from substantial completion. The exception being commercial grade monitors must have a (3) year warranty.
- H. Costs are to include the staging checkout process of a sample AV system. See requirement below in Part 3.

#### **1.06 WORK BY OWNER**

- A. Owner may provide certain electronic equipment not indicated on project documents.

#### **1.07 DESCRIPTION**

- A. This section covers general requirements associated with the installation of audiovisual systems within the project. Refer to sections listed below for more specific system requirements. Multiple spaces (rooms) with multiple systems may be covered under this section.
- B. Furnish all materials and labor to provide complete and professionally installed systems in working order. Programming and functionality of the AV systems will be the responsibility of the AV Contractor(s). The AV Contractor(s) is expected to work in conjunction with the Owner's Staff to complete the system installation to owner's satisfaction.
- C. AV Contractor(s) shall provide any and all connectors, hardware, transformers, power supplies, rack panels, interfaces, fasteners, wire harnessing materials, bushings and any other incidentals required for complete and proper functioning of this system whether specifically listed or not. Provide proper projector lens as required for application, screen size and throw.
- D. Owner's Staff may review and field verify exact projector location (and lens requirements) with the AV contractor for proper throw and image size prior to installation. AV contractor shall act as the Owner's agent in coordinating with the EC regarding conduit, power, enclosures and device locations. This does not relieve the contractor from performing his due diligence in installing equipment per manufacturer's recommendations and delivering a completely functioning system.
- E. Additional information concerning the design intent is contained both within this document and on AV system drawings.
- F. Where conflicts exist between drawings and specifications, the contractor must bring the discrepancies to the project AE's attention no later than ten (10) days before the bid due date, or, if noticed after the bid award, prior to installation of equipment. Contractor shall deliver a completely functioning system regardless of discrepancies in the documents.
- G. Purchase date(s) shall be within 3 months of the time the equipment is intended to be installed in the building.
- H. In the case of a manufacturer discontinuing the manufacture of a certain piece of equipment required by this project, the contractor shall provide a new submittal for a new product that is the newer version of the discontinued product from the same manufacturer.
- I. Any changes made to the equipment specifications after bidding that result in increased cost will be considered changes to the contract and will be processed accordingly. The change in cost resulting from owner selecting a more current projector model shall be handled as follows:
  - 1. The manufacturer's suggested retail price (MSRP) of the bid product shall be obtained.
  - 2. The MSRP of the new model selected by owner shall be obtained.
  - 3. The difference between the MSRP of the two models shall be calculated.
  - 4. If the change in MSRP between bid model and new model is positive, that shall be the amount of the change order due to the contractor.
  - 5. If the change in MSRP is negative, that shall be the amount due as a credit to the owner.
- J. Manufacturer's warranties to be in full effect for a minimum of one (1) year from substantial completion.
- K. The work that is to be performed by the AV Contractor(s) under this specification shall include the following:
  - 1. Dane County Medical Examiner AV Systems: Conference Room 106:
    - a. The conference room AV systems will support general presentations as well as audio conferencing and video conferencing via "soft" codec (Skype, Lync, etc.). The room will be configured so that any content can be displayed on any or all display devices.
    - b. The AV equipment will include (but not necessarily be limited to):
      - 1) One (1) ceiling-mounted projector with associated ceiling-recessed electric projection screen.

- a) Projection Screen: 65" x 116" (133" diag. 16:9)
    - b) Projection screen to be equipped with built-in low voltage control interface.
    - c) Projector: minimum 5400 lumens, minimum 1920x1080
    - d) Basis of design – Panasonic PT-EZ580
  - 2) Two (2) wall-mounted, 65" flat panel displays.
  - 3) Three (3) wall-mounted AV input plates.
    - a) Each input plate will provide VGA + 3.5mm and HDMI input connectivity.
  - 4) One (1) wall-mounted touch-screen control panel mounted at the front of the room.
  - 5) One (1) ceiling-mounted camera and two (2) ceiling mounted microphones will support audio and video conferencing via 'soft' codec (Skype, Lync, etc.) on an OFE PC mounted in the equipment rack.
  - 6) One (1) AV bridge to encode AV signals for use with a 'soft' codec.
  - 7) One (1) audio digital signal processor (DSP) for audio routing and interface with the building phone system.
  - 8) One (1) AV network switch for control communication.
  - 9) Distributed overhead loudspeakers will provide audio playback.
  - 10) One (1) equipment rack will be mounted in Storage 106A.
2. Dane County Medical Examiner AV Systems: Mobile Collaboration display:
- a. The mobile collaboration display will provide interactivity and local/remote collaboration. The 57" diagonal display will be mounted on a wheeled cart and will feature an integrated Windows PC, camera, microphone array, and loudspeakers.
3. Dane County 911 Center AV Systems: 911 Center 155 / Break Out 156:
- a. The 911 Center 155 and Break Out 156 AV systems will support general presentations as well as audio conferencing and recording. The room will be configured so that any content can be displayed on any or all display devices.
  - b. The AV equipment will include (but not necessarily be limited to):
    - 1) One (1) ceiling-mounted projector with associated ceiling-recessed electric projection screen.
      - a) Projection Screen: 65" x 116" (133" diag. 16:9)
      - b) Projection screen to be equipped with built-in low voltage control interface.
      - c) Projector: minimum 5400 lumens, minimum 1920x1080
      - d) Basis of design – Panasonic PT-EZ580
    - 2) Four (2) wall-mounted, 82" flat panel displays.
    - 3) One (1) wall-mounted 65" flat panel display.
    - 4) Three (3) wall-mounted AV input plates.
      - a) Each input plate will provide VGA + 3.5mm and HDMI input connectivity.
    - 5) One (1) surface-mounted input plate patched through an existing floor data location.
    - 6) One (1) wall-mounted touch-screen control panel mounted at the front of the room.
    - 7) One (1) ceiling-mounted camera to enable presenter IMAG and recording.
    - 8) One (1) audio digital signal processor (DSP) for audio routing
    - 9) One (1) AV network switch for signal distribution and communication.
    - 10) Distributed overhead loudspeakers will provide audio playback.
    - 11) One (1) network video recorder (NVR) to allow recording and playback.
    - 12) One (1) Owner-Furnished PC with six (6) video outputs.
      - a) The six (6) outputs will be routed to the video distribution system and available to be shown on any/all display devices.
    - 13) One (1) 4-channel windowing processor.
      - a) The windowing processor will allow four (4) sources to be displayed in one image simultaneously.
    - 14) Two (2) wireless microphone combination kits with one (1) handheld, and one (1) backpack transmitter each (only one transmitter can be used at a time).
4. All installations will effectively be retrofit. Contractor shall be prepared to provide device cut-ins, cut-in rings, wall fishing, conduit sleeves, j-hooks, etc. as needed.

## **1.08 BIDDER QUALIFICATIONS**

- A. AV contractor(s) shall perform the entire work of this section. These contractors shall be regularly engaged in the installation and service of audiovisual systems including but not limited to those systems listed.
- B. AV Contractors must meet the following qualifications:
  - 1. Capability to provide all systems within full and strict compliance with all provisions of this specification.
  - 2. Has been actively engaged in the installation of AV systems included under this section for a minimum of five years.
  - 3. Be a certified a dealer of the products which they are installing.
  - 4. AV contractor shall furnish upon request, a list of five projects whose size, value, scope and complexity is similar to that being bid. The minimum period of operation for each shall be 12 months. For each facility listed provide:
    - a. Name and location of installation.
    - b. Date of occupancy by Owner.
    - c. Owner's representative to contact and their telephone number.
    - d. Construction Manager or General Contractor and Architect's project manager and their telephone numbers.
  - 5. AV contractor shall have access to all necessary equipment and has organizational capacity and technical competence necessary to enable performance of this work properly and expeditiously.
  - 6. Contractor shall employ adequate number of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
  - 7. Contractor shall provide a designated supervisor present and in charge on the project site during all phases of installation and testing of the system.
  - 8. Contractor shall be prepared to furnish copies of the installation documents from a previous similar installation.
  - 9. Contractor shall be prepared to furnish a list of test and calibration equipment for the servicing and alignment of AV systems.
  - 10. Contractor shall have AutoCAD ability to create one-line shop drawings and accurate as-built record documents.
  - 11. Contractor's compliment of equipment shall include, but is not limited to:
    - a. Sencore CP5000 display analyzer system or equivalent.
    - b. Sencore Test pattern generator.
  - 12. Has a record of satisfactorily completing past projects. Criteria that will be considered in determining satisfactory completion of project by Contractor will include:
    - a. Completed contracts in accordance with drawings and specifications.
    - b. Diligently pursued execution of the work and completed contracts according to the established time schedule unless the Owner grants extensions.
    - c. Fulfilled guarantee requirements of the Contract Documents.
  - 13. The AV contractor supplying the equipment shall show satisfactory evidence, upon request, that it maintains a fully equipped local service organization capable of furnishing adequate inspection and service to the systems, including replacement parts. The service organization shall be capable of a minimum 4 hour on site response time. The contractor shall produce evidence that it has had a fully experienced and established service organization for at least five (5) years and proven satisfactory installations during that time.
  - 14. The Consultant reserves the right to request and have furnished to him any additional information he requires to determine the AV contractor's ability to complete the work. Such additional information shall be supplied with no additional costs incurred by the Owner.
  - 15. The A/E will make such investigation as is deemed necessary to determine the ability of the AV contractor to perform the work.
  - 16. Certification:
    - a. The Installing Contractor shall have a current INFOCOMM's "Audio Visual Solutions Provider" (AVSP) certification. The certifications shall match the level and complexity of the scope of work as follows:
      - 1) System Category One (\$10,000 to \$49,000)

- b. AVSP Sapphire status will be preferred as a minimum status for this work.
  - c. All Other System Categories
    - 1) AVSP Emerald status will be a minimum status for this work.
- C. Installing Contractor Personnel Qualifications:
  - 1. Summary: The Installing Contractor shall assign at least one full-time employee to the work whose qualifications meet the following minimum requirements.
  - 2. On-Site AV Supervision
    - a. Certifications:
      - 1) Shall have a current INFOCOMM Certified Technology Specialist certification with an installation endorsement (CTS-I) in good standing
      - 2) Installation contractor shall have on staff a certified CTS-D person for design review. Certifications shall be provided upon request.
    - b. Qualifications:
      - 1) Shall be capable of supervising a turn-key audiovisual system installation including, but not limited to, all cabling, loudspeakers, projection equipment, mounting hardware and electrical components including the necessary equipment, interconnections, transducers, labor, and services required to meet the functional requirement outlined in the Contract Documents.
      - 2) Shall provide all quality control (QC) and safety inspections as needed throughout installation.
      - 3) Shall conduct all AV system commissioning tests, and proof-of-performance testing/demonstration in accordance with the Contract Documents.
    - c. Other Installation Personnel:
      - 1) Certification:
        - a) Must have a CTS certification
        - b) No more than four (4) CTS certified installers for every CTS-I certified installer on-site.
    - d. Qualifications:
      - 1) Shall be capable of working within industry standards with minimal supervision. The work shall include, but is not limited to, cabling, loudspeakers, projection equipment, mounting hardware and electrical components including the necessary equipment, interconnections, and transducers and the downloading, or installation, of pre-developed control programs in the field.
    - e. On-Site Support Personnel:
      - 1) Certification:
        - a) CTS Preferred Qualifications:
        - b) Has a good general knowledge of AV installation procedures and standards, and must be trained in construction site safety. Performs support work under direct supervision of CTS-D and CTS-I installers.
        - c) AV Control Programmer: AV control and DSP programming for system equipment includes recommendations for control system features and functionality; input to AV system design; control system logic diagram, control system performance specification, block diagrams, control system program and user interface, system debug, program and source code and other system documentation as required.
        - d) Certification
        - e) Must have a CTS certification, CTS-I or CTS-D certification preferred
        - f) Individuals performing the AV control programming shall have manufacturer's control system programming training and certification for the specified AV control system
        - g) Individuals performing AV-DSP programming and setup shall have manufacturer's system programming training and certification from the manufacturer for specified equipment.
    - f. Sub-contracting of AV work
      - 1) Conditions:
        - a) Sub-Contractors must conform to the same certification standards listed above, and have prior approval.



- D. Installing Contractor Regulatory Requirements:
1. All equipment and installations under this contract shall conform to the following:
    - a. ANSI/NFPA 70 National Electrical Code.
    - b. ANSI/IEEE C2 National Electrical Safety Code TIA/EIA Standards 568 A (including TSB 67), and 607.
    - c. IEEE/ANSI 142 1982 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
    - d. ANSI/TIA-569B Commercial Building Standard for Telecommunications Pathways and Spaces
    - e. NFPA 72-2010; National Fire Alarm and Signaling Code [intelligibility requirements]
    - f. Illinois Accessibility Code
    - g. Refer to U of I Facilities Standards for regulations and requirements. See Instruction Media and Audio Visual Systems Guidelines as well as Media Guidelines.

#### **1.09 SERVICE**

- A. On-the-premises service, parts and labor is to be provided by AV contractor during normal working hours at no cost to the Owner, for a period of 12 months from the date of final acceptance. AV contractor must respond within 24 hours or the next business day to requests for service. AV contractor must also provide technical support via telephone at no charge during the warranty period.
- B. On-the-premises service must also be made available at other than normal working hours, and shall be charged by the AV contractor's service representative at current labor rates minus normal hour rate.
- C. The AV contractor shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the systems.

#### **1.10 MAINTENANCE AND OPERATING MANUALS**

- A. Upon project completion the Contractor shall provide four complete sets, in hard cover binders, of maintenance and operating instructions for this system and any software, CD-ROMs, DVDs or other materials provided by the manufacturer. These manuals shall include the following:
  - B. A table of contents.
  - C. Simplified operational procedures with diagrams depicting the actual equipment front panels showing the nominal level settings for the controls.
  - D. Question and answer type trouble-shooting guides.
  - E. One copy of approved system As Built drawings.
  - F. The AV contractor shall maintain in their office a record of all original manual information to be able to issue as a replacement copy, at the Owner's expense, during the time the equipment is in actual service.
  - G. See General Requirements Division 01.

#### **1.11 AS-BUILT CONSTRUCTION DRAWINGS**

- A. Drawings included with the specifications set shall be modified by the AV contractor to denote as-built information, and shall be included as part of the as-built documentation. As built documentation shall include a complete list of all cable runs including termination locations, numbers/identification, and test data as required under the section on commissioning.
- B. 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.
- C. The owner, through the Consultant, will provide floor plans in paper and electronic (".dwg", AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the contractor to denote as-built information as defined above and returned to the Consultant for acceptance. This information shall be supplied to the Consultant/Engineer no later than two (2) weeks after the completion of the project.
- D. The Contractor shall annotate the base drawings and return to the A/E in hard copy (same plot size as originals). Hard copies are REQUIRED. Electronic copies are OPTIONAL.
- E. Each drawing submitted by the Contractor as part of the Project Documentation shall be identified as an "As-built" drawing and include the following:
  1. The Contractor name and/or logo

2. The date of the drawing
- F. If electronic files are utilized, all fonts, color, layer, Model Space/Paper Space conventions established in the base drawings shall be retained by the Contractor in preparation of the As-built drawings.
- G. If electronic files are utilized, prior to generation of the drawings, the Contractor shall provide a sample file and test plot to the Engineer for review and approval.
- H. All documentation, including hard copy and electronic forms shall become the property of the Owner.
- I. If drawings are submitted by AV contractor in electronic form as "As-Builts" or "Record Drawings", they shall adhere to all CAD standards as outlined in the most recent edition of A/E's CAD standards manual.

## **1.12 WORK PRODUCT OWNERSHIP**

- A. Throughout the course of the project, all supporting documentation, work-in-progress, programed source code and software, written and electronic files, including all documentation and software necessary to edit and adapt the system, shall remain the property of the University and shall be provided to the University upon project completion and/or at any time during the course of a project upon request in an unsecured, unencrypted and easily modifiable format as prescribed by the University.
  1. All deliverables to be supplied to the University on compact disc media, and/or printed materials when requested
- B. Software – Control System, DSP, and All Other Applicable Equipment
  1. The software developer shall retain intellectual property rights to the operation software. The Owner shall be granted a license in perpetuity for use. The following requirements shall apply.
    - a. All source code becomes the exclusive property of The Owner.
    - b. All source code changes must be fully documented.
    - c. All custom programs for remote control system touch panels, and other programmed devices, shall become the property of the Owner and shall be submitted with the final systems documentation, and/or as requested in the DVD/CD-ROM and USB solid state media.
    - d. Subsequent to system certification, source code changes and/or additional programming, whether requested by the Owner or performed by the Installing Contractor, will be warranted by the Installing Contractor for a period of one (1) year, with the Installing Contractor responsible for the diagnosis and repair.
    - e. The vendor shall ensure that the current program is saved to CD-ROM and/or USB-solid state media, and backed up on electronic hard-disc/server.
    - f. No program resident in a control system shall be overwritten until a back-up of the resident program is made.
    - g. All documentation, not residing in the code, must be provided on CD-ROM and/or USB-solid state media in Adobe PDF and Microsoft Office format.
  2. The Installing Contractor shall also offer an annual "Software Maintenance" contract.
    - a. This shall cover all software provided as part of this system and/or written for this system, and shall include both routine upgrades to applications and operating systems, as well as any modifications to software that may be required by Any Company.
    - b. The Software Maintenance contract shall commence immediately after expiration of the warranty period, and continue for three (3) years.
  3. Written Release:
    - a. A written release will be given by the Installing Contractor for all control programming done by the Installing Contractor's personnel or sub-contractors. The release shall acknowledge the Owner's ownership and right to modify programming directly, or to have the programming modified by others on the Owner's behalf.
    - b. A CD shall be supplied with the written release that includes the program and source code for the system in an unencrypted format.

## **PART 2 – PRODUCTS**

### **2.01 EQUIPMENT STANDARDS**

- A. Complete AV systems consisting of all the individual systems as shown and specified are required. Equivalent manufacturers and products shall be in strict accordance with this specification. Substitutions during the construction phase may be permitted only with prior approval from the Owner's Staff and in writing from the AV consultant. For bidding purposes, no substitutions will be accepted or considered. Bidders are to adhere strictly to the project documents.
- B. It is the responsibility of the AV contractor to verify the completeness of the drawings, specifications and schedules and the suitability of devices to meet the intent of the specifications. Any additional equipment, accessories or incidentals required, whether or not specifically mentioned herein, shall be provided by the contractor without claim for additional payment, it being understood that a complete operational system is required.
- C. All materials and equipment shall be new and unused. Unless specifically approved by the Consultant, all materials and equipment in the system shall be the standard design or model ordinarily supplied as a product item by manufacturers regularly engaged in the production of such equipment. They shall be the manufacturer's latest standard designs current at the time of delivery, modified only to the extent necessary to comply with the requirements of these specifications. Where two or more units of the same class of equipment are required, such units shall be the standard product of a single manufacturer, but individual classes of compatible equipment may be the products of different manufacturers. Manufacturers shall be established in the industry so that prompt and continued service and delivery of spare parts may be assured.
- D. All equipment quantities listed in audiovisual specification sections are for reference only and could vary depending on the type of manufacturer equipment provided. Refer to schematic drawings to provide consultant approved quantities to meet design intent.
- E. All components that comprise the various systems shall be UL listed where a UL listing exists for that component or system.
- F. Equipment provided by this contractor shall be fully coordinated with all other equipment required for complete system function. This includes power, cooling, cabling, mounting equipment and locations, and controls.
- G. **Contractor shall anticipate future cost increases of equipment in their bid, whether such increases are due to inflation or technology change.** Technology changes frequently and manufacturers change or discontinue products. Contractor shall make reasonable assumption regarding possible cost increases and technology changes in the period between bidding and installation.
- H. **Contractor shall provide current models at time of installation.** Do not provide older models no longer in production or out of service.

## 2.02 SUBSTITUTIONS

- A. Consideration for substitutions during the construction phase shall be allowed in light of a significant gain or advantage in quality of product or considerable cost savings to the Owner. It is the contractor's responsibility to obtain approval on all substitutions prior to installation. **FAILURE TO OBTAIN APPROVAL FOR SUBSTITUTIONS SHALL BIND THE CONTRACTOR TO PROVIDING THE SPECIFIED EQUIPMENT WITHOUT REQUEST FOR ADDITIONAL PAYMENT.** Contractors request for approval shall include the reason for requesting the substitution along with any relevant product data.
- B. Requests for substitutions must be made at least 20 days prior to intended installation.

## 2.03 EQUIPMENT SPECIFICATIONS

- A. Acceptable brands include:
  - 1. Hitachi, Panasonic, QSC, BMS, Extron, Crestron, AMX, Da-Lite, Biamp, Shure, Audio-Technica, Middle Atlantic, Sony, FSR, Kramer, Chief, JBL, Steelcase, Samsung, Atlas IED, and others as approved by Engineer and owner to meet the intent of the design.
  - 2. Products may be mixed and matched to provide the best value and technical solution for the Owner.
  - 3. Certain products must integrate seamlessly, therefore families of products once chosen must be used throughout to assure this integration.
  - 4. While not required to be sole-sourced, there is a preference for Crestron control paired with Crestron DigitalMedia and AMX SVSI transport and switching.

5. Monitors shall be of commercial quality having no less than a 3-year warranty and able to perform 24x7x365,

## **2.04 AV CONTROL SYSTEMS**

- A. Wall mounted touch screen control device: Crestron TSW-752
  1. 7" diagonal projected capacitive, 2-point multi-touch display.
  2. Contractor to customize programming and labeling per project documents.
  3. Provide PoE injector(s) as required.
- B. Wall mounted touch screen control device: Crestron TSW-1052
  1. 10.1" diagonal projected capacitive, 2-point multi-touch display.
  2. Contractor to customize programming and labeling per project documents.
  3. Provide PoE injector(s) as required.
- C. Control Processor: Crestron CP3N
  1. Model may be altered to accommodate required inputs and outputs
  2. Control of screens, lights and shades may be from control processor or power sequencer depending on functionality of model selected
  3. Contractor to customize programming and labeling per project documents.
  4. Minimum Specifications:
    - a. Two (2) Ethernet ports to enable a private "A|V" network.
    - b. Two (2) serial ports supporting bidirectional RS-232.
    - c. Eight (8) relay ports.
    - d. Eight (8) IO ports.
    - e. Eight (8) IR output ports.
    - f. Native BACnet IP communication with licensing as required.
    - g. One (1) proprietary communications port.
- D. Presentation Switcher with Integrated Control Processor: Crestron DMPS3-300-C
  1. Model may be altered to accommodate required inputs and outputs
  2. Control of screens, lights and shades may be from control processor or power sequencer depending on functionality of model selected
  3. Contractor to customize programming and labeling per project documents.
  4. Minimum Specifications:
    - a. Control Ports:
      - 1) Two (2) Ethernet ports to enable a private "A|V" network.
      - 2) Two (2) serial ports supporting bidirectional RS-232.
      - 3) Four (4) relay ports.
      - 4) One (1) IO port.
      - 5) Four (4) IR output ports.
      - 6) Native BACnet IP communication with licensing as required.
      - 7) Four (4) proprietary communications ports.
    - b. Video Switcher:
      - 1) Full 7:4 matrix switching capability.
      - 2) Five (5) HDMI inputs.
      - 3) Three (3) VGA inputs.
      - 4) Two (2) HDBaseT inputs.
      - 5) Two (2) HDMI outputs.
      - 6) Two (2) HDBaseT outputs.
    - c. Audio Switcher:
      - 1) Full 7:7 matrix switching capability.
      - 2) Full audio embedding, deembedding, and independent routing and combination to/from analog and digital video inputs and outputs.
      - 3) Six (6) microphone inputs.
      - 4) Five (5) stereo analog audio inputs.
      - 5) Three (3) stereo analog audio outputs.
- E. Control Processor: AMX/SVSI SC-N8001
  1. Model may be altered to accommodate required inputs and outputs

2. Control of screens, lights and shades may be from control processor or power sequencer depending on functionality of model selected
3. Contractor to customize programming and labeling per project documents.
4. Minimum Specifications:
  - a. One (1) Ethernet interface.
  - b. Web-based control.
  - c. N-Command communication.
  - d. Custom panel support.
  - e. Custom script support.
  - f. Direct TCP control.
  - g. 3<sup>rd</sup>-party device control.

## 2.05 PROJECTION

- A. Manufacturers: Hitachi, Epson, NEC, Sony, Panasonic
  1. Sample model(s): Panasonic PT-FZ570, Panasonic PT-RZ670 (or current models at time of installation)
- B. Minimum Specifications – Conference Room 106 / 911 Center 155
  1. Similar to Panasonic PT-EZ580
  2. Aspect ratio: 16:9 or 16:10
  3. Resolution: 1920x1080
  4. Lumens: 5400 ANSI
  5. Mounting: ceiling-mount, securely fastened to overhead structure.
  6. Contrast: 10,000:1
  7. Audible noise: 33 dB max
  8. Compatibility: HDTV: 720p, 1080i, 1080p
  9. Inputs: HDMI, RS-232
  10. EDID and HDCP compatibility.
  11. Lens shift
  12. Lens as required for resolution, brightness and throw.
  13. **Field-verify all dimensions and mounting locations taking special not of any obstructions or complications prior to ordering equipment.**
  14. Projector is to be installed square, level, and perpendicular to the plane of the screen. No digital keystone correction is to be used.
  15. It is the responsibility of the contractor to assure the chosen projector has the required inputs and outputs and projects properly on the screen.
  16. Engineer approved equivalents will be considered
- C. Projector Mount
  1. Manufacturers: Panasonic, Chief, Peerless, Premier, Polaris
  2. Examples: Chief RPMA and VCMU
    - a. Provide custom-length mounting column, CMA395, and custom-mounting structure securely fastened to overhead structure for each projector location.
      - 1) Custom mounting structure and all mounting hardware must be capable of supporting a minimum of five (5) times the combined weight of all supported equipment.

## 2.06 AUDIO

- A. Digital Signal Processors:
  1. Biamp TesiraFORTE VI
    - a. Minimum specifications:
      - 1) Twelve (12) AEC inputs.
      - 2) Eight (8) outputs.
      - 3) USB connectivity.
      - 4) VoIP connectivity.
- B. Speaker(s):
  1. Manufacturers: Atlas IED, QSC, JBL, Extron, Crestron, Quam, Bogen, Armstrong
  2. Minimum Specifications:
    - a. Ceiling mounted, cut-in style

- b. Dispersion angle: 110 deg or greater
  - c. Mountable in standard drop ceiling tiles
  - d. White perforated grille
  - e. 8 ohm direct or 70/100 volt operation with 32, 16, 8, and 4 watt selectable power taps accessed via speaker wiring connections inside the rear panel.
  - f. 6.5" coaxial with 20mm silk dome tweeter.
  - g. Provide T-bar bridge support and wire support from structure.
- C. Amplifiers:
  - 1. Manufacturers: JBL, QSC, Extron, Biamp, Peavey, Bogen, Atlas, Ashly, Lab Gruppen, or approved others
  - 2. Minimum specifications for Conference Room 106 / 911 Center 155 / Break Out 156:
    - a. JBL CSA 140Z / 180Z / 1120Z / 240Z 280Z / 2120Z
    - b. Watts: as required plus 20%, then round up to nearest standard size.
    - c. Separate channels as indicated on project documents.
    - d. Combine smaller amps as required to obtain channel separation or zones.
    - e. Ports as required to connect to audio sources and outputs.
    - f. Audio input
      - 1) Number/signal type: 1 or 2 balanced/unbalanced
      - 2) Connectors: 1 or 2 captive screw connectors, 3 pole, 1 or 2 channel RCA
      - 3) Impedance: 20k ohms balanced / 50k ohms unbalanced
      - 4) Maximum level: +22 dBu
    - g. Audio output
      - 1) 70V: 1 or 2 channels 70 V
      - 2) Connectors: 1 or 2 screw lock captive screw connectors
    - h. Load impedance
      - 1) 70V: 120-40 ohms minimum depending on model
      - 2) 70V: 40-120 watts rms per channel, 70 V, 1 kHz, 0.1% THD
      - 3) Cable: as indicated on project documents or as recommended by manufacturer.
- D. Wireless Microphone(s) for 911 Center 155:
  - 1. Manufacturers: Shure QLXD 24/SM58
    - a. Provide handheld transmitter with SM58 microphone.
    - b. Provide beltack transmitter with lapel style and MX153 earset microphones.
  - 2. Antenna
    - a. Provide remote mounting and cabling as required to ensure complete coverage.
- E. Wired Desktop Microphone:
  - 1. Provide cabling / plates / interconnects as required.
  - 2. Manufacturer: Shure MX412D/C
    - a. Minimum Specifications:
      - 1) Desktop base.
      - 2) 10' cable.
      - 3) Logic functions.
      - 4) Programmable switch.
      - 5) LED indicator.
      - 6) Snap-fit windscreen.
- F. Wired Ceiling Microphone(s):
  - 1. Type 1:
    - a. ClearONE Ceiling Microphone Array 910-001-013
      - 1) Coordinate finish with Architect / design team prior to ordering / installation.
      - 2) Minimum requirements:
        - a) Polar Pattern: Cardioid polar pattern.
        - b) Dynamic Range: 80 dB, 1kHz @ max SPL
        - c) Signal/Noise Ratio: 60 dBA, 1kHz @ 1Pa
        - d) Frequency Response: 100 Hz – 12kHz
        - e) Sensitivity 114 mV/Pa
        - f) Impedance: 200 ohm
        - g) Phantom Powered: 12-52 VDC, 2mA typical.

- h) Contractor to provide above-ceiling back box with tile bridge – Quam SSB-1900 or equal.
  - i) Microphone array.
  - j) Mounting assembly
  - k) Microphone cable
  - l) RJ45 receptacle to mixer adapter cables
- G. Assisted Listening System (ALS):
1. Williams Sound PPA 458 PRO / Listen Technologies LS-71-xxx
  2. One base station for each space or room as required to meet ADA standards.
  3. Provide the following for each ALS space:
    - a. (1) Transmitter
      - 1) Coordinate frequency selection with local spectrum.
    - b. Provide receiver quantity as needed to meet ADA standards.
    - c. Provide inductive neckloop quantity as needed to meet ADA standards.
    - d. Ear surround earphones to match quantity of receivers.
    - e. Antenna
      - 1) Provide remote mounting and cabling as required to ensure complete coverage.
    - f. (1) Power Supply
    - g. (1) Power Cord (U.S.)
    - h. Rechargeable batteries as required to match quantity of receivers.
    - i. (1) Charging tray, sized as required to support quantity of receivers.
    - j. ADA signage as needed to meet ADA standards.
    - k. Rack mounting hardware.
  4. Provide over-the-ear headphones, not ear buds
  5. Sufficient UHF channels to prevent overlap
  6. ADA compliant range up to 300 ft. line of sight
  7. Modulation mode: FM
  8. Remote antenna ability so transmitters may be located in AV control room while antenna can be remotely located in auditorium or Majors lab.
  9. Remote antenna cable as required
  10. Provide ADA required/approved signage.

## **2.07 PROJECTION SCREENS**

- A. Specifications:
1. Projection screens
    - a. Manufacturers: Draper Inc.
    - b. Tab Tensioned
    - c. Matt / Matte White Screen Surface
    - d. Color: White
    - e. Motorized
    - f. Aspect Ratio: 16:9
    - g. Diagonal: 133"
    - h. Viewable: 65" x 116"
    - i. Black border all sides: 2", varies at sides for tensions, varies at top as required for installation.
    - j. Built-in/integrated low voltage control interface.
    - k. Alternate brands: Da-Lite, Elite Screens
    - l. Field-verify all dimensions and mounting locations taking special note of any obstructions or complications prior to ordering equipment.
    - m. Contractor to verify dimensions prior to ordering.
    - n. Contractor to verify black drop at top of screen and carefully coordinate that border with location of projector mount and ability of projector to shift image if required. Contractor to provide additional black drop as required to suit the installation location. Only the required amount of black drop to be ordered and utilized.
      - 1) It is NOT acceptable to order extra black drop and manipulate the screen 'show' position to hide extra black drop as this can lead to improper surface tensioning.

## **2.08 TRANSMITTERS / RECEIVERS**

- A. Specifications:
  - 1. As required by manufacturer to convert HDMI and VGA signals to balanced signal over Category 6 UTP.
  - 2. Minimum ports: HDMI, VGA + 3.5mm converted to RJ45, transmitter and receiver pairs as required.
  - 3. Others as required for complete system function utilizing Cat 6 video transport
- B. Scalers
  - 1. Some transmitters, receivers or matrix switchers may have built-in scalers
  - 2. If not, provide additional scalers at projectors and monitors to assure proper scaling of images and resolutions for different input equipment
  - 3. Proper implementation of EDID (extended display identification data) for all ports of matrix switch may preclude the need for separate scalers. Contractor is responsible to make certain all inputs will display properly on all devices.
- C. HDBaseT Transmitter(s):
  - 1. Wall-plate transmitter Crestron DM-TX-200-C-2G
  - 2. Provide mid-span power injector(s) as required Crestron DM-PSU-ULTRA-MIDSPAN or equal.
- D. HDBaseT Receiver(s):
  - 1. Surface-mount HDBaseT receiver Crestron DM-RMC-4K-100-C
    - a. (1) HDBaseT input
    - b. (1) HDMI output
    - c. (1) 10/100 Ethernet port
    - d. (1) RS232 port
    - e. (2) IR ports
  - 2. Surface-mount HDBaseT receiver Crestron DM-RMC-4K-SCALER-C
    - a. (1) HDBaseT input
    - b. (1) HDMI output
    - c. (1) 10/100 Ethernet port
    - d. (1) RS232 port
    - e. (2) IR ports
    - f. Integrated video scaler
  - 3. Provide mid-span power injector(s) as required Crestron DM-PSU-ULTRA-MIDSPAN or equal.
- E. HDBaseT Transmitter/Receiver Kit(s):
  - 1. Surface-mount TX/RX kit Binary B-520-EXT-230-RS
    - a. (1) HDBaseT input/output (depending on unit)
    - b. (1) HDMI input/output (depending on unit)
    - c. (1) IR input
    - d. (1) IR output
    - e. (1) RS232 receiver
  - 2. Provide mid-span power injector(s) as required.

## **2.09 NETWORKED AV ENCODERS / DECODERS**

- A. Specifications:
  - 1. As required by manufacturer to encode HDMI and VGA signals and transmit them via the network.
  - 2. Minimum ports: HDMI, VGA + 3.5mm converted to RJ45, encoder and decoder pairs as required.
  - 3. Others as required for complete system function utilizing network video transport
- B. Scalers
  - 1. Some encoders or decoders may have built-in scalers
  - 2. If not, provide additional scalers at projectors and monitors to assure proper scaling of images and resolutions for different input equipment
  - 3. Proper implementation of EDID (extended display identification data) for all ports of matrix switch may preclude the need for separate scalers. Contractor is responsible to make certain all inputs will display properly on all devices.
- C. Networked AV Encoders:
  - 1. Minimal proprietary compression (MPC) video over IP encoder – discrete unit – AMX/SVSI



- a. Minimum Requirements:
  - 1) VIDEO
  - 2) Digital Video Input
    - a) HDMI, DVI-D (through adapter),
  - 3) Analog Video Input
    - a) HD-15 VGA, Component (Component is supported through a passive adapter)
  - 4) Video Output
    - a) Network video over Ethernet via RJ45 port
  - 5) Progressive Input Resolutions
    - a) Supports most common HD up to 1920x1200.
  - 6) Interlaced Input Resolutions
    - a) Supports 1080i60
  - 7) Analog Input Resolutions
    - a) Supports most common HD up to 1920x1200
  - 8) Analog-to-Digital Conversion
    - a) 8-bit 165MHz per each of three color channels
  - 9) AUDIO
    - a) Input Signal Types
    - b) Embedded audio on HDMI (DVI-D through adapter) or Analog Stereo (Balanced or Unbalanced)
    - c) Output Signal Types
    - d) Ethernet
    - e) HDMI Audio Formats
    - f) 8ch PCM
    - g) Analog Audio Formats
    - h) Stereo 2-channel
    - i) Analog-To-Digital Conversion
    - j) 16-bit 32 kHz, 44.1 kHz and 48 kHz
  - 10) LATENCY
    - a) 10 ms at 60 fps
  - 11) COMMUNICATIONS
  - 12) Ethernet
    - a) 10/100/1000 Mbps, auto-negotiating, auto-sensing, full/half duplex, DHCP, Auto IP, and Static IP
  - 13) PORTS
    - a) (1) 12 Volt DC power input
    - b) (2) RJ45 female – One (1) for AV, network and power, one (1) for network
    - c) (1) IR
    - d) (1) RS232
    - e) (1) stereo analog audio
    - f) (1) HDMI input
    - g) (1) VGA input
2. Minimal proprietary compression (MPC) video over IP encoder – card for card frame – AMX/SVSI
  - a. Provide card frame(s) as required.
  - b. Minimum Requirements:
    - 1) VIDEO
    - 2) Digital Video Input
      - a) HDMI, DVI-D (through adapter),
    - 3) Analog Video Input
      - a) HD-15 VGA, Component (Component is supported through a passive adapter)
    - 4) Video Output
      - a) Network video over Ethernet via RJ45 port
    - 5) Progressive Input Resolutions
      - a) Supports most common HD up to 1920x1200.
    - 6) Interlaced Input Resolutions

- a) Supports 1080i60
- 7) Analog Input Resolutions
  - a) Supports most common HD up to 1920x1200
- 8) Analog-to-Digital Conversion
  - a) 8-bit 165MHz per each of three color channels
- 9) AUDIO
- 10) Input Signal Types
  - a) Embedded audio on HDMI (DVI-D through adapter) or Analog Stereo (Balanced or Unbalanced)
- 11) Output Signal Types
  - a) Ethernet
- 12) HDMI Audio Formats
  - a) 8ch PCM
- 13) Analog Audio Formats
  - a) Stereo 2-channel
- 14) Analog-To-Digital Conversion
  - a) 16-bit 32 kHz, 44.1 kHz and 48 kHz
- 15) LATENCY
  - a) 10 ms at 60 fps
- 16) COMMUNICATIONS
- 17) Ethernet - 10/100/1000 Mbps, auto-negotiating, auto-sensing, full/half duplex, DHCP, Auto IP, and Static IP
- 18) PORTS
  - a) (1) 12 Volt DC power input
  - b) (2) RJ45 female – One (1) for AV, network and power, one (1) for network
  - c) (1) IR
  - d) (1) RS232
  - e) (1) stereo analog audio
  - f) (1) HDMI input
  - g) (1) VGA input
- 3. Minimal proprietary compression (MPC) video over IP – wall-plate encoder – AMX/SVSI
  - a. Minimum Requirements:
    - 1) VIDEO
    - 2) Digital Video Input
      - a) HDMI, DVI-D (through adapter),
    - 3) Analog Video Input
      - a) HD-15 VGA, Component (Component is supported through a passive adapter)
    - 4) Video Output
      - a) Network video over Ethernet via RJ45 port
    - 5) Progressive Input Resolutions
      - a) Supports most common HD up to 1920x1200.
    - 6) Interlaced Input Resolutions
      - a) Supports 1080i60
    - 7) Analog Input Resolutions
      - a) Supports most common HD up to 1920x1200
    - 8) Analog-to-Digital Conversion
      - a) 8-bit 165MHz per each of three color channels
    - 9) AUDIO
    - 10) Input Signal Types
      - a) Embedded audio on HDMI (DVI-D through adapter) or Analog Stereo (Balanced or Unbalanced)
    - 11) Output Signal Types
      - a) Ethernet
    - 12) HDMI Audio Formats
      - a) 8ch PCM
    - 13) Analog Audio Formats

- a) Stereo 2-channel
  - 14) Analog-To-Digital Conversion
    - a) 16-bit 32 kHz, 44.1 kHz and 48 kHz
  - 15) COMMUNICATIONS
    - a) Ethernet - 10/100/1000 Mbps, auto-negotiating, auto-sensing, full/half duplex, DHCP, Auto IP, and Static IP
  - 16) PORTS
    - a) (1) 12 Volt DC power input
    - b) One (1) RJ45 for AV, network and power
    - c) (1) RS232
    - d) (1) stereo analog audio
    - e) (1) HDMI input
    - f) (1) VGA input
- D. Networked AV Decoders:
1. Minimal proprietary compression (MPC) video over IP decoder – discrete unit – AMX/SVSI
    - a. Minimum Requirements:
      - 1) VIDEO
        - a) Digital Video Input - Network video over Ethernet via RJ45 port or fiber via 1G SFP port
        - b) Video Output - HDMI, DVI-D (through adapter)
        - c) Formats - HDMI, DVI-D (through adapter), HDCP content protection support
        - d) Output Resolutions - Supports most common HD up to 1920x1200.
      - 2) AUDIO
        - a) Output:
        - b) Embedded 8ch PCM via HDMI
        - c) 2-channel stereo analog audio
      - 3) PORTS
        - a) (1) 12 Volt DC power input
        - b) (2) RJ45 female – One (1) for AV, network and power, one (1) for network
        - c) (1) IR
        - d) (1) RS232
        - e) (1) stereo analog audio
        - f) (1) HDMI out
  2. Minimal proprietary compression (MPC) video over IP decoder – card for card frame – AMX/SVSI
    - a. Provide card frame(s) as required.
    - b. Minimum Requirements:
      - 1) VIDEO
        - a) Digital Video Input - Network video over Ethernet via RJ45 port or fiber via 1G SFP port
        - b) Video Output - HDMI, DVI-D (through adapter)
        - c) Formats - HDMI, DVI-D (through adapter), HDCP content protection support
        - d) Output Resolutions - Supports most common HD up to 1920x1200.
      - 2) AUDIO
        - a) Output:
        - b) Embedded 8ch PCM via HDMI
        - c) 2-channel stereo analog audio
      - 3) PORTS
        - a) (1) 12 Volt DC power input
        - b) (2) RJ45 female – One (1) for AV, network and power, one (1) for network
        - c) (1) IR
        - d) (1) RS232
        - e) (1) stereo analog audio
        - f) (1) HDMI out

## 2.10 STAND-ALONE VIDEO SCALER(S)

- A. Surface-mount, stand-alone HDMI video scaler Crestron HD-SCALER-HD-E
  - 1. (1) HDMI input
  - 2. (1) HDMI output
  - 3. (1) audio input
  - 4. (1) audio output

## **2.11 IPTV RECEIVER(S)**

- A. Owner-Furnished, Contractor-Installed IPTV Receiver – Amino 140, Amino 540
  - 1. Coordinate installation and configuration with Owner's IPTV representative(s).
  - 2. Provide patch cables as needed.

## **2.12 PTZ CAMERA(S)**

- A. PTZ camera with video/power/control over twisted pair breakout box Vaddio RoboSHOT 12 QUSB system – 999-9909-000
  - 1. PTZ camera with tri-synchronous motion.
  - 2. 12X optical zoom
  - 3. 73-degree wide field of view
  - 4. 6.6-degree tele field of view
  - 5. 1/2.8", 2.34 Megapixel CMOS sensor.
  - 6. Full HD (1080p/60)
  - 7. Quick-connect USB video/power/control extension and breakout box.
- B. Provide semi-recessed, in-ceiling mounting hardware for Vaddio RoboSHOT cameras. Provide any ancillary mounting accessories as required. Support camera/mount to overhead structure.
  - 1. Sealed metal back can
  - 2. Bezel ring
  - 3. Back box lid
  - 4. Internal IR emitter board
  - 5. White trim ring
  - 6. One-piece tile support brace
  - 7. Mounting hardware

## **2.13 AV BRIDGE(S)**

- A. HD media streaming appliance Vaddio AV Bridge – 999-8210-000
  - 1. Minimum Requirements:
    - a. IP encoding (H.264 & AAC audio)
      - 1) Resolutions up to 1080p/30
    - b. USB 2.0 (MJPEG & PCM audio)
      - 1) Resolutions up to 720p/30
    - c. Supported Input Resolutions:
      - 1) HDMI & YPbPr:
        - a) 1080p/60/59.94/50/30/25
        - b) 720p/60/59.94/50
        - c) 1080i/59.94/50
      - 2) RGBHV (VESA):
        - a) 1280 x 720@60Hz (16:9)
        - b) 1280x768@60Hz (15:9)
        - c) 1280x800@60Hz (16:10)
        - d) 1360 x 768@60Hz (16:9),
        - e) 1024 x 768@60Hz (4:3 centered in 16:9 frame)
      - 3) DVI (on HDMI connector using sRGB color space):
        - a) 1080p/60/59.94/50
        - b) 720p/60/59.94/50Hz
        - c) 1080i/59.94/50Hz
        - d) 1440x900@60Hz
        - e) 1360x768@60Hz
        - f) 1280x800@60 Hz

- g) 1280x768@60Hz
- h) 1280x 720@60Hz
- 4) EDID Supported Resolutions:
  - a) 1080p/60/59.94/50
  - b) 720p/60/59.94/50Hz
  - c) 1440x900@60Hz
  - d) 1360x768@60Hz
  - e) 1280x800@60 Hz
- 5) Composite Video (Standard Definition):
  - a) 480i/29.97Hz NTSC
  - b) 576i/25Hz PAL
- d. Video/Audio DSP
- e. Audio IO:
  - 1) Two (2) XLR-F balanced inputs
  - 2) Two (2) RCA-F unbalanced inputs
- f. USB 2.0 type-B with UVC and UAC standard drivers
- g. Network RJ-45 Ethernet 10/100 BaseT
- h. RS-232

#### **2.14 NETWORK VIDEO RECORDER(S)**

- A. AMX / SVSI Networked Video Recorder
  - 1. Stream Compatibility:
    - a. MPC
    - b. JPEG2000
    - c. H.264
  - 2. Up to 40 hours of 1080p video.
  - 3. Stereo audio on each record channel
  - 4. Store to MPEG4 format at original resolution

#### **2.15 WINDOWING PROCESSOR(S)**

- A. AMX / SVSI Networked Video Windowing Processor
  - 1. Stream Compatibility:
    - a. MPC
  - 2. Up to four (4) MPC streams windowed into one output stream.

#### **2.16 BLU-RAY PLAYER**

- A. Oppo BDP-103
  - 1. RS-232 control
  - 2. Provide Middle Atlantic RSH-series custom rack shelf for each unit.

#### **2.17 LAPTOP PC(S) AND/OR TOWER PC(S)**

- A. Owner furnished, owner installed.
- B. Contractor to provide mounting hardware and interconnect cabling as required.

#### **2.18 ETHERNET SWITCH(ES)**

- A. Provide number of ports as required for AV system routing
- B. Provide separate power injectors as required for PoE function of AV touch panel and other equipment as required.
- C. Provide all patch cords as required to AV equipment and to OFOI structured cabling system ports.
- D. 5-port network switch Araknis AN-110-SW-C-5
  - 1. (5) 1000BaseT ports.
  - 2. Auto sensing
  - 3. Auto MDI/MDI-X
  - 4. 2K MAC table
  - 5. 128KB packet buffer.
  - 6. 10Gbps switching capacity

7. 7.44Mpps forwarding rate
8. 9k jumbo frame support
9. Store-and-forward mode
- E. 48-port PoE video network switch Cisco WS-C2960X-48FPD-L
  1. (48) 10/100/1000 Ethernet ports
  2. 740W available PoE power
  3. 2 SFP+ uplink interfaces
  4. 16K MAC addresses
  5. 128MB flash memory
  6. 512MB DRAM
  7. 600MHz dual core CPU
  8. 50Gbps forwarding bandwidth
  9. 100 Gbps switching bandwidth – full duplex
  10. 9198 byte maximum packet size
  11. 9216 byte maximum frame size

## **2.19 FLOOR BOXES**

- A. Provision of core drilling, conduit and floor boxes by EC
- B. Provision of individual device plates and adaptors by this contractor. Refer to project documents for adaptor plates required. Confirm all adaptor plates with require patch cords.
  1. Wiremold/Legrand 6” 6ATC
  2. Wiremold/Legrand 8” 8AT
- C. Refer to project documents for required device plates and adaptors. Project documents provide design intent and indication of requirements. Contractor is responsible to provide precise products as required for all cable types.

## **2.20 PATCH CORDS**

- A. Contractor to provide all patch cords required for complete function of all systems. This includes all patch cords indicated on project documents as well as others that may not be shown, but are required for system function. These could include, but not limited to: HDMI, RJ45, VGA, 3.5mm program audio, USB.
- B. Provide patch cords for all equipment within instructor station (lectern) in all labs, auditorium and classroom to connect to floor or wall box. This includes patch cords from transmitters and receivers up to top of lectern, all equipment, floor box connections, conference room connections from floor to transmitters and from transmitters to table top.
- C. Labs do not require patch cords from front of wall plate to top of lectern – these will be OFOI. They do require patch cords from back of wall plate down to floor box.
- D. Where shielded Cat 6 is required use Extron XTP DTP 24 or equivalent

## **2.21 EQUIPMENT RACKS**

- A. Manufacturer
  1. Middle Atlantic, Rittal, Damac
- B. Requirements
  1. Conference Room 106 Equipment Rack
    - a. Middle Atlantic Products 21RU, 28” Deep Equipment Rack – Part Number ERK-2128
    - b. Provide Middle Atlantic 21RU Large Perf Front Door – Part Number LVFD-21
    - c. Provide Middle Atlantic Rear Door.
    - d. Provide 9-Outlet Rack-Mounted Power Distribution Unit on Single Circuit
    - e. Provide Middle Atlantic Fan Kit with Fans and Vent Blockers
      - 1) Provide Fan Cord(s) as Required
    - f. Provide Middle Atlantic FC Series Thermostatic Fan Control – Part Number FC-4-1CA
    - g. Provide Middle Atlantic Blank Panels for All Unused Spaces – Part Number EB1, EB2, EB3, etc. As Required.
    - h. Provide Light-Blocking Vented Blank Panels as Indicated / Required – Part Number VTB1, VTB2, VTB3, etc.

- i. Provide Vented, Clamping Rack Shelves as Indicated / Required – Part Number RC-2, RC-3, RC-4, CAP5, CAP6, CAP7, CAP8, etc.
- j. Provide Flanged Blank Panels for All Unused Spaces – Part Number EB1, EB2, EB3, etc. As Required.
- k. Provide Middle Atlantic Vertical and Horizontal Cable Lacing Bars as Required
- l. Provide additional rack rails as required.
- 2. IT Room 140 (911 Center 155 AV Equipment) Equipment Rack:
  - a. Middle Atlantic Products 40RU, 28” Deep Equipment Rack – Part Number ERK-4028
  - b. Provide Middle Atlantic 40RU Large Perf Front Door – Part Number LVFD-40
  - c. Provide Middle Atlantic Rear Door.
  - d. Provide 9-Outlet Rack-Mounted Power Distribution Unit on Single Circuit
  - e. Provide Middle Atlantic Fan Kit with Fans and Vent Blockers
    - 1) Provide Fan Cord(s) as Required
  - f. Provide Middle Atlantic FC Series Thermostatic Fan Control – Part Number FC-4-1CA
  - g. Provide Middle Atlantic Blank Panels for All Unused Spaces – Part Number EB1, EB2, EB3, etc. As Required.
  - h. Provide Light-Blocking Vented Blank Panels as Indicated / Required – Part Number VTB1, VTB2, VTB3, etc.
  - i. Provide Vented, Clamping Rack Shelves as Indicated / Required – Part Number RC-2, RC-3, RC-4, CAP5, CAP6, CAP7, CAP8, etc.
  - j. Provide Flanged Blank Panels for All Unused Spaces – Part Number EB1, EB2, EB3, etc. As Required.
  - k. Provide Middle Atlantic Vertical and Horizontal Cable Lacing Bars as Required
  - l. Provide additional rack rails as required.

## **2.22 FLAT SCREEN COMMERCIAL TV MONITORS**

- A. Manufacturer: Sony, Panasonic, NEC, Samsung, equivalents as approved
- B. Type: Commercial use, not residential
- C. Conference Room 106 / Break Out 156:
  - 1. Size: 65” diagonal flat panel display – Samsung DM65E or equal.
    - a. Resolution/Aspect Ratio: 1920x1080p, 16:9
    - b. Wall mountable, provide heavy-duty, adjustable wall mount device Chief LTTU – Verify display / mount compatibility prior to ordering.
    - c. 2 x HDMI inputs
    - d. RS-232 port
    - e. Audio line output compatible with sound bar or speakers
- D. Mobile Collaboration Display:
  - 1. InFocus Mondopad 57-inch – INF5720-KIT with INF-MOBCARTPRO-B
    - a. Size: 57” diagonal minimum.
      - 1) Multi-touch interactive
      - 2) Sound bar(s)
      - 3) Camera / Microphone array
      - 4) Mobile stand
      - 5) Patch cables as required.
      - 6) Configuration and coordination with Owner’s IT representation for outside connectivity.
- E. 911 Center 155:
  - 1. Size: 82” diagonal flat panel display – Samsung DM82E or equal.
    - a. Resolution/Aspect Ratio: 1920x1080p, 16:9
    - b. Wall mountable, provide heavy-duty, adjustable wall mount device Chief LTM1U – Verify display / mount compatibility prior to ordering.
    - c. HDMI inputs
    - d. RS-232 port
    - e. Audio line output compatible with sound bar or speakers

## **2.23 CABLING**

- A. All applicable provisions of the NEC and local codes shall apply. All cabling and wiring shall be in metallic conduit or raceway, or supported securely with approved j-hook devices. All AV systems conduit, raceway and standard enclosures are to be provided by the electrical contractor according to drawings provided and in accordance with applicable provisions of Division 26. Specialized enclosures are to be provided by the AV systems contractor.
- B. All BNC type connections shall employ true 75 ohm connectors for video applications and true 50 ohm connectors for antennas.
- C. All cabling shall be in accordance with manufacturer's recommendations. If the manufacturers recommended cabling for equipment proposed as equivalent in quality and performance cannot be accommodated in the conduit indicated in the contract documents, without exceeding normal fill or code requirements, the contractor shall furnish and install the additional required conduit without cost to the Owner.
- D. In the case of Extron DTP and XTP products, use Extron's XTP DTP 24 shielded Category 6 cable for video, audio and control transport to and from RX and TX devices.
- E. All cabling shall be either enclosed within conduit or supported by cable tray. J-hooks are not to be used, or only in pre-approved locations.
- F. All systems wiring shall be color coded with labeling and coding as submitted and approved by shop drawing.
- G. Cabling shall be continuous and shall not be spliced between equipment. Color coding and tagging shall be maintained throughout the system at all accessible locations to the cabling.
- H. This Contractor to provide Cat 6 cabling as required for point-to-point equipment operation (as well as all other cabling required for equipment operation). In the case of Extron DTP and XTP products, use Extron's XTP DTP 24 shielded Category 6 cable for video, audio and control transport to and from RX and TX devices.
- I. Cables in poke-through floor device are indicated on project documents.
- J. Poke Through provided by Electrical Contractor (EC). Device plates provided by AV Contractor. AV Contractor to coordinate with EC and review Division 26 specifications for poke through device type. Device plates are indicated on project documents.
- K. AV system cabling is divided into classes that may not be intermixed within a conduit or raceway. Conduits for different AV cabling classifications must maintain minimum separations from each other and from other services. In certain cases, AV system cabling of different classes may pass through or terminate in a common enclosure provided that proper separation is maintained within the enclosure. AV system cabling may not be intermixed with AC wiring within a conduit, raceway or enclosure. AV system cabling may not be intermixed with wiring related to any other trades or discipline including but not limited to; fire protection, HVAC, CATV, alarm, intercom, master clock, access control or other similar systems within a conduit, raceway or enclosure.
- L. Wiring classifications, type and minimum separations are as follows. Not all cabling will apply to all projects. They are noted here as a reference.
- M. All voice/data/audio/visual cabling run free air (not in conduits) must meet or exceed NEC requirements and be suitable for the environment for which it is installed (plenum rated).
- N. Microphone Level:
  - 1. 22 Ga. Stranded copper (7x30), insulated conductors, shielded twisted pair, bonded foil shield 100% coverage and 22 A WG stranded tinned copper drain wire. ASTM tinned copper conductor 22 A WG. Polypropylene insulation thickness: .008 (.20mm) Overall bonded @ shielded with aluminum foil. Overall 75° C PVC jacket Nom. jacket thickness .020" (.51 mm) Nominal O.D. 135" (3.43 nun) Electrical Characteristics: Nominal capacitance: 34 pf/ft.> 67 pf/m. Nom. D.C.R. @ 20°C: 17 Ohm 1000 ft. Nom. Velocity of Prop. : 66%
  - 2. Maintain minimum 6" separation from conduits containing other low voltage services. Maintain minimum 12" separation from long parallel conduit runs containing AC voltages below 250 volts. Maintain minimum 24" separation from long parallel conduit runs containing AC voltages greater than 250 volts.
  - 3. Acceptable: West Penn 454 or approved equal by Canare
- O. Line Level Audio:
  - 1. 22 AWG Stranded copper (7x30), insulated conductors, shielded twisted pair, bonded foil shield 100% coverage and 22 AWG stranded tinned copper drain wire, ASTM tinned copper conductor 22 AWG, Polypropylene insulation thickness: .008 (.20mm) Overall bonded @ shielded with



- aluminum foil. Overall 75-C PVC jacket Nom, jacket thickness, .020" (.5 I nun) Nominal OD, 135" (3.43 mm).
- 2. Electrical Characteristics: Nominal capacitance: 34 pf/ft.\* 67 pf/m. Nom. D.C.R. @ 20-C: 17 n/1000 ft. Nom. Velocity of Prop. 66%
- 3. Maintain minimum 6" separation from conduits containing other low voltage services. Maintain minimum 12" separation from conduits containing AC voltages below 250 volts. Maintain minimum 24" separation from conduits containing AC voltages greater than 250 volts.
- 4. Acceptable: West Penn 454 or approved equal by Canare
- P. Speaker Level Audio:
  - 1. Insulated copper, twisted pair or THHN sized per drawings. # t0 THHN or twisted pair for subwoofers, #12 twisted pair equal to West Penn 227 for all direct coupled loudspeakers, # 16 twisted pair equal to West Penn 225 for 70 volt circuits.
  - 2. Maintain minimum 6" separation from conduits containing other low voltage services, Maintain minimum 6" separation from conduits containing AC voltages below 250 volts. Maintain minimum 12" separation from conduits containing AC voltages greater than 250 volts.
  - 3. Acceptable manufactures: Belden, Covid, Extron, West Penn, Whirlwind, Canare
- Q. AV Control System:
  - 1. 18 Ga. Stranded copper minimum, or greater as required for distance and current draw, Insulated conductors, quantity and shielding as required per equipment manufacturer. Maintain minimum 6" separation from conduits containing other low voltage services, Maintain minimum 12" separation from conduits containing AC voltages below 250 volts. Maintain minimum 24" separation from conduits containing AC voltages greater than 250 volts.
  - 2. Acceptable manufactures: Liberty AMX AX Link or equal
- R. Composite Video:
  - 1. Nominal 75 ohm characteristic impedance. RG6 type, 18 Ga, Solid copper center conductor. Gas injected foamed polyethylene, or fluorinated ethylene propylene dielectric. Bonded foil 100% shield and tinned copper braid. Nominal velocity of propagation not less than 85%. Attenuation shall not exceed 3db @ 200MHz at 100'. Capacitance shall not exceed 17pF/foot. Maintain minimum 6" separation from conduits containing other low voltage services.
  - 2. Maintain minimum 12" separation from conduits containing AC voltages below 250 volts. Maintain minimum 24" separation from conduits containing AC voltages greater than 250 volts.
  - 3. Acceptable: Belden I 694A or approved equal by Canare.
- S. Coaxial Video Connectors:
  - 1. Use only true 75 ohm crimp type connectors. Twist on type connectors are not acceptable. Acceptable: AMP 221185-1 Dual Crimp Gold Pin BNC (75 Ohms); Amphenol31-70000 Dual Crimp Gold Pin BNC (75 Ohms); Kings 2065-10-9 Dual Crimp Gold Pin (75 Ohms); Trompeter UPL220-20 Dual Crimp Gold Pin BNC (75 Ohm); ADC BNC1694D; Dual Crimp Gold Pin BNC (75 Ohm)
- T. RGBHV (RGB 5) Cable. Cable is constructed of individual coaxial cables for red, green, blue, horizontal and vertical sync. Each sub cable is RG6 15 gauge copper center conductor. Nominal impedance is 75 ohms. Nominal DC resistance less than 6.4 ohm/1000'. Each sub cable is color coded and individually shielded with bonded foil shield and tinned copper braid. Nominal velocity of propagation not less than 85%. Attenuation shall not exceed 3db @ 270M Hz at 100'. Capacitance shall not exceed 17pF/foot.
  - 1. Use preformed VGA connector heads
  - 2. Maintain minimum 6" separation from conduits containing other low voltage services. Maintain minimum 12" separation from conduits containing AC voltages below 250 volts. Maintain minimum 24" separation from conduits containing AC voltages greater than 250 volts.
  - 3. Acceptable: Extron RG6ISHR-5 or approved equal.
- U. Cat 6 (or better) Cable
  - 1. Shall meet ANSI/TIA/EIA-568-A Category 6 standards
  - 2. Where multiple services are included in transport, including video, use shielded cable with shielded jacks.
- V. HDBaseT Cable
  - 1. Utilize manufacturer recommended cable as required.
  - 2. AMX Systems:

- a. Belden enhanced category 6A F/UTP bonded-pair cable – part number 10GX63F
      - 1) Provide connectors, patch panels, patch cables, interconnects, etc. as required.
  - 3. Crestron Systems:
    - a. Crestron DigitalMedia Ultra shielded twisted-pair cable – part number CM-CBL-ULTRA-P
      - 1) Provide connectors, patch panels, patch cables, interconnects, etc. as required.
  - 4. Extron Systems:
    - a. Extron XTP systems shielded twisted-pair cable – part number 22-235-03
      - 1) Provide connectors, patch panels, patch cables, interconnects, etc. as required.
- W. HDMI Cable
- 1. HDMI, 2.0b:
    - a. Supports data rates up to 18. Gbps,
    - b. 4K (2160p) @ 60hz
    - c. 32 audio channels
    - d. 1536kHz audio sample rate
    - e. 21:9 video aspect ratio support
    - f. Bidirectional CEC support
  - 2. Non-Plenum or Plenum as required by installation location
  - 3. Manufacturer: Extron, Liberty, C2G, FSR Inc.
  - 4. Or pre-approved equal.
  - 5. Maintain minimum 6" separation from conduits containing other low voltage services. Maintain minimum 12" separation from conduits containing AC voltages below 250 volts. Maintain minimum 24" separation from conduits containing AC voltages greater than 250 volts.

## 2.24 CONDUIT REQUIREMENTS

- A. Conduit requirements for AV systems cabling may differ from those of Project's other trades. It is important that the electrical contractor become familiar with these specialized requirements.
- B. AV systems cabling must be enclosed within metallic conduit or raceway as shown in bid documents, or supported by approved j-hook devices. Conduit, raceway and floor boxes shall be furnished and installed by electrical contractor. Conduits containing different wiring classes must maintain minimum separations. Conduits sizes and quantities shown on bid documents are minimums.
- C. Separate conduit runs specified in bid documents may not be combined for any purpose.
- D. Conduit runs entering or exiting equipment racks must be electrically isolated from the equipment rack by use of non-metallic bushings, a short run of non-metallic raceway, or other suitable means.
- E. Conduits shall run uninterrupted from the end device to the nearest accessible cable tray or to the nearest AV cabinet within casework.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. Verify dimensions and conditions at the project site. Submit any conflicts in a timely manner for resolution. AV contractor shall coordinate their efforts with other trades to ensure timely completion of their work and to avoid conflicts over scheduling, access and locations of their work.
- B. Materials to be furnished shall include all back boxes and all wire and cable.
- C. Furnish all mounting brackets, raceways, sleeves, rack rails, termination plugs, jacks, faceplate mounting hardware, and other unique components as necessary to securely mount equipment and panels.
- D. Furnish all required equipment whether or not specifically mentioned in these specifications or all the drawings. Such devices shall include but not be limited to hardware, fasteners, rack screws, rack brackets, power supplies, fan guards, impedance matching devices, transformers, line pads, line amplifiers, relay and LED power supplies, and other devices as necessary to interface, control, or balance the AV systems. Facilitate the integration of other room systems including lighting control systems and existing overhead page system.
- E. Furnish painting and finishing as required to match components, cabinetry, and room decor.
- F. Contractor shall determine the "installed" price for the AV system in each sub system. The costs are to include material, labor, installation, testing, documentation, commissioning, manuals, training,

- warranty; and the AV proportion of the Schedule of Values consisting of general conditions, bond, mobilization, record drawings, punch list, cleanup, and demobilization.
- G. Install projector mount to building structure according to manufacturer's recommendations. Contractor must verify that projector mount location complies strictly to the throw distance from the screen as recommended by the projector manufacturer for the specific projector to be installed. Make every attempt to install projector mount at the center point of the throw range.
  - H. Install projector to mount according to manufacturer's recommendations.
  - I. Verify correct projector throw to screen location prior to mounting any equipment. Every projector model has a different throw requirement. It is the responsibility of the contractor to verify the manufacturer's suggested throw distance from the screen to the projector lens prior to mounting any equipment. The contractor shall rely only on the manufacturer's throw specifications, not on any drawing dimension or directions from any other party.
  - J. Refer to Architectural sheets for approximate projector and screen placement. Coordinate actual field placement with other utilities. Notify AE team of any conflicts.
  - K. Adjust speaker placement as required to suit field conditions.
  - L. Provide additional cable to connect existing paging system to page override port on Control Module in each room. Provide necessary cable, connectors, transformers or baluns to integrate the existing overhead page system with the new audio system in each classroom.
  - M. Provide projection screens as indicated on project documents. Consult with Architect as required if questions arise concerning screen placement or mounting.
  - N. Install projection screens in accordance with manufacturer's instructions using manufacturer's recommended hardware. Install plumb and level. Do not field cut screens.
  - O. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
  - P. Coordinate projector placement with screen size and height for proper projector throw and tilt.
  - Q. Protect all installed products until completion of project. Touch up, repair or replace damaged products before substantial completion.
  - R. Avoid conflicts with light fixtures, switch locations, sprinkler heads, architectural features, casework and other items. Contractor shall visit site prior to ordering high value equipment that could be impacted by sight conditions.
  - S. No screen or projector shall be installed that has known, observable obstructions between screen and projector that will prevent a full, complete image from being displayed or from being visible by all audience members. Contractor shall relocate or replace screens or projectors that do not permit full function and viewability.

### **3.02 CONTROL**

- A. AV System Control:
  - 1. Provide system programming to permit user control of all input and output routing on graphical user interface touch panel at lectern.
  - 2. Control to include all audio and video source inputs being routed to all audio and video device outputs.
  - 3. Graphic user interface (GUI) layout shall comply with InfoComm standards as well as Owner preferences.
  - 4. Contractor shall provide screen shots of proposed GUI layouts for owner approval once basic programming or layouts have been accomplished but before final programming. Owner requires time to review proposed layouts and routing in order to provide comments to the contractor.
  - 5. Provide submittal indicating button-by-button and page-by-page programming and GUI layouts for owner and engineer approval.
  - 6. The contractor shall provide programming in accordance with owner comments and shall provide allowance in bid to accommodate this coordination with owner. Contractor shall seek out owner prior to final programming and provide personnel to coordinate with owner for programming and GUI layout. No change order will be accepted to comply with Owner requests for programming changes to meet their needs unless such changes are requested after final acceptance and project completion.
  - 7. Refer to project documents for inputs and outputs. Programming and GUI shall account for and accommodate all inputs and outputs.

8. Programming and GUI shall propose certain short cuts or standard configurations that will make instructor use easy and streamlined.
9. The top of the GUI should have a menu of options for easy selection of pages or functions
10. GUI pages or functions may be organized according to function or equipment, for example:
  - a. Video or content inputs
    - 1) Laptop
    - 2) Blu-Ray
    - 3) Document camera
    - 4) Tower PC
  - b. Projection screen outputs
    - 1) Screen 1
    - 2) Screen 2
    - 3) Screen 3
    - 4) Confidence monitor
    - 5) Annotation function
  - c. Audio inputs
    - 1) Audio shall follow video
    - 2) Instructor mics (voice lift)
  - d. Audio outputs
    - 1) Overhead speaker control for voice lift
    - 2) Stereo speaker control for program audio
    - 3) ALS system
  - e. Utilities
    - 1) Screen 1, 2, and 3, up and down
    - 2) Projector 1, 2 and 3 on and off
    - 3) Window shades up and down or partial
    - 4) Lighting controls, dimming, on and off, zone control for presentation modes
11. The GUI touch panel should present the instructor with certain simple choices, defaults, standard configurations or pre-sets such as Presentation Mode 1, Presentation Mode 2, etc. or as directed by owner.
  - a. For instance, Presentation Mode 1 or Pre-Set 1 might cause primary laptop content to be displayed on center screen 2, while secondary tower PC content to be displayed on two outer screens 1 and 3.
  - b. Presentation Mode 2 might be primary laptop content to be displayed on center screen 2 while screens 1 and 3 are retracted for viewing of the wall-mount periodic table.
  - c. Presentation Mode 3 might be document camera input to be displayed on all three screens, etc.
  - d. The simple modes may also contain (hidden) commands regarding dimming of lights, function of screens and movement of window shades.
  - e. For instance, Presentation Mode 1, 2 or 3 may also automatically direct certain projectors to turn on or off, certain screens to be up or down (coordinated with projectors), certain lights to dim or be turned off and certain window shades to be lowered.
  - f. Contractor shall consult with owner regarding preferences for such functionality.
  - g. During building renovation, but before AV installation, owner and engineer reserves the right to provide more detailed direction for system programming and GUI layouts. But in the absence of further direction, contractor remains responsible to provide screen shots, submittals and owner coordination.
  - h. In addition the simple or pre-set modes, utilities shall have a page to permit individual, minute functions of each item. For instance, a lighting page shall permit control of all zones, dimming, on/off that do not affect presets of other utilities. Screens shall have a page permitting individual control of each screen. Window shades shall have a page permitting individual control of shades, to the extent possible as permitted by the system.
12. The instructor should also have the option to individually select which inputs are routed to which outputs.
  - a. For instance, instructor may wish to cause laptop image to be displayed on center screen 2, tower PC content to be displayed on outer screen 1 and screen 3 be retracted.

- b. This mode should allow instructor complete control of all inputs and outputs.
- c. Contractor shall consult with owner regarding preferences for such functionality.

### **3.03 PREPARATION**

- A. Before starting installation, verify proper installation of the following work by others
  - 1. Inspect site.
  - 2. Document and submit a single report for each space with AV to the Owner before any work is started on-site.
  - 3. Carry out this requirement for each phase of work on-site (field wiring, and system/equipment installation) for each space with AV
  - 4. Frequency Coordination - Prior to ordering equipment, the Installing Contractor shall coordinate the frequencies of all wireless devices to prevent unwanted interaction between devices and rooms.
  - 5. This includes, but is not limited to, wireless microphones, assisted listening system devices, wireless control panels, etc.
  - 6. Frequency coordination shall take place with the use of a spectrum analyzer and frequency allocation/analysis software.
  - 7. Documentation of this frequency coordination shall be provided to the Owner for review.

### **3.04 STAGING CHECKOUT (PROTOTYPE SHOP CHECKOUT)**

- A. Staging of systems and equipment at the Installing Contractors shop will be done to expedite the on-site installation by allowing the assembly and checkout where the resources are, and prior to the project site being ready.
  - 1. This applies to “one-off” AV system projects
  - 2. Prototypical system testing for proof of concept in projects with multiple like systems. This will allow the identification and prevention of making the same mistake multiple times.
  - 3. Installing Contractor will successfully perform, document, and then submit all the test results to the Owner
  - 4. Installing Contractor’s test submittal will serve to allow 7-days for the Owner to make arrangements to do Staging Checkout verification
  - 5. All verification testing is the responsibility of the Installing Contractor. This includes qualified personnel and proper test equipment.
  - 6. See related paragraphs entitled Performance Standards and Test Procedures for more details on testing and testing procedures
  - 7. In the event there is required rework, large scale readjustments, or defective equipment that must be repaired or replaced, tests may be suspended or continued at the option of the Owner.
  - 8. In the event there is required rework, large scale readjustments, or defective equipment that must be repaired or replaced, tests may be suspended or continued at the option of the Owner. Any charge for additional time incurred by the Consultant, or Owner, required to over-see the system tests, due to improper system installation or previous failed systems, shall be the responsibility of, and charged directly to the Installing Contractor.
  - 9. Checkout will include:
  - 10. Appropriate Testing with as many of the various inputs and outputs that can be used to emulate the full system operation
    - a. Insure there are no equipment problems
    - b. Test as much of the control system operation as possible and to make sure the user interface is intuitive
  - 11. Inspection
    - a. Workmanship
    - b. Safety related issues
    - c. Serviceability of the system
  - 12. Once successful completion of the Staging Checkout has been acknowledged the Installing Contractor can:
  - 13. for “One-Off” Type of System – Prepare or proceed to the next phase of the installation
  - 14. for Prototypical – continue the assembly of the other like rooms while testing, documenting and submitting results for each system.

### **3.05 ON-SITE PROTOTYPE CHECKOUT**

- A. Prototypical system testing for proof of concept in projects with multiple like systems. This will allow the identification and prevention of making the same mistake multiple times.
  - 1. Installing Contractor will successfully perform, document, and then submit all the test results to the Owner. Installing Contractor's test submittal will serve to allow 7-days for the Owner to make arrangements to do On-Site Prototype Checkout verification
  - 2. All verification testing is the responsibility of the Installing Contractor. This includes qualified personnel and proper test equipment.
  - 3. See Section 3.4 Testing and 3.5 Testing Procedures for more details on testing and testing procedures
  - 4. AV Consultant will be responsible to note any minor infractions on a "punch list" and Installing Contractor will be responsible for fixing these items before next checkout phase.
  - 5. In the event there is required rework, large scale readjustments, or defective equipment that must be repaired or replaced, tests may be suspended or continued at the option of the Owner. Any charge for additional time incurred by the Consultant required to over-see the system tests, due to improper system installation or previous failed systems, shall be the responsibility of, and charged directly to the Installing Contractor
  - 6. Checkout will include:
  - 7. Appropriate Testing with all field cables and connections made, and all equipment operational.
    - a. Insure there are no equipment and field wire problems
    - b. Test the complete control system operation and to make sure the user interface is intuitive
  - 8. Inspection
    - a. Workmanship
    - b. Safety related issues
    - c. Serviceability of the system
  - 9. Once successful completion of the On-Site Prototype Checkout has been acknowledged the Installing Contractor can continue the build-out of the other like rooms.

### **3.06 QUALITY CONTROL/COMMISSIONING**

- A. Required testing and testing procedures are included in the Contract Documents
  - 1. See related Performance Standards and Testing Procedures paragraphs in Part 3 of this technical section.
  - 2. The main AV milestones that testing will be required:
  - 3. Prototype verifications (off-site and on-site)
  - 4. Final System Checkout
    - a. Provide programming checklist (button by button) for system check out and verification.
  - 5. Final Checkout

### **3.07 WIRING**

- A. All cables and wiring are to be logically, legibly and permanently labeled for easy identification. Each wire shall be permanently marked with a number at each end. This applies to wire within a rack assembly as well as wire running in conduit. Labels on cables to be adhesive strip type covered with clear heat-shrink tubing. Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style label. Hand-written or self-laminating type labels are not acceptable.
- B. Wiring designations shall be an alpha-numeric code that is unique for each cable. Locate the cable designation at the start and end of each cable run and within 2 inches of the point of termination or connection. Label must be printed in three lines so that the designator is visible from all angles. For cable runs that have intermediate splice points, the cable shall have the same designation throughout with an additional suffix to indicate each segment of the run. Actual cable designation assignments shall be determined by the installing contractor. The overall system of wire designators shall be uniform throughout the entire project from sub-system to sub-system.
- C. Provide adhesive labels on the rear of equipment where cables attach to indicate the designation of the cable connected at that point.
- D. Exposed cables shall be enclosed with surface raceway.
- E. All screw on terminals shall have crimp-on terminal lugs.
- F. Wire ends and shield drain wires shall be covered with shrink tubing.

- G. All cables in racks and custom panels shall be harnessed with suitable nylon tie wraps in a vertical and horizontal configuration. Cables that break out from harnesses for connection shall be provided with an adequate amount of slack cable for a service loop to provide access to equipment for servicing and adjustment.
- H. All voice/data/audio/visual cabling run free air (not in conduits) shall be rated for the environment in which the cables are installed.
- I. Provide speaker wire from Smart Room Module to speakers as indicated on project documents.
- J. All runs over 8 ft. to provide 2 ft. of slack cable coiled at each end of cable run.

### **3.08 EQUIPMENT GROUNDING**

- A. Bond all metallic parts to approved equipment ground.

### **3.09 WORK IN OTHER SECTIONS**

- A. The division of responsibility regarding work to be done by the Electrical Contractor and work to be done by the AV contractor shall be in accordance with the following:
- B. The following work shall be the sole responsibility of the AV contractor:
- C. Furnish and install all equipment, panels, and devices associated with the AV systems as indicated on project documents
- D. Termination of all AV systems wiring: Coordination of AC 120 volt power and wiring within AV systems cabinet and/or Instructor's Station
- E. Preparation of AV shop drawings, maintenance manuals, wiring diagrams and other submittals required by the individual AV system specification sections
- F. Tests, balancing, trouble shooting, adjustments and other similar work as may be required to insure complete operating AV systems
- G. All AV training sessions required by these specifications
- H. Any and all warranty work associated with the building audio visual systems
- I. Any other work associated with the AV systems that due to its technical nature should logically be performed by the AV contractor.
- J. For all video lines confirm and document the following relevant test data:
  - 1. Sweep all video signal paths using a broadband noise source.
  - 2. Measure and record signal loss using an RF spectrum analyzer at 100, 200 and 400 MHz.
  - 3. Verify that signal loss at 270 MHz does not exceed 3 db.
  - 4. Correct and faulty connections and retest as necessary.
- K. Test all video lines using a TDR to verify:
  - 1. Absence of impedance anomalies due to improper connector use or installation or cable damage or shorts
  - 2. Proper circuit appearing at each termination location
  - 3. Continuity of all conductors
  - 4. Absence of shorts between conductors
  - 5. Absence of shorts between conductors and conduit
  - 6. Specified bandwidth is maintained
  - 7. Impedance is maintained
- L. Documentation shall include a chart listing applicable data.
- M. Provide Impedance measurements: For all permanently mounted speaker terminations, provide impedance measurement of each pair of speaker lines with all speakers connected and all amplifiers disconnected. These measurements shall be documented in a table listing impedance for each 1/3 octave band from 20Hz to 20 KHz and shall be accurate to the nearest tenth of an Ohm.
- N. Create, then provide Verification Checklist for each space or system. Checklist should include all equipment indicated on project documents and may also include important items from this execution specification. Where no coax is utilized, some sweep tests may not be required.
- O. Verify that all loudspeakers and mountings are free of buzzes and rattles when swept with sign wave tones throughout its rated bandwidth at normal levels.
- P. Verify that correct polarity is maintained throughout the entire signal path.
- Q. Verify that all equipment and systems are operating to manufactures specifications.
- R. Verify that audio systems are free of humming, buzzing, feedback, interference, spurious oscillations, digital artifacts or extraneous noises of any kind.

- S. Verify uniformity of sound coverage throughout intended coverage area. Contractor shall invite owner to attend testing sessions. Contractor to adjust sound levels in every room to meet owner's expectations.
- T. Verify with consultant measurement locations, conditions and measurement criteria.
- U. Verify that all equipment is operating correctly and is operating to manufacturers specifications.
- V. Perform sound system rough equalization, cross over and delay settings and final sound system settings.
- W. Perform all video system set up and calibration.
  - 1. Verify proper aiming, focus and image size for projectors.
  - 2. Verify proper operation of all controls.
  - 3. Verify brightness and correct color balance of each projected image using SENCORE CP5000 display analyzer system or equivalent.
- X. Verify each installed data network cable or fiber optic cable conforms to TIA/EIA performance standards.
- Y. Submit three (3) copies of a Systems Checklist or written report detailing the results of Initial Adjustments and Verification tests including all relevant drawings, charts, test instrument data and photographs. This report shall be complete and submitted to the engineer for review a maximum of five (5) days after substantial completion. With this report, submit written certification that the installation conforms to the requirements stated herein, is complete in all respects, and is ready for owner engineer final inspection and/or owner move-in.
  - 1. Project is not complete until a Systems Checklist has been submitted. The Checklist shall identify all systems and major components required for system function. The Systems Checklist shall be filled out by contractor during systems operational testing prior to informing AE or Owner that system is complete.
  - 2. Systems Checklist shall be presented to the Engineer prior to final punch list.
  - 3. Provide Systems Checklist per section 27 05 00. Example of possible Systems Checklist. Contractor shall augment or add columns and rows to this list according to what makes sense for each major system component.

Item Description	Observed Operation	Throw	Adjustments Needed	Limitations	Date Item Verified/Initials
Projector 1	Yes	Centered	Focus, tilt	None	9/10/15 R.K.
Projector 2	Yes	Max range	Bad bulb, replaced	None	9/10/15 R.K.
Speaker 1	Yes	NA	Change tap to 1W	No local volume control	9/10/15 R.K.
Speaker 2	Yes	NA	None	No local volume control	9/10/15 R.K.

- Z. At Engineer request, Contractor shall be present during punch list to demonstrate function of all systems to Engineer and/or Owner.
  - 1. Termination of all AV systems wiring: Coordination of AC 120 volt power and wiring within AV systems cabinet and/or Instructor's Station
  - 2. Preparation of AV shop drawings, maintenance manuals, wiring diagrams and other submittals required by the individual AV system specification sections
  - 3. Tests, balancing, trouble shooting, adjustments and other similar work as may be required to insure complete operating AV systems
  - 4. All AV training sessions required by these specifications
  - 5. Any and all warranty work associated with the building audio visual systems
  - 6. Any other work associated with the AV systems that due to its technical nature should logically be performed by the AV contractor.
  - 7. For all video lines confirm and document the following relevant test data:
    - a. Sweep all video signal paths using a broadband noise source.
    - b. Measure and record signal loss using an RF spectrum analyzer at 100, 200 and 400 MHz.
    - c. Verify that signal loss at 270 MHz does not exceed 3 db.
    - d. Correct and faulty connections and retest as necessary.
  - 8. Test all video lines using a TDR to verify:



- a. Absence of impedance anomalies due to improper connector use or installation or cable damage or shorts
- b. Proper circuit appearing at each termination location
- c. Continuity of all conductors
- d. Absence of shorts between conductors
- e. Absence of shorts between conductors and conduit
- f. Specified bandwidth is maintained
- g. Impedance is maintained
9. Documentation shall include a chart listing applicable data.
10. Provide Impedance measurements: For all permanently mounted speaker terminations, provide impedance measurement of each pair of speaker lines with all speakers connected and all amplifiers disconnected. These measurements shall be documented in a table listing impedance for each 1/3 octave band from 20Hz to 20 KHz and shall be accurate to the nearest tenth of an Ohm.
11. Create, then provide Verification Checklist for each space or system. Checklist should include all equipment indicated on project documents and may also include important items from this execution specification. Where no coax is utilized, some sweep tests may not be required.
12. Verify that all loudspeakers and mountings are free of buzzes and rattles when swept with sign wave tones throughout its rated bandwidth at normal levels.
13. Verify that correct polarity is maintained throughout the entire signal path.
14. Verify that all equipment and systems are operating to manufactures specifications.
15. Verify that audio systems are free of humming, buzzing, feedback, interference, spurious oscillations, digital artifacts or extraneous noises of any kind.
16. Verify uniformity of sound coverage throughout intended coverage area. Contractor shall invite owner to attend testing sessions. Contractor to adjust sound levels in every room to meet owner's expectations.
17. Verify with consultant measurement locations, conditions and measurement criteria.

### **3.10 FULL SYSTEM CHECKOUT**

- A. Installing Contractor's Full System Checkout
  1. Installing Contractor will accomplish a complete system(s) inventory of all equipment, and inspection of all workmanship quality relating to installation details. See section 27 40 10.
  2. Installing Contractor will complete all testing for system operational compliance, and test to ensure all equipment is working fully to published specifications
  3. Results will be recorded and submitted to the Owner. Installing Contractor's test submittal will serve to allow 7-days for the Owner to make arrangements to do Final System Checkout.
  4. A physical inventory will be taken of all equipment on site and will be compared to equipment lists in the contract documents and subsequent Installing Contractor submittals.
  5. The operation of all system equipment shall be demonstrated by the Installing Contractor.
  6. Both subjective and objective tests will be required to determine compliance with the specifications.
    - a. The Installing Contractor shall be responsible for providing test equipment for these tests.
    - b. The Installing Contractor shall be responsible for providing qualified personnel to run the tests, make adjustments, and answer system questions for as long as required to accomplish the tests and setup satisfactorily.
  7. The Installing Contractor shall be responsible for providing the personnel that accomplished all programming for the system; this includes the control system, AV touch panel and any DSP software. This person will be available to run requested demonstration, make adjustments, and answer system programming questions for as long as required to accomplish the demonstration satisfactorily.
  8. The Contractor shall provide initial set up and testing of Crestron AirMedia devices in all locations. This may require coordination with owner for access to Owner network. Contractor shall prove system works and provide training to owner on permissions, passcodes, access to content and configurations required to permit access by Apple, Android and PC devices.
  9. In the event there is required rework, large scale readjustments, or defective equipment that must be repaired or replaced, tests may be suspended or continued at the option of the Owner. Owner

will advise if training can commence while any further clean-up is being done before Final System Checkout

### **3.11 TRAINING**

- A. Demonstrate to Engineer and/or owner that all individual components and all integrated systems function according to the design intent of the project documents and according to manufacturer's recommendations. Contractor shall dedicate a minimum of two (2) hours to demonstrating to Engineer/Owner the operation of each component. This is in addition (prior) to actual training sessions. This is simply to demonstrate project completion and allow Engineer to perform punch list.
  - 1. Before scheduling such a demonstration it is the responsibility of the contractor to assure that all components and systems are functioning properly.
  - 2. The AV contractor shall conduct group and/or individual training sessions, as requested by the Owner, for the proper operation and maintenance of the complete system.
  - 3. Training shall provide a total of at least four hours of instruction at the site encompassing each system installed and shall orient responsible personnel to a level satisfactory to the Owner and Consultant. Training times shall be arranged with the Owner. The training shall include the facilities electrician or other designated personnel. Training shall not take place until all systems are 100% operational and Systems Checklist has been completed.
  - 4. The Installing Contractor shall provide on-the-job training by a qualified instructor, to personnel designated by the Owner, to instruct them in the operation and routine maintenance of the systems.
  - 5. All training shall take place after the systems are operational, but before the acceptance tests.
  - 6. Operational Training:
    - a. There shall be a minimum of four (4) hours of end-user training included in this specification for this activity.
    - b. In the event the Installing Contractor does not have qualified instructors on staff for certain sophisticated equipment, the Installing Contractor, at no additional cost to Owner, will provide a manufacturer's representative for such instruction to the Owner.
  - 7. Training Materials Supplied:
    - a. System operational manual (not equipment operation manuals) that explains how to fully operate the system; from start-up to shut-down, and all operational steps in-between, in a step by step description, with pictures and other visuals to help convey information.
    - b. The Installing Contractor shall video record training session(s) for Owners reference (to help limit minor follow up phone calls in the future).
  - 8. Maintenance Training:
    - a. A session with Owner's designated technical personnel for routine and preventive maintenance will be given.
      - 1) This training is for scheduled preventative maintenance for such items as filter and lens cleaning, minor equipment checks and "user" adjustments.
        - a) This training is not meant to teach Owner's representatives how to use commercial test equipment and/or do sophisticated equipment/system alignment.
    - b. There shall be a minimum of two (2) hours of end-user training included in this specification for this activity.
  - 9. Training Materials Supplied:
    - a. Utilizing the equipment manuals and flow diagrams of the required in contract closeout submittals supply a listing with suggested preventative maintenance schedule of the system equipment.
    - b. Follow-up training within sixty (60) days shall also be provided.
    - c. There shall be a minimum of two (2) hours of end-user training included in this specification for this activity.

### **3.12 FINAL CHECKOUT**

- A. Final Checkout will not be performed until the Installing Contractor's Full System Checkout has been successfully completed (including all "punch-list" items) and the test results have been reviewed by the Owner.
  - 1. Installing Contractor's test submittal will serve to allow 7-days for the Owner to make arrangements to do Final Checkout

2. The Final Checkout with the Owner will consist of the following:
3. A physical inventory will be taken of all equipment on site and will be compared to equipment lists in the contract documents and subsequent Installing Contractor submittals.
4. The operation of all system equipment shall be demonstrated by the Installing Contractor.
5. Both subjective and objective tests will be required to determine compliance with the specifications. The Installing Contractor shall be responsible for providing test equipment and qualified personnel for these tests.
6. All final, "as-built" drawings, run sheets, manuals, and other required documents shall be on hand.
  - a. Two complete sets of these documents shall be delivered to the Owner at this time..

### **3.13 WARRANTY**


- A. See General Conditions.
- B. Warranty period shall be a minimum of one year. Warranty period shall commence at substantial completion or first beneficial use of system by owner, whichever comes first. During the warranty period, AV contractor shall furnish on site diagnostic and repair service to installed AV systems free of charge to owner. Contractor shall respond to service requests within 24 hours. Contractor shall provide on-site diagnostic and repair service within two business days of trouble report. Contractor shall make available after hours or weekend service at a premium rate not to exceed 1.5 times normal hourly rates minus normal hourly rates.
- C. During the warranty period, the AV contractor shall provide for three service and maintenance calls by technically qualified personnel without additional charge. Calls shall be at least two hours at the site and shall be pre-arranged at least two weeks prior with the Owner
- D. All tests, adjustments, or replacements shall be made in the presence of Owner's technician, or other person designated by the Owner's superintendent. Upon completion of each call a report will be provided to clearly indicate any replacements or adjustments and any evidence of tampering.
  1. To maintain certain manufacturer's warranties, equipment must be installed, aligned and serviced by those installers authorized by that manufacturer to perform those duties. If the Installing Contractor is not authorized, by the manufacturer, it is the Installing Contractor's sole responsibility to make the appropriate arrangements and bear all cost and consequences
  2. In cases where the manufacturer's warranty period is greater than specified in the Contract Documents, the Installing Contractor shall provide that warranty for the full extent of the manufacturer's warranty period.
  3. The Installing Contractor shall exclude any labor costs incurred by removing and re-installing the defective items after the system's one-year warranty.
  4. In cases where the manufacturer's warranty period is less than 12 months, the Installing Contractor shall warrant the system(s) in accordance with the Contract Documents (See below).
  5. \* Optional\* The system warranty shall include a minimum of four (4) preventive maintenance visits, to perform operation checks of the equipment, screens, projector lenses and other critical surfaces, to lubricate moving parts as recommended by the respective manufacturers and to adjust and align projector to maintain optimum registration and focus.
  6. All manufacturers' equipment warranties shall be activated in the Owner's name and shall commence on the date of Substantial Completion.
  7. In the case of Installing Contractor-modified equipment, the manufacturer's warranty is normally voided. In such cases, the Installing Contractor shall provide the Owner with a warranty equivalent to that of the original manufacturer.
  8. In the event of malfunction or failure of any audiovisual equipment provided by the Installing Contractor, the Installing Contractor shall be responsible for replacement of faulty equipment, or providing "loaner" equipment at no cost to the Owner for the duration of the repairs. In the event that "loaner" equipment is provided, said equipment shall meet or exceed the original equipment's specifications until the original equipment is replaced.
  9. In cases where the Installing Contractor is providing and installing audiovisual equipment and/or hardware to be integrated with equipment furnished by others, it shall be the responsibility of the Installing Contractor to warrant their equipment as described in the Contract Documents unless said equipment shows misuse and or abuse by others during re-installation or connection of equipment by others.
  10. Telephone Support

11. The Installing Contractor shall respond via telephone within two (2) hours to any request for service.
12. This first contact should outline the nature of the problem or functional anomaly.
13. The Installing Contractor shall make available personnel knowledgeable with the installed system who can address specific system issues described by the system operators.
14. Telephone support shall be available between normal business hours, Monday through Friday.
15. On-Site Support
16. The warranty shall be an "on-site" warranty, with a twenty-four (24) hour response time.
17. Warranty period shall be a minimum of one year. Warranty period shall commence at substantial completion or first beneficial use of system by owner, whichever comes first. During the warranty period, AV contractor shall furnish on site diagnostic and repair service to installed AV systems free of charge to owner. Contractor shall respond to service requests within 24 hours. Contractor shall provide on-site diagnostic and repair service within two business days of trouble report. Contractor shall make available after hours or weekend service at a premium rate not to exceed 1.5 times normal hourly rates minus normal hourly rates.
18. During the warranty period, the AV contractor shall provide for three service and maintenance calls by technically qualified personnel without additional charge. Calls shall be at least two hours at the site and shall be pre-arranged at least two weeks prior with the Owner
19. These service and maintenance calls shall be in addition to any warranty required service calls and shall commence every 4 months after the date of final acceptance by the Owner.
20. All tests, adjustments, or replacements shall be made in the presence of Owner's technician, or other person designated by the Owner's superintendent. Upon completion of each call a report will be provided to clearly indicate any replacements or adjustments and any evidence of tampering

END OF SECTION

## GENERAL NOTES:

1. THE A CONTRACTOR SHALL REVIEW THE DRAWINGS, SPECIFICATIONS, AND CONTRACT DOCUMENTS AND SHALL COMPLETE ALL OF THE DESCRIBED WORK.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL CABLE LENGTHS, PATHWAYS, DIMENSIONS, ETC.
3. THE DRAWINGS AND SPECIFICATIONS TOGETHER DESCRIBE THE REQUIRED WORK. ANY DISCREPANCY OR CONFLICT WITHIN THE DOCUMENTS SHALL BE SUBMITTED IN WRITING TO THE DESIGN TEAM.
4. ANY ITEM NOT BROUGHT TO THE ATTENTION OF THE DESIGN TEAM SHALL BE DEEMED TO HAVE BEEN PROPOSED IN THE HIGHER QUANTITY, HIGHER QUALITY, AND/OR MORE COSTLY INSTALLATION METHOD.
5. THE EXACT LOCATION OF THE MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
6. FIELD-VERIFY PROJECTION SYSTEMS DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT.
  - a. FIELD-VERIFY PROJECTION LENS CALCULATIONS.
  - b. FIELD-VERIFY PROJECTOR MOUNTING REQUIREMENTS.
  - c. FIELD-VERIFY PROJECTION SCREEN MOUNTING REQUIREMENTS.
7. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
7. CONTRACTOR SHALL RESTORE ALL PENETRATIONS BACK TO THEIR ORIGINAL RATINGS.
8. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.



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3562 COUNTY HIGHWAY AB  
MCFARLAND, WI 53568**

DRAWN BY	JWL
APPROVED BY	TBC
CHECKED BY	DPR
ISSUE DATE	OCTOBER 10, 2016

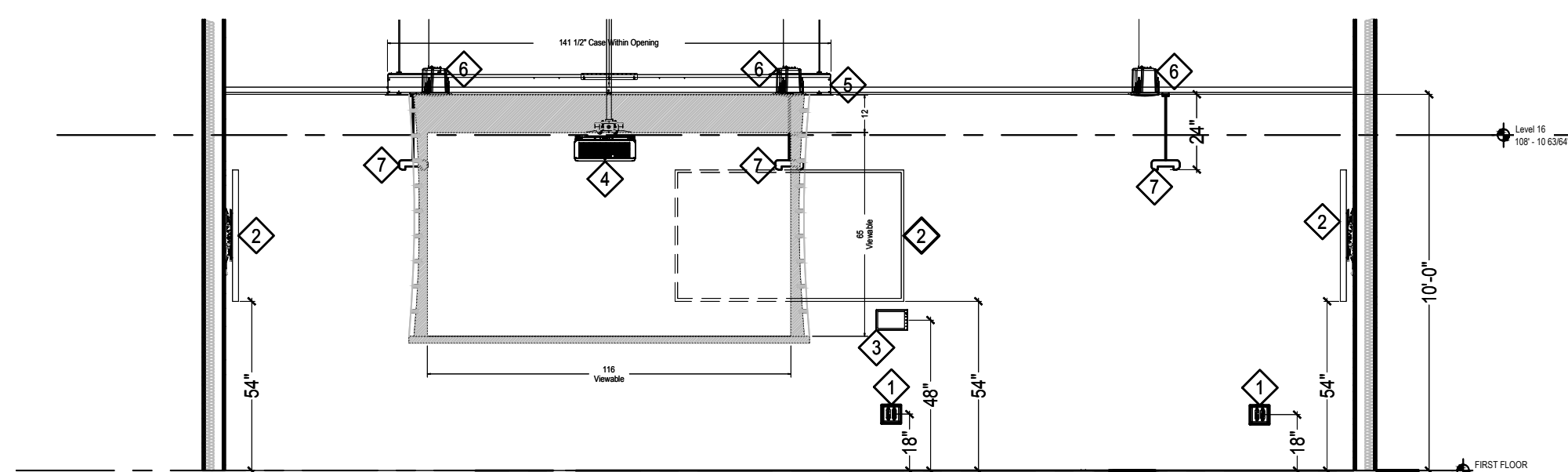
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# T200

SHEET NO.







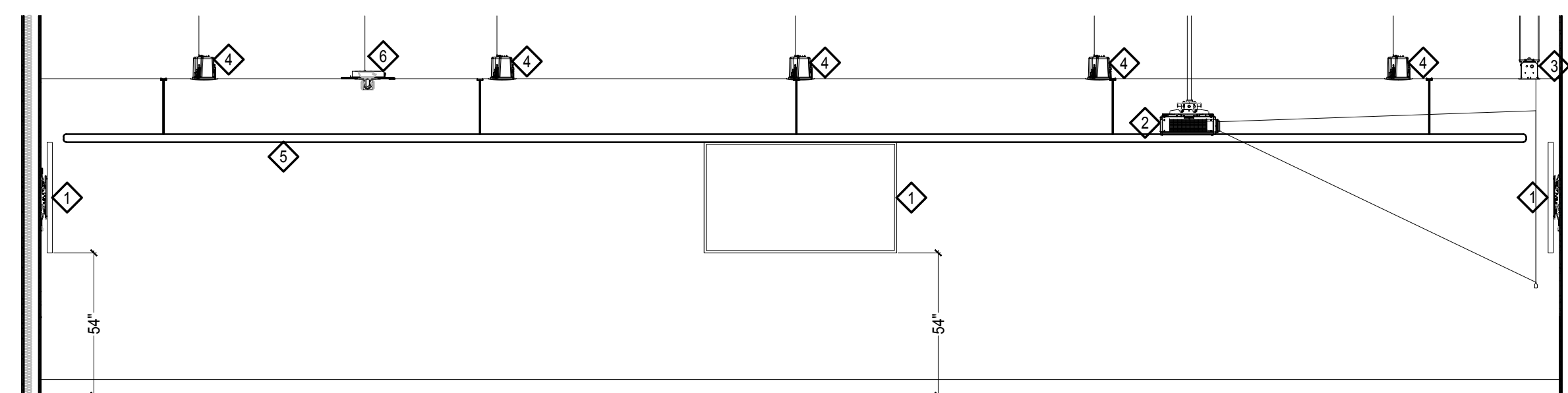
7 911 CENTER 155 PROJECTOR WALL ELEVATION  
NO SCALE

GENERAL NOTES:

1. FIELD-VERIFY THE EXACT MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
2. FIELD-VERIFY EQUIPMENT DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
3. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

KEYED NOTES:

- ◆ WALL-MOUNTED AV OVER IP ENCODER.
- ◆ WALL-MOUNTED FLAT PANEL DISPLAY - 82" DIAGONAL.
- ◆ WALL-MOUNTED CONTROL PANEL - 10.1" DIAGONAL.
- ◆ CEILING-MOUNTED PROJECTOR. FIELD-VERIFY INSTALLATION LOCATION AND LENS CALCULATION. MOUNT PROJECTOR AS CLOSE AS PRACTICABLE TO SCREEN, PROVIDE LENS AS REQUIRED FOR INSTALLATION LOCATION.
- ◆ CEILING-RECESSED PROJECTOR SCREEN. FIELD-VERIFY INSTALLATION LOCATION AND MOUNTING PRIOR TO ORDERING. PROVIDE ADDITIONAL BLACK DROP AS REQUIRED; (ONLY IN DIMENSIONS) AS REQUIRED. COORDINATE MOUNTING LOCATION AND SCREEN SIZING WITH DESIGN TEAM AND SITE CONDITIONS. PROVIDE SPECIAL NOTIFICATION OF ANY OBSTRUCTIONS (LIGHTS, CEILING-MOUNTED EQUIPMENT, ETC.) TO AVOID CONFLICTS. LOCATE SCREEN TO AVOID OBSTRUCTIONS AND MINIMIZE CEILING DISRUPTION.
- ◆ CEILING-RECESSED LOUDSPEAKER. SUPPORT LOUDSPEAKER WITH DISCRETE CABLE / THREADED ROD SECURELY FASTENED TO OVERHEAD STRUCTURE.
- ◆ HANGING LIGHT. COORDINATE PROJECTION SYSTEM WITH LIGHT LOCATION(S) TO AVOID OBSTRUCTIONS.



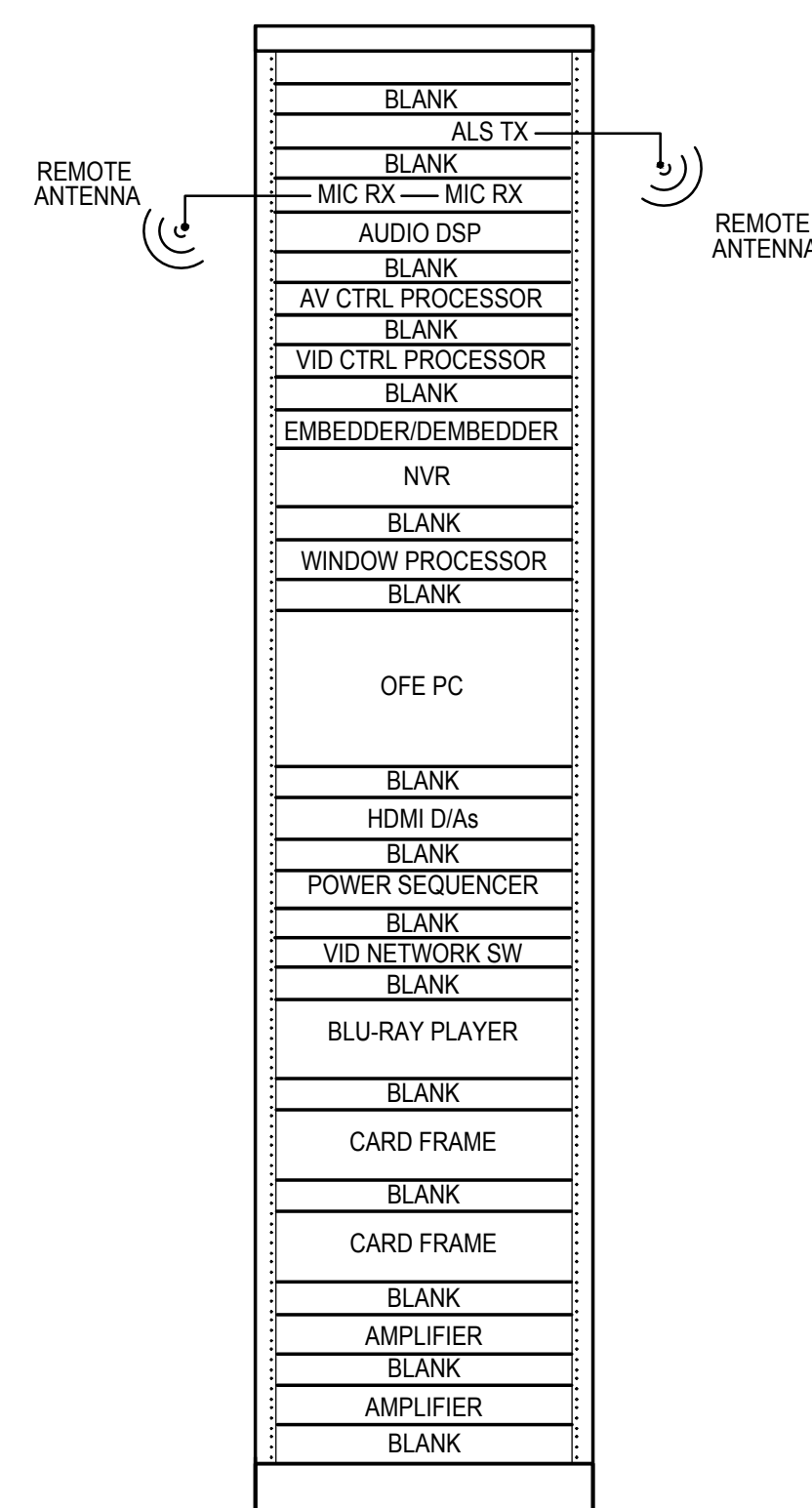
4 911 CENTER 155 SECTION VIEW  
NO SCALE

GENERAL NOTES:

1. FIELD-VERIFY THE EXACT MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
2. FIELD-VERIFY EQUIPMENT DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
3. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

KEYED NOTES:

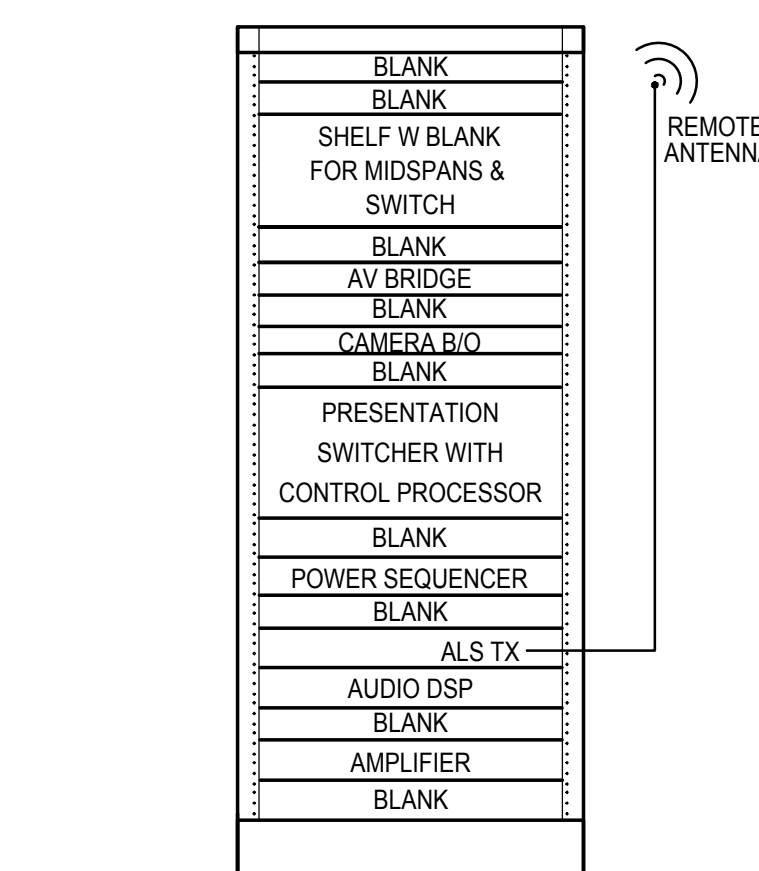
- 1 WALL-MOUNTED FLAT PANEL DISPLAY - 82" DIAGONAL.
- 2 CEILING-MOUNTED PROJECTOR. FIELD-VERIFY INSTALLATION LOCATION AND LENS CALCULATION. MOUNT PROJECTOR AS CLOSE AS PRACTICABLE TO SCREEN, PROVIDE LENS AS REQUIRED FOR INSTALLATION LOCATION.
- 3 CEILING-RECESSED PROJECTOR SCREEN. FIELD-VERIFY INSTALLATION LOCATION AND MOUNTING PRIOR TO ORDERING. PROVIDE ADDITIONAL BLACK DROP AS REQUIRED, (ONLY IN DIMENSIONS) AS REQUIRED. COORDINATE MOUNTING LOCATION AND SCREEN SIZING WITH DESIGN TEAM AND SITE CONDITIONS. TAKE SPECIAL NOTE OF ANY OBSTRUCTIONS (LIGHTS, CEILING-MOUNTED EQUIPMENT, ETC.) TO AVOID CONFLICTS. LOCATE SCREEN TO AVOID OBSTRUCTIONS AND MINIMIZE CEILING DISRUPTION.
- 4 CEILING-RECESSED LOUDSPEAKER. SUPPORT LOUDSPEAKER WITH DISCRETE CABLE / THREADED ROD SECURELY FASTENED TO OVERHEAD STRUCTURE.
- 5 HANGING LIGHT. COORDINATE PROJECTION SYSTEM WITH LIGHT LOCATION(S) TO AVOID OBSTRUCTIONS. PROJECTION SCREEN SIZE AND / OR LOCATION MAY NEED TO BE ADJUSTED DEPENDING ON SITE CONDITIONS.
- 6 CEILING-MOUNTED CAMERA IN SEMI-RECESSED HOUSING. SECURELY SUPPORT UNIT TO OVERHEAD STRUCTURE AND GRID. COORDINATE INSTALLATION LOCATION WITH SITE CONDITIONS AND SIGHT LINE REQUIREMENTS.



1 IT 140 AV EQUIPMENT RACK DIAGRAM  
NO SCALE

NOTES:

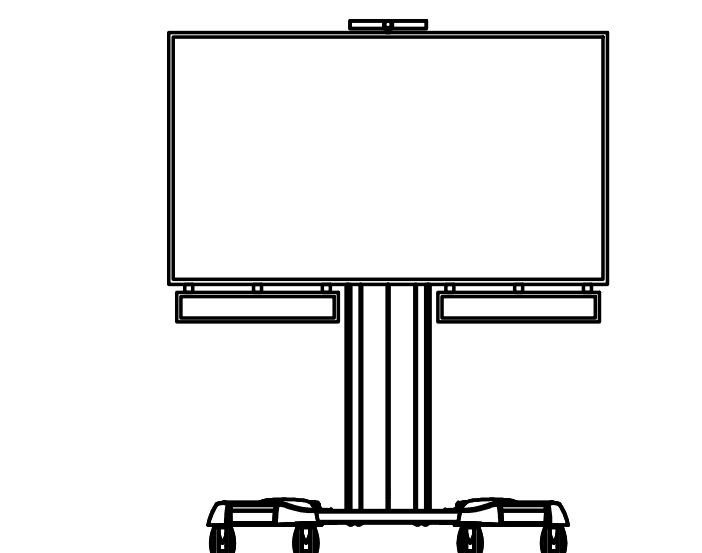
1. DIAGRAM SHOWN FOR DESIGN INTENT ONLY. CONTRACTOR SHALL PROVIDE ALL REQUIRED EQUIPMENT AND EFFICIENT ARRANGEMENT.



2 STORAGE 106A AV EQUIPMENT RACK DIAGRAM  
NO SCALE

## NOTES

1. DIAGRAM SHOWN FOR DESIGN INTENT ONLY. CONTRACTOR SHALL PROVIDE ALL REQUIRED EQUIPMENT AND EFFICIENT ARRANGEMENT.

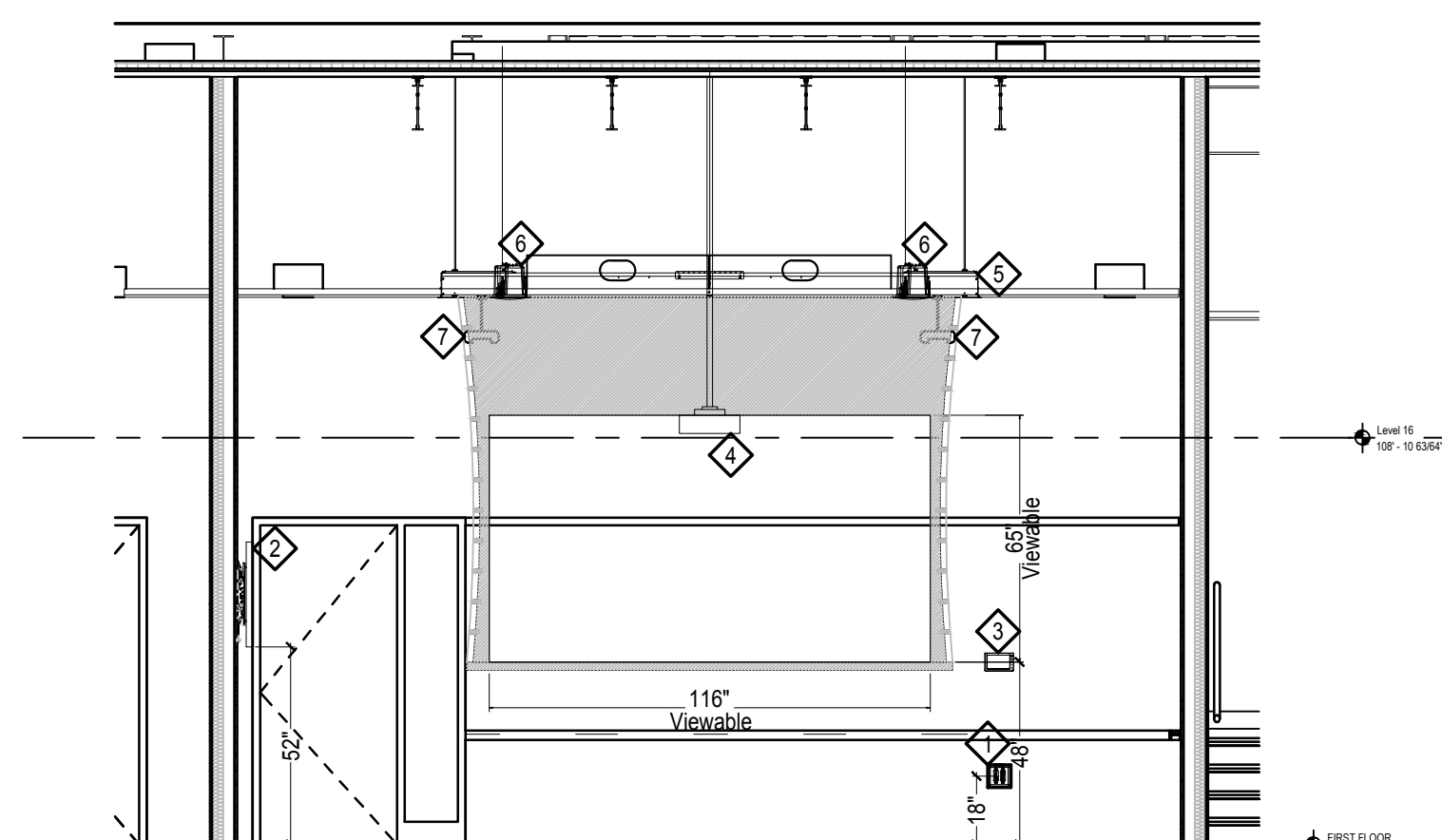


3 MOBILE COLLABORATION DISPLAY  
NO SCALE

1. FIELD-VERIFY THE EXACT MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
2. FIELD-VERIFY EQUIPMENT DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
3. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

**KEYED NOTES:**

- ◆ WALL-MOUNTED FLAT PANEL DISPLAY - 65" DIAGONAL.
- ◆ CEILING-MOUNTED PROJECTOR. FIELD-VERIFY INSTALLATION LOCATION AND LENS CALCULATION. MOUNT PROJECTOR AS CLOSE AS PRACTICABLE TO SCREEN, PROVIDE LENS AS REQUIRED FOR INSTALLATION LOCATION.
- ◆ CEILING-RECESSED PROJECTION SCREEN. FIELD-VERIFY INSTALLATION LOCATION AND MOUNTING PRIOR TO ORDERING. PROVIDE ADDITIONAL BLACK DROP AS REQUIRED, ONLY IN DIMENSION(S) AS REQUIRED. COORDINATE MOUNTING LOCATIONS AND SCREEN SIZES WITH DESIGN TEAM AND SITE CONDITIONS. TAKE SPECIAL NOTE OF ANY OBSTRUCTIONS (LIGHTS, CEILING-MOUNTED EQUIPMENT, ETC.) TO AVOID CONFLICTS. LOCATE SCREEN TO AVOID OBSTRUCTIONS AND MINIMIZE CEILING DISRUPTION.
- ◆ CEILING-RECESSED LOUPEAKER. SUPPORT LOUPEAKER WITH DISCRETE CABLE / THREADED ROD SECURELY FASTENED TO OVERHEAD STRUCTURE.
- ◆ CEILING-MOUNTED MICROPHONE. COORDINATE INSTALLATION LOCATION AND HEIGHT WITH SITE CONDITIONS AND EQUIPMENT NEEDS. SUPPORT MICROPHONE FROM OVERHEAD STRUCTURE.
- ◆ CEILING-MOUNTED CAMERA IN SEMI-RECESSED HOUSING. SECURELY SUPPORT UNIT TO OVERHEAD STRUCTURE AND GRID. COORDINATE INSTALLATION LOCATION WITH SITE CONDITIONS AND SIGHT LINE REQUIREMENTS.



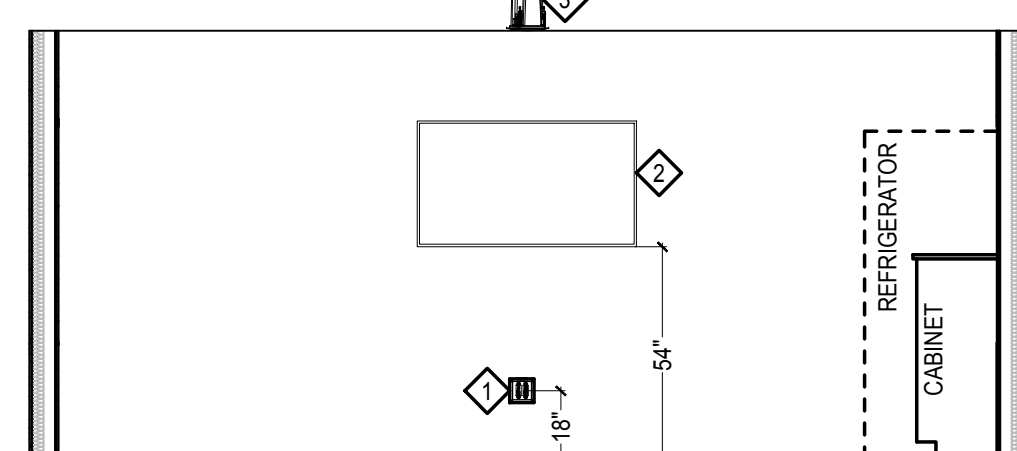
6 CONFERENCE ROOM 106 PROJECTION WALL ELEVATION  
NO SCALE

GENERAL NOTES:

1. FIELD-VERIFY THE EXACT MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
2. FIELD-VERIFY EQUIPMENT DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
3. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

KEYED NOTES:

- ◆ WALL-MOUNTED HDBaseT TRANSMITTER.
- ◆ WALL-MOUNTED FLAT PANEL DISPLAY - 65" DIAGONAL.
- ◆ WALL-MOUNTED CONTROL PANEL - 7" DIAGONAL.
- ◆ CEILING-MOUNTED PROJECTOR. FIELD-VIEW INSTALLATION LOCATION AND LENS CALCULATION. MOUNT PROJECTOR AS CLOSE AS PRACTICABLE TO SCREEN, PROVIDE LENS AS REQUIRED FOR INSTALLATION LOCATION.
- ◆ CEILING-RECESSED PROJECTION SCREEN. FIELD-VIEW INSTALLATION LOCATION AND MOUNTING PRIOR TO ORDERING. PROVIDE ADDITIONAL BLACK DAP AS REQUIRED, ONLY IN DIMENSION(S) AS REQUIRED. COORDINATE MOUNTING LOCATION AND SCREEN SIZING WITH DESIGN TEAM AND SITE CONDITIONS. TAKE SPECIAL NOTE OF ANY OBSTRUCTIONS (LIGHTS, CEILING-MOUNTED EQUIPMENT, ETC.) TO AVOID CONFLICTS. LOCATE SCREEN TO AVOID OBSTRUCTIONS AND MINIMIZE CEILING DISRUPTION.
- ◆ CEILING-RECESSED LOUDSPEAKER. SUPPORT LOUDSPEAKER WITH DISCRETE CABLE / THREADED ROD SECURELY FASTENED TO OVERHEAD STRUCTURE.
- ◆ HANGING LIGHT. COORDINATE PROJECTION SYSTEM WITH LIGHT LOCATION(S) TO AVOID OBSTRUCTIONS.



8 BREAKOUT 156 FLAT PANEL WALL ELEVATION NOTES:  
NO SCALE

GENERAL NOTES:

1. FIELD-VERIFY THE EXACT MOUNTING LOCATION OF ALL ITEMS PRIOR TO INSTALLATION. COORDINATE FINAL INSTALLATION LOCATION ON SITE TO AVOID CONFLICTS.
2. FIELD-VERIFY DIMENSIONS, SIGHT LINES, ANY OBSTRUCTIONS, ETC. PRIOR TO ORDERING EQUIPMENT. MAKE SPECIAL NOTE OF ANY POTENTIAL OBSTRUCTIONS PRIOR TO ORDERING.
3. REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

KEYED NOTES:

- 1 WALL-MOUNTED AV OVER IP ENCODER.
- 2 WALL-MOUNTED FLAT PANEL DISPLAY - 65" DIAGONAL.
- 3 CEILING-RECESSED LOUDSPEAKER. SUPPORT LOUDSPEAKER WITH DISCRETE CABLE / THREADED ROD SECURELY FASTENED TO OVERHEAD STRUCTURE.

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**Website:** <http://www.henneman.com>  
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#H4000561

SEAL

**MEDICAL EXAMINER OFFICE  
3562 COUNTY HIGHWAY AB  
MCFARLAND, WI 53568**

## KEY PLAN

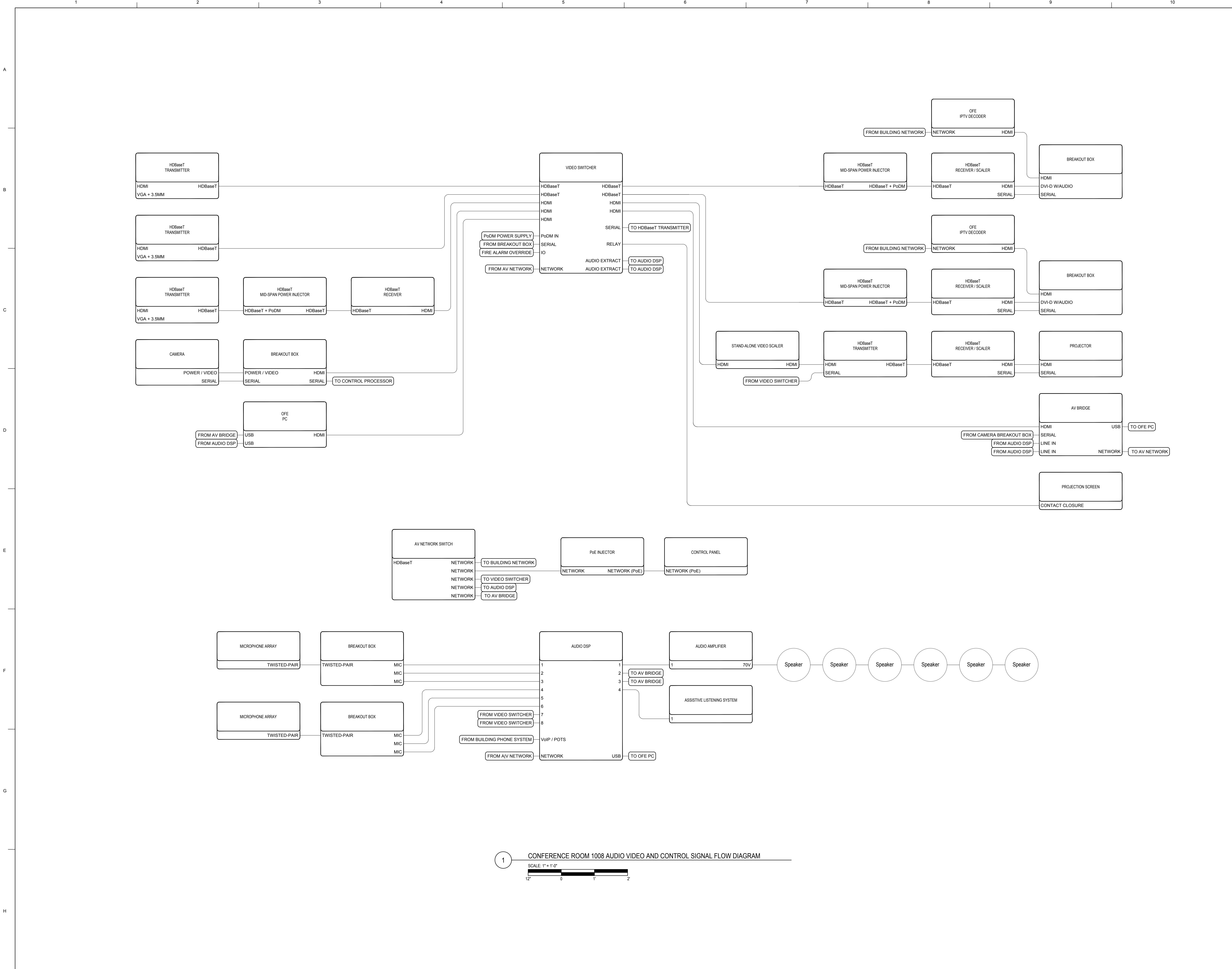
DRAWN BY	JWL
APPROVED BY	TBC
CHECKED BY	DPR
ISSUE DATE	OCTOBER 10, 2016

[illegible]

SHEET TITLE:  
AUDIO VISUAL  
CONFERENCE ROOM 229  
ENLARGED PLAN

# T400

SHEET NO.



1 CONFERENCE ROOM 1008 AUDIO VIDEO AND CONTROL SIGNAL FLOW DIAGRAM  
SCALE: 1" = 1'-0"  
12" 0 1 2

SEAL

**MEDICAL EXAMINER OFFICE  
3562 COUNTY HIGHWAY AB  
MCFARLAND, WI 53568**

KEY PLAN

DRAWN BY: JWL  
APPROVED BY: TBC  
CHECKED BY: DPR  
ISSUE DATE: OCTOBER 10, 2016

REVISIONS		
NO.	DATE	DESCRIPTION
1	10-10-2016	100% BID SET

SHEET TITLE:  
AUDIO VISUAL  
CONFERENCE ROOM 106  
SIGNAL FLOW

T500

SHEET NO.



