



REQUEST FOR BID
Date: 6/2/09
Bid 09-16DS

RETURN BY OPENING TIME TO:
Purchasing Division
RM 100 City Hall
411 West 1st Street
Duluth, MN 55802

**Audio/Video/Data Equipment
And Installation**

Buyer: Dennis Sears
Phone: 218-730-5003
Fax: 218-730-5922

BID OPENING, RM 100 AT 2:00 PM ON TUESDAY, JUNE 30, 2009

Note: All bids must be written, signed, and transmitted in a sealed envelope, plainly marked with the bid number, subject matter, and opening date. The City of Duluth reserves the right to split award where there is substantial savings to the city, waive informalities and to reject any and all bids. Bidder should state in proposal if bid is based on acceptance of total order. Sales tax is not to be included in the unit price. Bidder to state freight charges if, proposal is F.O.B. shipping point, freight not allowed. Low bid will not be the only consideration for award of bid. All pages must be signed or initialed by authorized bidder's representative as indicated at the bottom of the page(s) of the request for bid forms.

RETURN BID IN DUPLICATE WITH DUPLICATE DESCRIPTIVE LITERATURE
FOR BID RESULTS, ENCLOSE A SELF-ADDRESSED, STAMPED ENVELOPE WITH BID

City bid information on website: www.duluthmn.gov/purchasing/bid_information.cfm

Designated F.O.B. Point

Tax: Federal Excise Tax Exemption
Account No. 41-74-0056 K

Item No.	Qty	U/OM	Description	Unit Price	Total Price
1	1	Lot	Audio/Video/Data and other equipment per the attached specifications and descriptions installed in the Council Chambers.		

Vendor E-mail Address _____ Freight Charges N/A

Name _____ Total Bid Price _____
Addr _____ (To include any additional pages)

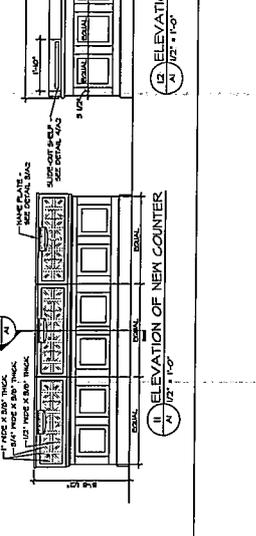
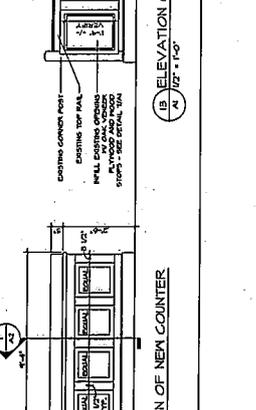
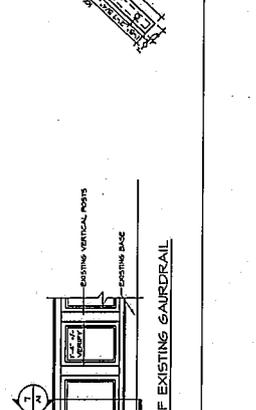
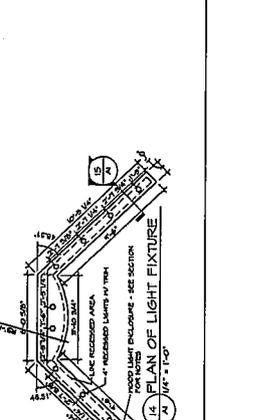
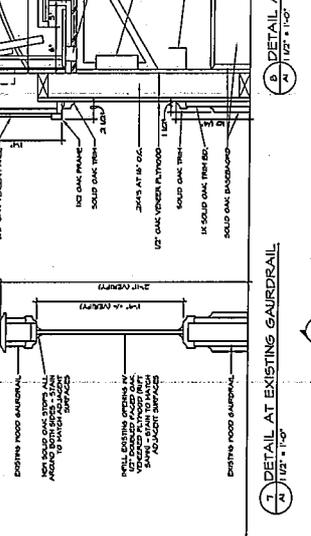
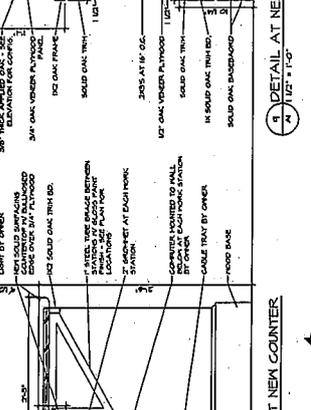
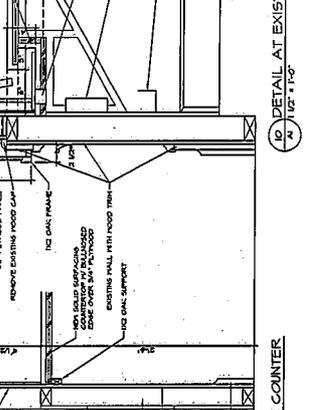
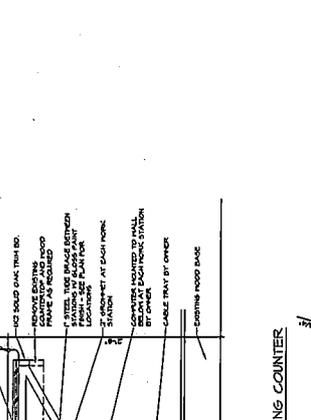
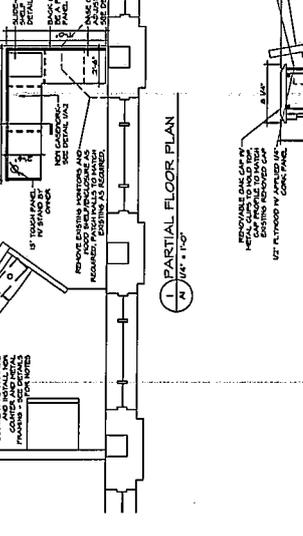
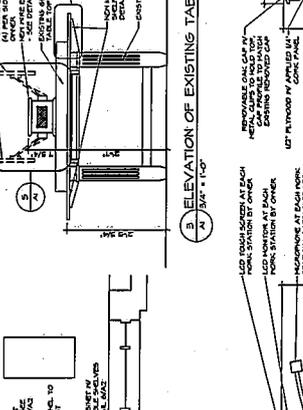
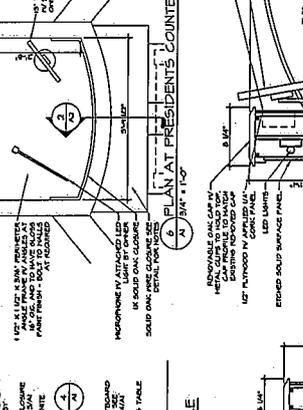
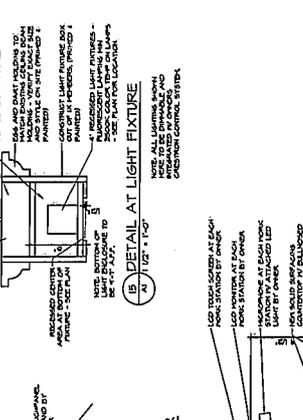
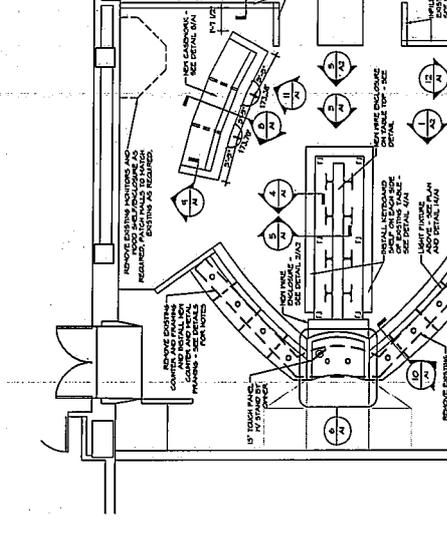
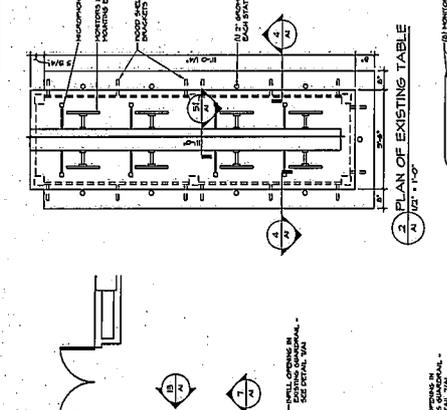
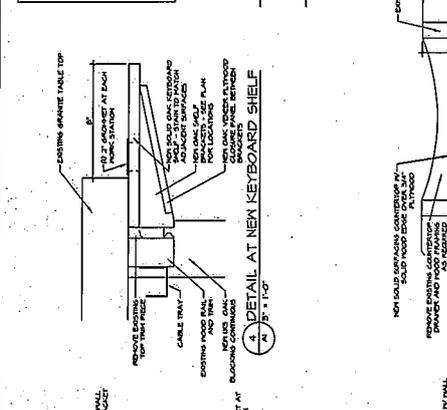
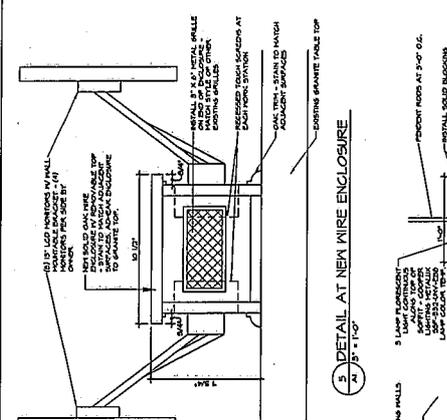
Payment Terms _____

By: _____ F.O.B. Point N/A

(print title)

Delivery Date N/A

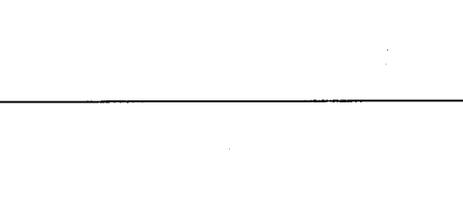
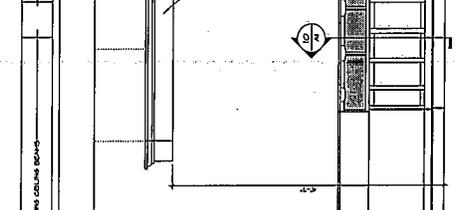
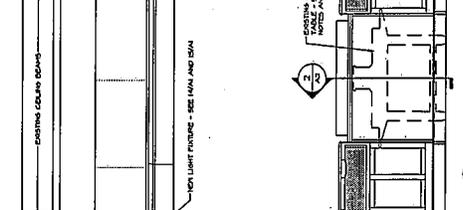
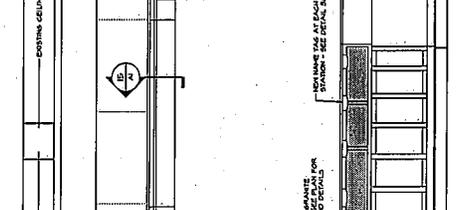
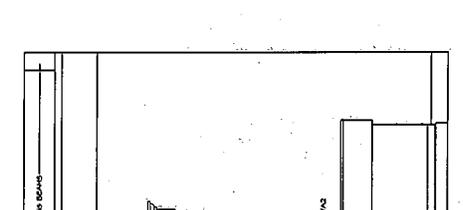
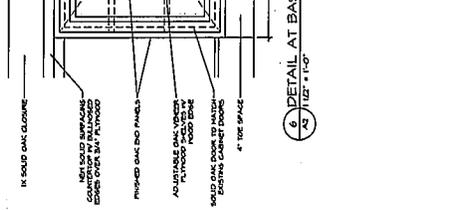
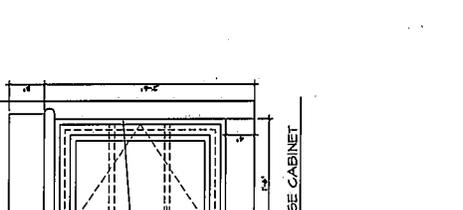
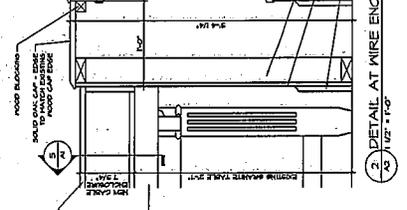
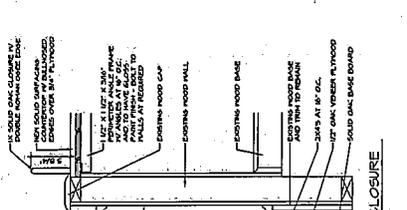
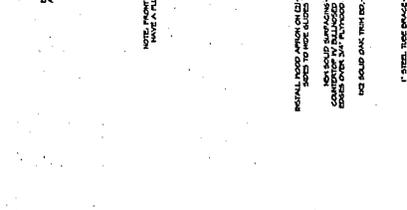
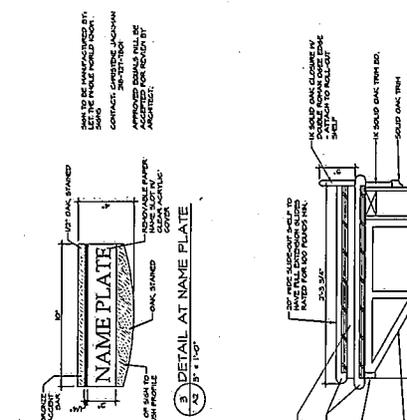
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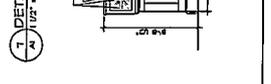
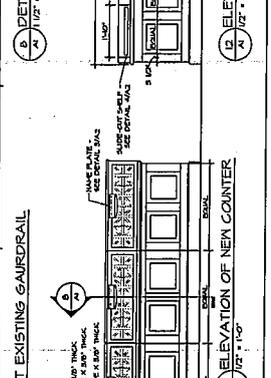
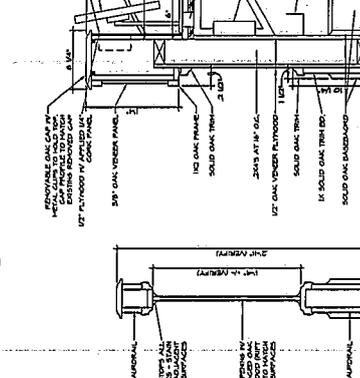
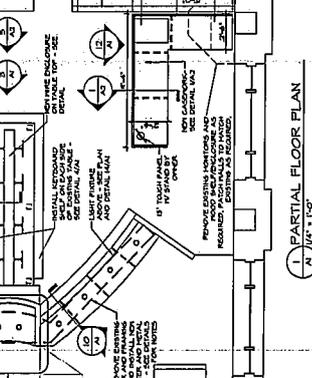
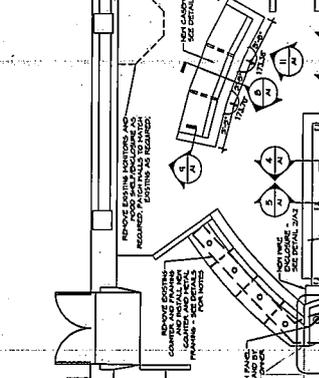
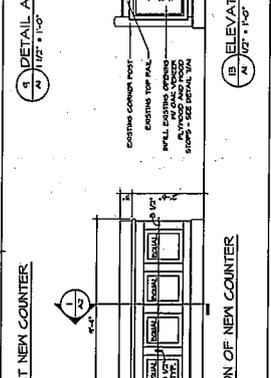
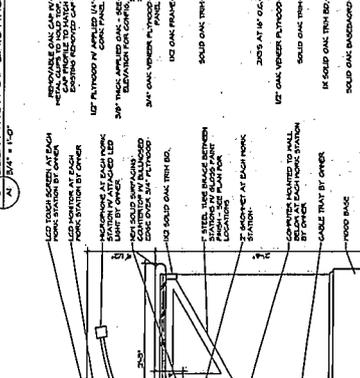
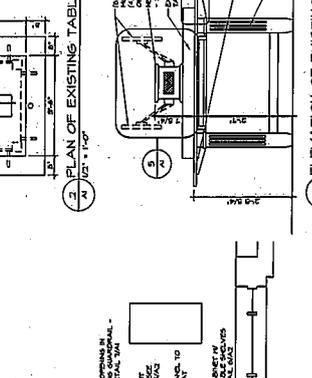
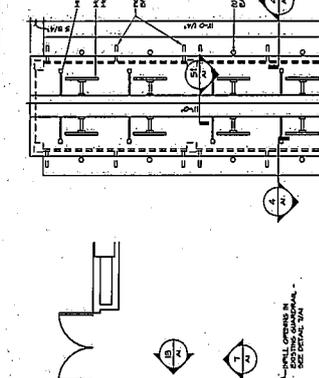
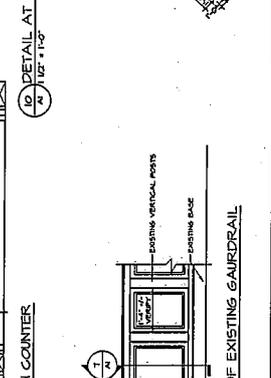
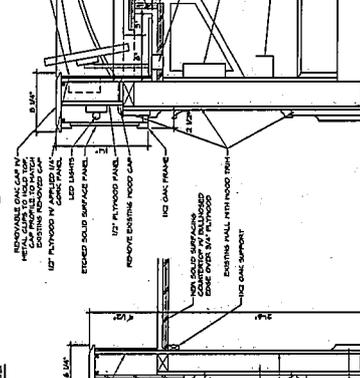
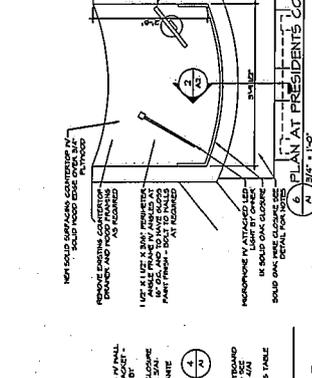
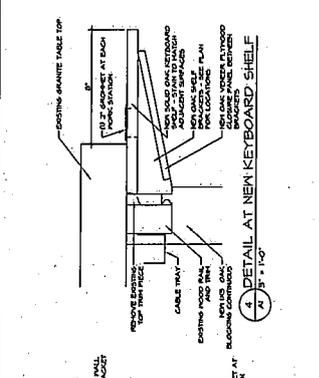
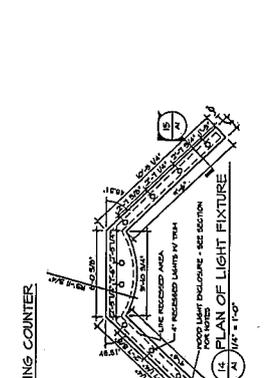
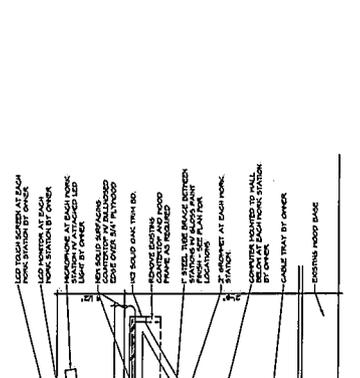
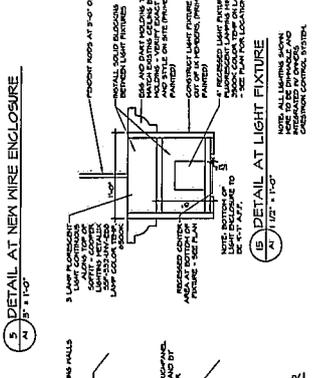
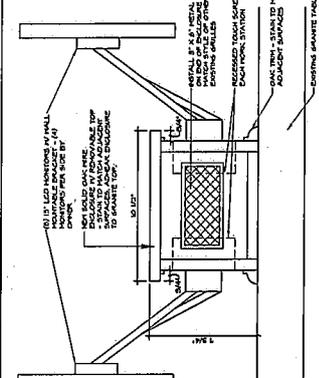
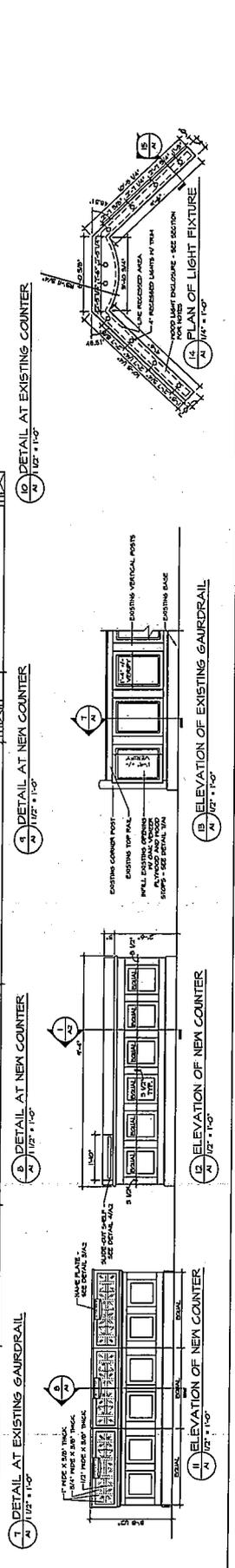
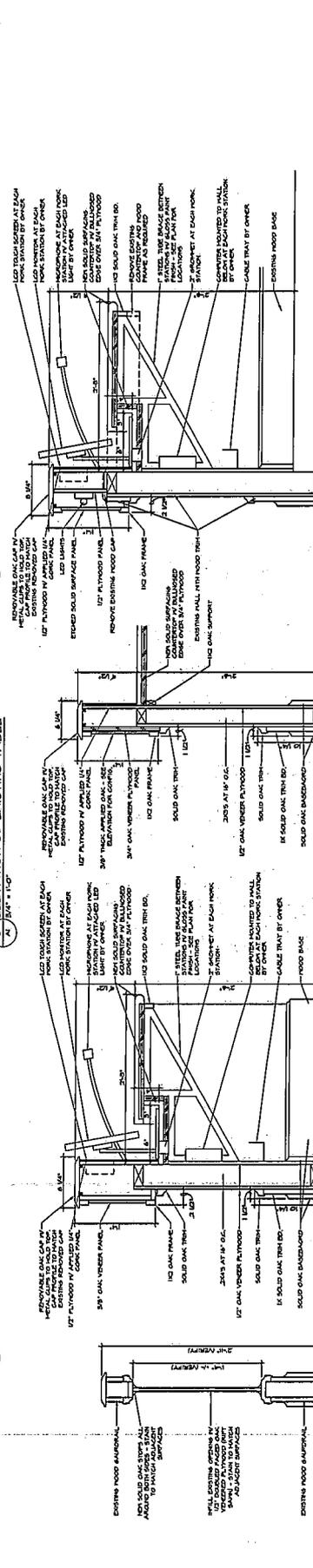
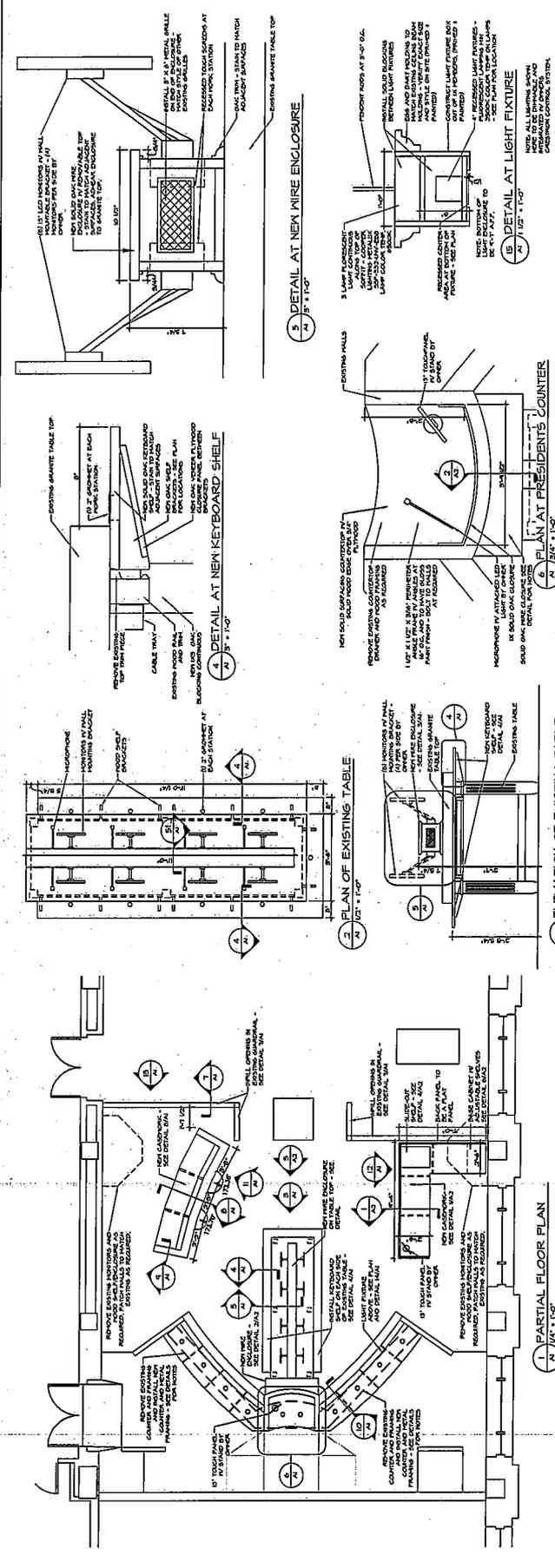


1. Heavy duty metal fasteners, stainless steel, 1/2" dia. x 3" long.
 2. 1/2" x 1/2" x 1/4" stainless steel plate.
 3. 1/2" x 1/2" x 1/4" stainless steel plate.
 4. 1/2" x 1/2" x 1/4" stainless steel plate.
 5. 1/2" x 1/2" x 1/4" stainless steel plate.
 6. 1/2" x 1/2" x 1/4" stainless steel plate.

CHECKED BY: [Signature]
 DRAWN BY: [Signature]
 411 WEST FIRST ST. DU LUTH, MN
 - COUNCIL CHAMBERS -
 DULUTH CITY HALL
 DETAILS
 SHEET TITLE:

PROJECT NO. 0413
 RELEASE DATE: 03/20/04
 REVISIONS:
 SET NO.
 SHEET NO. **A2**
 2 OF 2





PART 1 GENERAL INFORMATION

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- 1.2 BID DOCUMENTS
- 1.3 PROPOSAL CERTIFICATION
- 1.4 PRODUCT SUBSTITUTION FORM

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- 2.2 QUALIFICATION OF BIDDERS
- 2.3 SUB CONTRACTORS
- 2.4 SUBMITTALS AND AS-BUILT DRAWINGS
- 2.5 FACILITIES DURING CONSTRUCTION
- 2.6 SYSTEM WARRANTIES
- 2.7 PAYMENT SCHEDULE
- 2.8 CONTRACT CLOSURE AND TRAINING
- 2.9 COPYRIGHT NOTICES

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- 3.2 AUDIO EQUIPMENT
- 3.3 RECORDING EQUIPMENT
- 3.4 MEDIA CONTROL SYSTEM
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4.2 AUDIO EQUIPMENT

4.3 RECORDING EQUIPMENT

4.4 MEDIA CONTROL SYSTEM

4.5 EQUIPMENT RACKS

4.6 OUTLETS AND POWER

4.7 CABLE AND CONNECTORS

4.8 SYSTEM INTERCONNECTIONS AND CABLING

4.9 TESTING AND ALIGNMENT

PART 1 GENERAL INFORMATION

1.1 INSTRUCTIONS TO BIDDERS

- A. By submitting a bid, the bidder agrees they have read and understand the documents set forth.
- B. The bidder agrees to enter into contract with the owner. The bidder shall supply a turnkey system based upon the specifications, equipment and materials supplied herein.
- C. Bidders requiring interpretation of this document shall make all inquiries in writing using email three days prior to the bid opening date specified. All technical inquiries shall be emailed to PCOLLINS@duluthmn.gov and RBIBEAU@duluthmn.gov All bid related inquiries shall be emailed to DSEARS@duluthmn.gov . Interpretations obtained in any other manner shall not be valid. In terms of the audio questions, Paul and Rod can help determine if John or Jerry, or both are needed to respond accordingly.
- D. The bidder is responsible to review all documentation to put forth a comprehensive bid. Documentation includes drawings and specifications included in this portion.
- E. If changes are necessary to the bid package, an addendum shall be mailed, faxed or emailed within 72 hours of the bid due date. All bidders whom have received full bid documents shall receive the addenda. Each bidder shall ascertain, prior to bid submittal, all addenda have been received.
- F. Bids shall be submitted and signed by the owner or corporate officer with the power to legally enter into contract with another company or corporation. All bids shall be filled in with permanent ink or type written. The bid signer must initial any alterations or erasures.
- G. A list of references for similar projects shall be submitted with the bid proposal. The references shall be of projects completed within the last three years.
- H. Bids shall be valid for 90 days after the submission date. During the 90-day period the owner shall inform the bidder, if awarded the bid, to enter into contract with said bidder. Should the period expire, any and all bids shall be rejected and bid securities released.
- I. A bid may not be modified or withdrawn after the bid due date. A bid may be withdrawn prior to date with a written request by said bidder.
- J. The owner reserves the right to award the contract to the bidder of whom they choose and determine is in their best interest. Further, the owner reserves the right to accept or reject any or all bids. Lowest bid package pricing may not be the determining factor for vendor selection.

- K. The bidder agrees by a submission of bid, that collusion with another bidder or vendor has not occurred at anytime in part or whole.
- L. Quoted pricing shall include all delivery and handling charges.
- M. Field cabling shall be provided, pulled, tested and labeled by the AV contractor. Type, quantity and location of each cable pull will be agreed upon by the AV Contractor and the owner based on design submittal.
- N. Installation dates are set for _____ through _____. Installation alignment and training must be complete by the _____.
- O. **Bids are due** on _____ 2009 by _____ a.m. central standard time.

1.2 BID DOCUMENTS

Brands and models specified are examples of minimum products. If updated brands and/or models exist, they would be preferred or recommended, providing they will accomplish what is needed for a successful system implementation. If substitutions of equipment brands or models are made, please provide an excel spreadsheet containing all information that is requested on the Product Substitution Form or contact Paul Collins or Rod Bibeau in MIS at 218-730-5170 to obtain prior approval of substitutions.

The City of Duluth reserves the right to make determination of what is considered equal in product substitution.

Presentation Equipment:

Qty	Brand	Model and Description	\$ Each	\$Extended
1	Sony	VPL-FX40L, 4000 ANSI Lumen Projector		
1	Sony	VPLL-Z1024, Long Throw Lens		
1	Premier	Nova, Projector Mount		
1	Da-Lite	88492, Tension 120" Contour Electrol Screen		
1	Da-Lite	40973, Low Voltage Interface		
4	Sony	FWD-50PX2, 50" Plasma		
4	Premier	AM250, Swing Out Arm Plasma Mount		
1	Extron	60-332-11, 16x16 Matrix Switcher with Audio		
5	Extron	60-486-01, RGB 192 Computer Interface		
3	Extron	60-245-03, 1x6 VGA Distribution Amplifier		
1	Extron	60-246-03, 1x4 VGA Distribution Amplifier		
1	Extron	60-046-03, 1x2 VGA Distribution Amplifier		
1	Extron	60-736-01, DVS 304 Scaler		
16	Liberty	E-MVGAMAM-M-12, 12' VGA Male to Male Cables		
6	Liberty	E-MVGAMAM-M-6, 6' VGA Male to Male Cables		
6	Liberty	E-VGAM-5BNCF-.5, VGA Male to BNC Female		
21	Liberty	E-MVGAMAM-M-3, 3' VGA Male to Male Cables		
21	Extron	60-758-01, VSW-2VGA A 2xi VGA Switcher		
21	Extron	70-077-01, Under Desk Mount		
2	Tascam	DV-D01U, DVD Player		
1	WolfVision	VZ-9Plus, Document Camera with Monitor		
20	ViewSonic	VA503B, 15" LCD Monitor		

Audio Equipment:

Qty	Brand	Model and Description	\$ Each	\$Extended
22	Audio Technica	ES915C24, 24" Gooseneck Cardioid Microphone		
1	Shure	MX412DC, Desktop Cardioid Microphone for Talkback		
1	Shure	ULXP14/85, Wireless Lavalier Microphone System		
3	Nexia	CS, 10x6 Programmable Matrix Mixer		
1	Netgear	FS605NA, IP Switch		
1	Crown	CTs-4200, Four Channel Amplifier		
6	Tannoy	Di6DC, Speaker (White)		
2	Tannoy	Di5MP, Amplified Studio Speakers (Black)		
2	Tannoy	MB 5Y, Mounting Yoke (Black)		
2	Extron	60-440-01, MDA 3A 1x3 Audio Distribution Amplifier		
1	Extron	60-190-10, Rack Shelf		

Recording Equipment:

Qty	Brand	Model and Description	\$ Each	\$Extended
4	Sony	BRC-300, 3 Chip Pan/Tilt Camera		
4	Sony	BRBK-301, Analog/RGB Component Card		
4	Sony	CCMC-9DS, RGB/Component, Y/C Cable		
1	Sony	RM-BR300, Remote Control Unit		
1	Panasonic	AG-MX70, Digital Video Mixer		
4	Extron	60-559-01, YCV 100 S-Video to Composite Encoder		
1	Marshall	VR-44P, Four 4" LCD Rack Monitor		
1	Marshall	V-R82DP-2C, Dual 8" LCD Rack Monitor		
1	Marshall	V-R151P, 15" LCD Rack Monitor w/Audio & Tuner		
1	Extron	60-477-01, VSC 700 Scan Converter		
3	Extron	60-190-10, 1 RU Rack Shelf		
1	Extron	60-692-22, DA 6SVA EQ S-Video DA with Audio		
1	Extron	60-494-01, DA6 YUV A Component Video DA		
1	Extron	60-692-21, DA 6AV EQ Composite Video DA with Audio		
1	Compix	LCG-7000R, Character Generator		

Media Control System:

Qty	Brand	Model and Description	\$ Each	\$Extended
1	Crestron	PRO2, System Controller		
3	Crestron	TPS-15G-QM, Touch Panel		
1	Crestron	QM-TX, Quick Media Transmitter		
1	Crestron	QM-RX, Quick Media Receiver		
19	Crestron	C2N-FT-TPS4-U, 3.6" Flip Top Touch Panel		
4	Crestron	CNPWS-75, Power Supply		
3	Crestron	CNXRY-8, Relay Card		
3	Crestron	ST-IO, Relay Expansion Module		
4	Crestron	CN-RJ11, Network Adapter		
1	Crestron	C2ENET-2, Network Card		
4	Crestron	ST-COM, Network to RS-232		
2	Crestron	C2N-HBLOCK, Network Expansion		
2	Crestron	IRP2, IR Emitter		
4	Crestron	CNPC-1A, Power Controller		
4	Crestron	ST-RMK, Rack Mount		
5	Netgear	GS108, 8 Port Network Switch		

Equipment Rack:

Qty	Brand	Model and Description	\$ Each	\$Extended
1	Winsted	J8218, 3 Bay Console with Tapped Rails		
1	Winsted	J8248, 3 Bay Top Module with Tapped Rails		
1lot	Winsted	Filler Panels		
2	Middle Atlantic	PD-1415SC, Vertical Power Strip		
1	Middle Atlantic	PD-815SC, Power Strip		
1	Middle Atlantic	WUSS17.5, Computer Shelf		

Equipment Total:		
Installation Materials:		
Installation Labor:		
Engineering/Documentation:		
System Total:		

1.3 PROPOSAL CERTIFICATION

Date: _____

Purchasing Department
Duluth City Hall
411 West First Street
Duluth, MN 55802

The undersigned certifies that to the best of his/her knowledge there is no employee of Duluth City who has, or whose relative has a substantial interest in any contract award prior to this contract.

In compliance with the bid specifications set forth herein and after carefully reviewing all the terms, conditions, and requirements contained therein the undersigned agrees to furnish such services in accordance with the Scope of Work.

Firm Name

Telephone Number

Address

Fax Number

By

Title

1.4 PRODUCT SUBSTITUTION FORM

Date: _____

Company Name: _____

Requested By: _____

Phone Number: _____

Fax Number: _____

Item Specified In Bid Document:

Brand: _____

Model Number: _____

Requesting Substitution Approval For:

Brand: _____

Model Number: _____

Reason for Substitution:

Substitution Approved:

_____ Yes

_____ No

Reason for Rejection:

Signed By: _____

Request for product substitution as indicated in section 3.6

PART 2 SYSTEM INFORMATION

2.1 DEFINITION OF TERMS

- A. The term "Owner" shall refer to Duluth City, or a representative of said owner.
- B. The term "Bidder" or "Vendor" shall refer to the perspective contractor submitting a bid to enter into a contractual agreement to this specified project.
- C. The term "A/V Contractor" or "Contractor" shall refer to the bidder who has successfully been awarded the project by the owner.
- D. The term "Electrical Contractor" shall refer to the independent electrical contractor or firm with the responsibility to supply electrical power and devices throughout the complex for which this encompasses.
- E. The phrase "By Others" shall refer to items being supplied by another party not contained in this contract.
- F. The designation "OFE" shall refer to owner furnished equipment or an existing item or condition.
- G. The term "Sub Contractors" shall refer to a company hired by the A/V Contractor to accomplish all or a portion of work awarded to said contractor by the Owner.

2.2 QUALIFICATION OF BIDDERS

- A. Prospective bidders shall have a minimum of three years experience in the installation of similar projects. References of similar projects completed in the last three years shall be included with the bid package.
- B. Vendors shall have the capability of providing submittals, single line drawings and as-built documentation in a clean and easy to read document, preferably utilizing CAD graphics. Information that is sent in for approval, which is indiscernible, shall be rejected and returned for correction.
- C. Prospective bidders are required to be licensed for the installation of low voltage cabling. A copy of the license shall be provided to the owner upon request.
- D. Prospective bidders shall employ staff for the programming of the media control systems.
- E. Vendors are required to have the proper tools, hardware and test equipment necessary for the project specified.

2.3 SUB CONTRACTORS

- A. If it is the intent of the A/V contractor to use sub contractors for any portion or the entire contract awarded, notification of intent shall be included in the bid package. The sub contractors company name, project manager and on site foreman shall be provided in writing.
- B. The owner has the right to accept or reject the request for the particular company as the sub contractor.
- C. Should rejection occur, the A/V contractor reserves the right to submit another request for a different company or persons to be used as a sub contractor.
- D. If sub contract labor is used on the project, a certificate of insurance containing the liability requirements must be submitted with the bid.
- E. Low voltage licensing, is required by all companies used for sub-contract labor. A copy of the license shall be available upon request by the owner.

2.4 SUBMITTALS AND AS-BUILT DRAWINGS

- A. Prior to bidding, approval of any equipment substitutions must be submitted to the owners' representative in writing. The request for substitution will include manufacturer cut sheets and equipment specifications.
- B. A list of references for similar projects shall be submitted with the bid proposal. The references shall be of projects completed within the last three years.
- C. Prior to installation, vendor will provide project manager and foreman name and contact information.
- D. Prior to contract closure, two copies of as-built drawings shall be submitted in electronic format. The documents shall contain the following: equipment owners manuals for each item installed, audio single line, video single line, control single line, schematics of any custom equipment supplied, schematics of all modifications made to a piece of equipment, a cable numbering scheme for all cables installed and a copy of the custom media control system program.

2.5 FACILITIES DURING CONSTRUCTION

- A. Installation dates and site accessibility shall be determined through the owner representative.
- B. Contractors are responsible to maintain a clean working environment. Tools and equipment shall be located in a central area to prevent interruptions to other trades. All debris and refuse must be removed at the end of each working day. The contractor is required to remove all packing from the premises.
- C. Contractors are responsible to provide protection to building finishes and floors. If any damage occurs or is noticed, the contractor shall report the information to the Owner Representative.
- D. Arrangements for deliveries and parking will need to be made with the owner.

2.6 SYSTEM WARRANTIES

- A. This project shall have a one-year warranty on parts and labor for all equipment, cabling and connectors installed under this contract. The warranty period shall commence after final acceptance of the system.
- B. Warranty shall not cover any items that fail due to abuse or mistreatment by the owner or operator.
- C. Should a piece of equipment fail during the warranty period, the contractor shall make every attempt to provide the customer with a substitute item that provides adequate features until the original item is repaired or replaced.
- D. This project requires the A/V vendor to provide a 24-hour support phone number. Phone support must be provided for operational questions by a technician associated with the project.
- E. Warranty issues should have a one hour response time with a resolution plan between the hours of 8:00 am and 5:00 pm and problem resolution within 8 hours.

2.7 PAYMENT SCHEDULES

- A. A request for payment for the equipment portion can be made upon equipment delivery. A line itemization of the equipment inventory, with serial numbers, must accompany the request. The request for payment of 90% of the labor portion.
- B. The remaining 10% of the labor portion shall be made once installation is complete.

2.8 CONTRACT CLOSURE AND TRAINING

- A. Final payment will be issued after the as-built manuals have been received, testing, alignment and training has been accomplished.

- B. Operational training will consist of a minimum of four, two to three hour with selected representatives of the owner. An additional technical training consisting of at least 2 hours with the owner's technical group will be required to review full system wiring and troubleshooting technique. The contractor shall contact the owner to obtain a date, mutually agreed upon for training.
- C. After training is completed the contractor agrees to provide phone support to the operators as necessary throughout the one-year warranty period. The contractor must provide the hourly cost of phone support as necessary beyond the one year warranty period, and any options for block of time services, if offered.

2.9 COPYRIGHT NOTICES

- A. All documentation given herein is for construction purposes only. Duplication of this material in any or all parts cannot be made without written permission of the consultant and/or owner. Duplication includes photocopies, facsimiles, or transfers of material to database systems.
- B. If extra copies of the drawings are necessary for construction, a request can be made to the owner.

PART 3 EQUIPMENT

3.1 PRESENTATION DATA/VIDEO EQUIPMENT

- A. Display of the computer and video signals to the audience will be accomplished with a multimedia projector. The LCD projector will be ceiling mounted at the correct distance to fill the screen. Lumen output shall be rated at a minimum of 4000 ANSI lumens, 1080/60p and WXGA+ capable. Lamp replacement must be accessible without removal of the projector from the mount and control shall be via RS-232. The example unit is Sony VPL-FX40L or approved equivalent. The unit must be capable of both 4:3 and 16:9 aspect ratios.
- B. A long throw lens is required to allow the projector to be mounted on the girder and not over shoot the screen. The lens must be compatible with the projector in your bid.
- C. A new electric projection screen and low voltage interface for front projection will be needed for audience viewing. The screen shall be white in color and self enclosed to mount to the girder. The image size is 120" or larger diagonal, matte white in 16:9 video format with tensioning. The example screen and low voltage interface is Da-Lite model 88492 Contour Electrol and 40973 or approved equivalent.
- D. Four 50" plasmas or LCDs will replace the aging CRT monitors facing the dais. The plasmas will be capable of 1366x768 progressive scan or higher. Viewing angles shall be a minimum of 170 degrees vertically and horizontally or better. Control shall be via RS-232. The example unit is a Sony FWD-50PX2 or approved equivalent.
- E. Analog RGBH&V signals shall be routed to the display and record systems through a 16x16 RGBH&V switcher with audio. The switcher shall be capable of routing computer, component, S-Video and composite video signals. A minimum bandwidth of 450 MHz (-3dB) fully loaded. ADSP sync processing is required to maintain a full 5 V p-p sync level. Control from a third party remote will be done through RS-232 and must allow for front panel routing should it become necessary. The example switcher is an Extron model CrossPoint 450 plus 1616 HVA.
- F. The dedicated computer located at the staff table and control room, prior to being fed to the switcher, shall be converted to analog RGBH&V with amplification applied. Interfaces shall covert unbalanced audio to balanced audio for drive

length to the matrix. The example model is an Extron, RGB 192V or approved equivalent.

- G. Distribution of DVI signals to the display devices will be accomplished through 1x2, 1x4 and 1x6 distribution amplifiers. Distribution amplifiers shall have a minimum bandwidth of 300 MHz with selectable gain for long haul performance. The example distribution amplifiers are Extron model P2/DA2 Plus, P/2 DA4xi and P/2 DA6xi or approved equivalent.
- H. Switching of DVI sources from each of member's computer and the feed for display will be accomplished via a 2x1 switcher. Switcher minimum bandwidth is 300MHZ with HD compatibility and input control through contact closure. The example unit is an Extron VSW 2VGA A SW DVI A or approved equivalent.
- I. DVD playback will be available from the control room and staff table. The unit shall be capable of DVD video, video CD, CD-DA, MP3, WMA, WAV, JPEG, ASF, MPEG2/1 and DivX playback. Outputs will include S-Video and component with RS-232 control. The example unit is a Tascam model DV-D01U or approved equivalent.
- J. High resolution document display will be located at the staff table. Image pickup will be provided through a single CCD, native SXGA or 720p HD camera, 30 frames per second with a local LCD display built in for positioning. The brand or approved equal document camera is a WolfVision VZ-9Plus.
- K. Each position will contain an LCD monitor for display of their local computer or the presentation material built into the tables and dais. The monitor will be fed WXGA+ resolution from all data and video sources being up scaled to eliminate switching. The LCD monitor example is a ViewSonic VA503B.

3.2 AUDIO EQUIPMENT

- A. Microphones are located at each position with a length of 24" to accommodate for the additional electronics at each position. The microphone shall have be condenser type, a frequency response of 30-20,000 Hz and a cardioid pick up pattern. A shock mount,adapter is to be provided for mounting to the lectern. The example unit is an Audio-Technica ES915C24 or approved equivalent.
- B. A single microphone will be located in the control room to be used for talk-back into the chamber for the operator. The microphone will contain a desk stand and

be configured for push to talk. The example unit is a Shure model MX412DC or approved equivalent.

- C. Microphone mixing, level control, equalization of each channel, presets, microphone control and delays will be accomplished through multiple DSP mixers. Frequency response shall be 20-20,000Hz utilizing 24bit sampling rate in A/D and D/A conversions. Each unit will contain 10 inputs and 6 outputs fully configurable. The example unit is a Biamp, Neixa model CS.
- D. Amplification for each zone of speakers will be accomplished using a four channel amplifier to provide the mix minus speech reinforcement. Unit shall be capable of driving 4 ohm, 8 ohm and constant 70 volt at a frequency response of 20-20,000 Hz. Volume control for each channel will be rear accessible to prevent unauthorized tampering after final alignment. The example unit is a Crown model CTs-4200.
- E. The control room will monitor speech and program audio, mixed, from the audio mixers and broadcast through amplified speakers. The amplified speakers will provide a frequency response of 100 – 25,000 Hz with a total power output of 30 watts rms. The example amplified speakers are a Tannoy model Di5MP.
- F. Signal distribution to the media plate will be at two different levels to include balanced and unbalanced line levels. The unit shall be able to maintain unity for both balanced and unbalanced signals. The example unit is an Extron MDA 3A.

3.3 RECORDING EQUIPMENT

- A. Recording video will be picked up through cameras using three-chip technology with integrated pan/tilt capabilities. CCD type shall allow for 4:3 and 16:9 formats. Signal-to-Noise ratio shall be a minimum of 50 dB and a horizontal resolution of 600 lines in NTSC mode. Minimum illumination shall be 7 LUX at F1.6 with a 12x optical zoom lens. The example camera is the Sony model BRC-300 with BRBK-301 Analog/RGB component card.
- B. Control of the camera and lens position will be provided to the operator for recording purposes. The pan/tilt head shall contain preset capabilities with two-way serial communication from the controller fed to the camera. The controller will allow storage and access to 6 presets per camera. The example controller is a Sony model RM-BR300.
- C. Camera switching, wipes and additional source switching shall be accomplished utilizing a digital video mixer. The video mixer will accommodate four component, key and CG inputs. A minimum of 56 dB signal-to-noise ratio with component

output. The unit will also be able to mix incoming audio for program and speech providing VU display for record purposes. The example unit is the Panasonic model AG-MX70.

- D. Camera video will be previewed, for positioning prior to recording, through four 4" color monitors. The monitors are LCD in design with tilt screen for viewing. The loop-through shall automatically terminate if the loop-through is not utilized. The example monitor system is the Marshall model V-R44P.
- E. Preview and program signals fed out of the digital video mixer are viewable in 8" color LCD monitors mounted in the same rack mount. Each monitor will include two video inputs. The example unit is a Marshall model V-R82DP-C.
- F. For monitoring of the final output signal and as a studio standard and the C.G. output, a 15" color LCD monitor will be used. The monitor shall be capable 1024x768, NTSC video and RF signal display. The example monitor is the Marshall model V-R151P.
- G. Conversion of high resolution computer signals will be converted to component and NTSC video for record and broadcast purposes. The scan converter shall be compatible with computer resolutions up to 1600x1200 and frequencies up to 100 kHz horizontal and 120 Hz vertical. The example unit is an Extron VSC 700 or approved equivalent.
- H. Distribution of audio and video signals from the program output for recording will be accomplished using 1x6 distribution amplifiers. The amplifiers will contain an audio and video input with six distributed outputs. Units will include composite video, S-video and component video to feed the existing recording system, modulators and future encoders. The example devices are Extron models DA 6SVA, DA 6AV EQ and DA 6YUV A.
- I. Injection and overlays of titles will be generated using a character generator. The unit shall be gen-lock capable with video inputs to include composite, S-Video and component. The outputs are to include composite, component video, S-Video overlay, and Alpha Key Out. Compix LCG 7000R is the example character generator.

3.4 MEDIA CONTROL SYSTEM

- A. The media control system processor shall contain 8 relays, 8 programmable analog and digital I/O ports, 6 serial output ports for IR/RS232 connections, 6 bi-directional COM ports for RS232/422 communication and 3 open card slots for expansion. Front indicator readout panel and menu buttons shall be present to aid the user if diagnostics are required. Programmed information shall be stored in a permanent memory location should power failure occur. The example control system is Crestron, PRO2 or approved equivalent.
- B. Three main user interfaces, programmed with different levels of operation, with the control system will be accomplished through wired color touch panel with a diagonal of 15" with an active matrix and native resolution of 1024x768. Each will

have a tilt enclosure and will be located at the president's position, staff table and control room. A contrast ratio of 700:1 minimum with a color depth of 16.7 million colors is required. The touch panels example is Crestron model TPS-15G-QM or approved equivalent.

- C. All other member and staff locations will contain a small, imbedded, flip up color touch panel for limited control as described in the installation section. The display shall be active with a minimum resolution of 320 x 240 resolution and a contrast ratio of 300:1. The example unit is the Crestron, C2N-FT-TPS4 or approved equivalent.
- D. Additional power supplies will be required to drive the specified touch panels, and network devices. The example power supply is the Crestron, CNPWS-75 or approved equivalent.
- E. Relay cards will be utilized to expand control to the local VGA switchers at each member's computer. The relay card will accommodate eight isolated relays for control. The example card is a Crestron model CNXRY-8 or approved equivalent.
- F. Power controller devices shall be capable 1800 watts maximum current draw. The example device is Crestron, CNPC-1A or approved equivalent.

3.5 EQUIPMENT RACK

- A. Most equipment will be securely mounted in a three bay rack console. The rack will be supplied with a top module to house the preview/program video monitors. The rack will need to be supplied with all of the necessary hardware and clamping rack shelves to securely mount all of the equipment involved. The example rack is a Winsted J82180 3-Bay Console with the J8248 Top Module, other equipment will be needed and is the responsibility of the AV contractor.
- B. All power distribution internal to the rack is to be provided under the AV contract.

3.6 EQUIPMENT SUBSTITUTIONS

- A. The equipment specified herein has been selected to provide a minimum level of quality to fulfill the customer's needs and requirements. Substitutions of a particular piece of equipment may be requested with the same or greater specifications. Operational characteristics, bandwidths, number and type of inputs, physical dimensions and features have been considered when the selections were made. Variations from these considerations may be grounds for rejection of a particular substitution.
- B. The owner or representative may request samples be made available for testing and inspection prior to acceptance.

- C. A request for substitution may be generated, to the owner representative, up to 2 days prior to the bid opening date. The request must be made in writing via e-mail with the manufacturer's specification sheet, name and address of the company, and the reason for the substitution.
- D. A response to all substitution requests will occur within a reasonable period. If the request is denied, the reason will be given at that time.
- E. If a request of substitution has not been generated, it is assumed items are bid as specified.

3.7 MISCELLANEOUS EQUIPMENT

- A. This proposal is to be provided as a turnkey system. These specifications are for design intent only and additional items may be necessary to complete the project. It is the responsibility of the vendor to provide the additional items at the time of bid preparation.
- B. Some equipment specified may need addition power supplies, rack mounts, Impedance matching circuits, etc.
- C. The racks specified shall have equipment installed at a user height determined by the frequency of access. The empty rack spaces left after equipment installation shall be filled with blank or vented filler panels.
- D. Power distribution in the equipment racks and lectern shall be covered under the A/V contract.

3.8 EQUIPMENT QUALITY

- A. Equipment to be installed in this project shall be new from the manufacturer. Demo units or manufacturer B stock is deemed unusable in this project.
- B. If during the course of installation a product is not operational from the manufacturer, a replacement or immediate repair is necessary without cost to the customer. A temporary substitution is required if an item is down for an extended period of time during final system testing and closure.

3.9 EXISTING EQUIPMENT

- A. Equipment that exists in the system, prior to installation, is presumed to be in good working order. If failures are detected during the course of installation and testing, the A/V vendor shall provide repair and/or replacement costs to the owner representative.
- B. The owner reserves the right to accept or reject either proposal.

PART 4 INSTALLATION AND OPERATION DESCRIPTION

4.1 PRESENTATION VIDEO/DATA PROJECTION

- A. The projection system will be configured in a front projection format. Installation of the projector shall be done to the manufacturers' specifications local and state codes. The ceiling mount will be secured to the beam as indicated on the floor plan. Standard engineering practices will be followed for three times the weight support. Feeds to the projector will be from the matrix switcher for display of sources. The primary function of the display will be for presentation sources however, it may be used for outgoing broadcast signal if requested by the City Administrator.
- B. A long throw lens will be required for the projector to fill the 120" image. AV contractor shall verify distance and lens requirement to ensure proper fill.
- C. A new 120" or larger diagonal electric screen with tab tension is provided under the AV contract and shall be ordered in a white case. Mounting of the screen will require attaching to the beam so the case is not visible from the front of the room when it is in the "up" position. The screen low voltage interface will be delivered with the screen at the agreed time between the electrical contractor and the AV contractor.

- D. Four 50" plasmas or LCDs will be mounted where existing 32" monitors are currently. The existing mounting area will be modified to allow two plasmas on each side directly replacing the 32" monitors. The units will predominately display program feeds outgoing to cable as a confidence monitor for the council members. Control of power will be provided through the control system.
- E. The matrix switcher, located in the control room, will control routing of all sources for display and recording purposes. Control of the matrix will be through the third party controller. Audio will follow video in most cases to feed the sound system's zones.
- F. Interfaces will be installed for data grade signals to provide drive and conversion of unbalanced audio to balanced audio for each computer location that can be used for presentation. A laptop input will be located at the lectern and front table. A dedicated computer will be located at the staff table and in the control room. An additional interface will be used for the document camera located at the staff table. A/V contractor must provide input cables to the computer interface that are narrow and flexible and contain audio. Due to the drive distance "DDSP" is to be turned on and the audio must be wired balanced to reject noise.
- G. Distribution of scaled program video to the dais and tables will be accomplished using distribution amplifiers strategically located under the dais and tables. The output of the amplifiers will be fed to the switchers to allow for automatic display of program sources when they are selected from the touch panel located at the staff table or control room. Female BNC to VGA male adapters will be required to feed from the matrix switcher to the distribution amplifier.
- H. Each output of the distribution amplifier will be fed to the VGA switcher. The second input to the switcher will be fed from the local computer for each position at the dais and tables. The switcher will be controlled via contact closure from the media control system. The switcher will display the local computer until a presentation source is selected. Automatic switching to the program source will occur until the local override is selected on the flip up touch panel or the display of the presentation source is completed.
- I. Two DVD players will be installed into the system for playback as a presentation source. A DVD player will be located at the staff table and one in the control room. The component output will be used to feed the matrix switcher to be distributed to the display devices and recording system. Full transport controls will be programmed at the staff table and control room touch panels.
- J. Document display will be accomplished at the staff table through the document camera. Typical usage will require the person at the staff table to select the unit as a source and provide full control to display the requested information at the unit. The document camera will be fed to the control room through a computer interface to provide necessary drive to the matrix switcher.
- K. The LCD monitors will be located throughout the dais and tables to allow members to view their local computer and the presentation sources. The design intent is to feed a fixed, high resolution format to the input and not provide input switching on the unit. Standby power will be utilized by dropping any signal feeds to the unit instead of doing direct power switching on the monitors.

4.2 AUDIO EQUIPMENT

- A. Microphones will be installed at each location on the dais, staff table, legal table and lectern. The AV contractor will be required to provide coordination as necessary with other trades to position the microphone holes to be cut. The microphones are 24" in length to allow for maximum flexibility in positioning around the additional electronics located at each position. Each microphone run to the control room matrix mixer will be continuous without splice. All microphone cable shall be new without using existing cabling.
- B. The desktop microphone for the control room will be configured for push to talk only. The purpose for the microphone is for talk back into the chambers from the control room to aide in set up functions.
- C. A single hand held wireless microphone will be incorporated into the system. The wireless microphone receiver output will be over all zones. Locating the receiver in the control room may require the antennas to be extended into the council chambers space to provide enough reception. The AV contractor will be required to provide the extension at no additional cost to the City if needed.
- D. The Nexia programmable matrix mixer will be configured to provide:
- Preamplification with phantom power.
 - Equalization for each microphone and program source.
 - Microphone equalization must be limited to the speech band for reduced reflections and feedback.
 - Program equalization will be for full fidelity prior to mixing with the microphones.
 - Control of each individual microphone input level through the touch panel located in the control room.
 - Mix minus for each amplification zone over the dais with program audio mixed throughout.
 - Individual muting and overall muting of the microphones through the touch panel located at the dais, staff table and control room (see control system description).
 - Control of overall level into the room from the touch panel located at the staff table and control room (see control system description).
 - Delay of the rear most audience speakers for intelligibility from the front two audience speakers.
- E. Each amplifier in the CTs-4200 will be run in a 4 or 8 ohm setting for full fidelity. Balancing of the output will be done with an SPL meter to ensure even and level coverage. Each amplifier control is required to be marked for settings after alignment.
- F. Six box speakers will be located in the council chambers. Each speaker will be mounted on the column face to reduce the view of the speaker. Two speakers will be mounted to the face of the column firing at each half of the dais and driven in a mix minus format for microphones. The second set will be located on the column above the podium angled at the audience. The third set will be positioned to cover the back of the room and delayed to reach the area of coverage at the same time as the second set for intelligibility.

- G. A pair of amplified speakers will be mounted on the top of the rack utilizing the specified yolk mounts. The speakers will be fed from the matrix mixer with program left separated from right and the microphone audio mixed in both channels. Volume control will be accomplished via the control room touch panel by controlling the output of the matrix mixer feeding the amplified speakers.
- H. Two 1x3 stereo distribution amplifiers will be fed independently from the matrix mixers at two different levels to be used for media feeds. Each input will be wired in parallel to provide six like mixed outputs from the microphones and program audio. One will be fed and drive balanced audio at line levels to the media plate. The second distribution amplifier will be fed and will drive unbalanced line levels to the media plate.

4.3 RECORDING EQUIPMENT

- A. Installation of the cameras will consist of replacing the existing units at the same location with new cable. The cameras must be free of vibration during the pan/tilt operation. Each camera will contain the RGB board and will drive the digital switcher in component video. The contractor will be required to pull, multi-conductor video, power and control cable and terminate as required for operation. AC receptacles will not be available at the camera locations. The S-video output will be utilized and converted at the rack for a composite feed to the positioning monitors. The five multi conductor video cable specified will carry the three component signals and the two S-video signals.
- B. Each camera position, zoom and presets will be controlled by the Sony remote control unit. The unit will be located in the control room on the desk of the rack system.
- C. The digital effect video switcher will be located in the control room next to the camera controller. Inputs will be component to maintain higher video quality. The fourth input of the digital video mixer will be fed from the matrix and will carry one of the four cameras selected by the control room operator as well as the other display sources. The audio portion of the digital video mixer will be utilized to mix the program and speech audio prior to distribution for recording, local monitoring and cable output. The operator will use the VU metering and local monitoring to set mix and output levels.
- D. Monitoring of each camera will be done with the four, 4" LCD rack. Each will be fed composite from the S-video to composite encoder. The unit will be mounted at eye level for the control room operator.
- E. The dual 8" LCD monitor group will be fed preview (on the left) and program, (on the right) from the digital video mixer. The location should be directly above the digital video mixer in the editing console.
- F. The 15" color LCD monitor will provide previewing for the incoming cable system, character generator set-up and recording signal.

- G. A scan converter will be fed from the matrix switcher to convert computer signals prior to feeding back into the matrix switcher for proper routing. The output signal utilized will be component to maintain quality. The output of the scan converter will be automatically routed through the matrix to the digital video mixer (input 4) when a computer or document camera is selected as a source. The automatic routing will allow the control room operator easy call up of the signal during a presentation for output to the cable and recording system.
- H. Video Distribution amplifiers are specified for each type of outputs available from the downstream CG. Each output will drive the distribution amplifiers to allow any selected recording system the highest signal it is capable of receiving. Coordination with the Director of PACT will be required by the AV vendor to ensure the signals are provided as requested. It is the responsibility of the AV contractor to provide the feeds to the recording system.
- I. A rack mounted CG will be installed into the editing console downstream from the digital video mixer. The input to the CG will be run component video to maintain the highest quality of signal. The VGA output will feed the 15" LCD rack mounted monitor for programming. Each output will be fed to a distribution amplifier.

4.4 MEDIA CONTROL SYSTEM

- A. Programming of the control of the control system will be extensive and will require a higher level of programming than normal systems. As indicated in the prior sections, the AV contractor must provide the expertise necessary to program the system as requested. The program, after final completion, must be included in the as-built documentation and shall be kept up to date if any changes are made over the course of the warranty period. The programmer may be required to make an additional trip 30 days after final acceptance to provide simple label changes or operational changes that are listed by the owner. The list will be made available so as to allow the owner to review necessary changes prior to the trip.
- B. Wiring of the control system will include incorporating control over the room functions and equipment. Communication to each piece of media will consist of RS-232, IR or contact closure. RS-232 communication will be utilized whenever possible over any other control. ST-COM devices are required to extend RS-232 communications from the control room to the council chambers over the control network.
- C. The TPS-15G-QM touch panel located at the President's position will provide four main functions:
 - When a "request to speak" button is pushed on the C2N-FT-TPS4 touch panel, located at all of the other positions, feedback will indicate to the President the request. The President can activate the microphone to allow the member to speak on the record. When the member is finished, the President or member will cancel the "request to speak" which will automatically mute the microphone and reset the touch panel. More than one

member can request to speak. This selection will also allow an overall un-muting and muting of the dais and legal table through a single button.

- Enable and disable voting. The President can enable and disable voting via selection on the touch panel. Upon enabling, the touch panel will also allow the President to vote as well as activating the member's C2N-FT-TPS4 touch panels to vote. Voting will include: Yea, Nay or Abstain. The President's touch panel will not show the vote tally.
- Display of the local computer or presentation material.
- Select presets of the audio system for Council Meetings and Planning Commission/Training meetings. The Council meeting preset will automatically engage the request to speak function. The Planning/Training meetings preset will automatically engage the C2N-FT-TPS4 touch panels to allow the microphones at each location to latch on or off. Each microphone will start in the muted state upon this selection of the preset. As member's sit down they will be able to turn their microphone on at that location.

The layout of the touch panel for microphone selection will include a map of the microphone locations for the dais, staff table and overflow table. When in the voting mode this map will also contain the member's name at that location. An edit button must be located on the touch panel to allow editing of the member's name when accessed. Upon selection of "Edit Name" a small keyboard will display to allow a user to edit names of new members. It is understood that the editing process is not a practical method for weekly meetings but will function as a way to edit the names or add new members after elections.

- D. The TPS-15G-QM touch panel located at the Staff desk will provide the following functions:
- Presentation control of the AV system. Sources for display include the dedicated computers at the staff desk and control room, document camera at the staff desk, DVD players at the staff desk and control room, cable feed, and touch Panel output feed.
 - Voting of each member will be displayed on this touch panel. Each member's vote will provide feedback, by their name, on the touch panel. When the voting is complete, the staff member will select "go to display" and the output of the touch panel will be displayed throughout the room, go to record and to cablecast.
 - Control of overall microphone gain and program audio gain. Each must be independent and cannot affect record outputs.
- E. The TPS-15G-QM touch panel located in the control room will provide the following functions:
- Presentation control of the AV system.
 - Voting of each member will be displayed on this touch panel. Each member's vote will provide feedback, by their name, on the touch panel. When the voting is complete, the staff member will select "go to display" and the output of the touch panel will be displayed throughout the room, go to record and to cablecast.
 - Control of each microphone independently. A page will be provided to allow control of each microphone to allow the control room operator access to the microphone setup through the Nexia programmable mixer. The independent control will not be able to be saved to memory of the preset to ensure the system goes back to preset levels on the next meeting.

- Control of overall microphone gain and program audio gain. Each must be independent and cannot affect record outputs.
- F. Programming the C2N-FT-TPS4-U touch panel will be programmed for three specific functions:
- “Request to Speak”, “Cancel”, “Local” and “Presentation” view will be the standard page when the system is in the Council Chamber mode. The “Request to Speak” button will send feedback to the President’s touch panel for indication. The “cancel” button will allow the council member or president to clear the request. The “Local” and “Presentation” buttons switch the local 2x1 VGA switcher between the local computer and the presentation source. The 2x1 switcher will automatically switch the VGA output to the local monitor showing the presentation source when it is selected at the staff desk or control room. The small panel will allow the member to override the presentation source back to their local computer if desired.
 - “Voting” when selected at the President’s touch panel will provide a page flip to show Yea, Nay or Abstain. Vote indication feedback will show on the Staff table’s and control room’s touch panel.
 - When the “Planning/Meeting” mode selected is selected at any of the three large touch panels, the small panels will allow a user to latch on or off the microphone at their position. This will prevent having all of the microphones latched on when there may not be a person at that position.
- G. An automatic system power down shall be programmed into the control system. The system shut down will be programmed at a predetermined time made by the owner and AV contractor.
- H. AV system power will be broken out to allow the presentation system to operate in audio support only, full presentation and full presentation with recording capabilities. The audio only operation will require the ability to record on the existing record system.
- I. The installer, to eliminate down time for any problems that may occur if the system fails, must be able to perform necessary programming needs to ensure operational functionality of the system.
- J. The AV contractor shall allow the owner to comprise a list of changes in the program operation, menu, or nomenclature after the original programming. A one time programming change will be done at no charge.
- K. A copy of the system program shall be turned over to the owner for final acceptance.

4.5 EQUIPMENT RACK

- A. Equipment racks shall be assembled according to the manufacturer’s specifications. All bolts shall use locking washers and nuts.
- B. Equipment mounted in the racks shall use rack mounts designed for that particular make and model. If a rack mount does not exist for the piece of equipment a generic shelf should be used. When a shelf is implemented the

piece of equipment shall be secured to prevent the unit from sliding back when the front panel buttons are accessed.

- C. Unused portions of the rack shall be filled with matching blank or vented panels.
- D. Custom built enclosures will be made with precision to provide function and clean aesthetic look. Custom enclosures that contain any high voltage must be made with approval from a licensed master electrician. Approval must be acquired, and notification to the owner must be made prior to installation. The AV contractor accepts all liability of any enclosures made containing high voltage.
- E. Power distribution will be provided through the A/V contract, internal to the rack system.
- F. Equipment wiring will be done throughout the rack system. Separation of power, balanced audio, and unbalanced audio shall be implemented throughout the wiring scheme. All cabling shall be secured with ty-wraps and labeled as to their function.

4.6 OUTLETS AND POWER

- A. AC power has been supplied under the original contract. The system may require an increase in the number of outlets through UL listed multiple outlet strips. Outlet strips must contain grounding on the plugs to reduce the possibility of ground hum problems.
- B. Should it become necessary to add outlets where the plans did not specify, the A/V contractor shall contact the owner to obtain the additional outlet.
- C. All power cords shall be neatly dressed through the use of tie wraps to provide proper lengths and eliminate tangled wire bundles.

4.7 CABLE AND CONNECTORS

- A. Video Cable - Video and pulse cable shall contain a 20 AWG solid copper center conductor with 95 % braided solid copper shield. A minimum NOM attenuation of .24 db per 100' at 10MHz. Cable shall be Liberty RG59-CCTV-PL.
- B. RGB/Component Cable - Component and computer cabling will utilize 5 conductor single jacketed cabling to maintain precise lengths on each conductor. Computer connections will use all five conductors to drive horizontal and vertical sync signals independently. A minimum NOM attenuation of 5.75 db at 270MHz per 100' is required. The specified cable is Liberty RGB5C-23-CMP.
- C. Audio Cable - Balanced and unbalanced audio cable shall contain a 20 AWG twisted pair cable with 100% overall aluminum foil shield and drain wire. Cable shall be Liberty 20-2C-TTPSH.
- D. Exposed Microphone Cable - Microphone or audio cable that is used in a portable or temporary setting shall be Liberty, 24-2P-STAR-B or equivalent

- E. Speaker Cable 70V. - Speaker cable shall contain an 14 AWG twisted pair. Cable shall be Liberty 14-2C-TTP Premium speaker cable.
- F. Speaker Cable - Low impedance speaker cable shall be 12 AWG twisted pair. Cable shall be Liberty 12-2C-TTP Premium Speaker Cable.
- G. Control Cable - Cable shall contain the Data rating for any signal that is digital or contains data. Conductor shall be stranded with the number of conductors as necessary. Cable shall contain an overall shield with a minimum of 18 AWG conductors.
- H. BNC Connectors - Connectors shall be compression crimp and strain relief. Connectors are to be sized for the specific cable and terminated with tools specific for that connector. BNC connectors shall be rated for data use and the impedance shall be 75 ohms.
- H. BNC Panel Mount Connectors - Shall be a one piece, metal feed through style, isolated, and rated at 75 ohms impedance.
- I. Microphone Connectors - Connectors shall contain a cinch type cable strain relief. Connectors shall be Neutrik, NC3M or NC3F.
- J. Microphone Panel Mount Connectors - Connectors shall be a three pin XLR, direct solder type. Acceptable manufacturers are SwitchCraft, Canare, or Nuetrik.
- K. RCA Connectors - Connectors will have metal bodies with the conductor surface gold plated. Connectors shall be Canare, F-10.
- L. 1/4 " Connectors - Connectors shall contain full metal bodies with a clamp type strain relief. Connectors shall be Canare, F-15 for monaural and F-16 for stereo.
- M. 1/8 " Connectors - Connectors shall contain full metal bodies with a clamp type strain relief. Connectors shall be Canare, F-11 for monaural and F-12 for stereo.
- N. All connectors shall be crimp type or solder type. When crimp type connectors are installed only the manufacturer's recommended crimp size dies must be used.

4.8 SYSTEM INTERCONNECTIONS AND CABLING

- A. All National, State and Local Electrical, Fire, and Building Codes apply to this project. The A/V contractor must be aware of and adhere to these codes. The owner shall not be liable for failure of the A/V contractor in following code. Any portion of the installation that does not meet code shall be removed and re-installed up to code by the A/V contractor at their own expense.
- B. System connections will be made to provide the features described and specified herein. Additional connections and cabling may be required to provide a complete system.

- C. Cabling terminated at each piece of equipment shall be cut to length and terminated with the appropriate connector. The use of tie wraps is necessary to maintain the cabling in a neat manner.
- D. Equipment utilizing screw terminals shall have the cabling terminated using crimp on spade terminals.
- E. Equipment utilizing NEMA type connectors shall have the conductors tinned prior to tightening into the terminals.
- F. Cabling in the racks shall be run and bundled with other cables carrying similar signal levels. All cable shall be supported and run in paths that provide as much access room at the back of the equipment as possible. Any cable run outside of the equipment racks shall be contained in cable duct to prevent damage.
- G. Cable pulled through an enclosure shall have a service loop to insure the cable does not kink or cut.
- H. Cable should be run in one piece without splices made. In the event a splice is absolutely necessary it shall be done to provide proper impedance. Video cable shall use a female to female BNC type barrel with crimped BNC connectors on each end. Audio cable shall use XLR type connectors to provide a locking fit. All splices must be accessible and not internal to conduit as per code regulations.
- I. All cables shall be labeled by number or origination and termination designation. Labels must be permanent and legible. Peel off numbers are not acceptable unless clear heat shrink is used to cover the numbers for protection.
- J. Cable numbering shall be documented on the as-built drawings to provide instant access to the cable origination and destination.

4.9 TESTING AND ALIGNMENT

- A. All equipment shall be aligned as recommended per the manufacturer.
- B. Video signals shall be 100 IRE at the designation point. Sync levels shall be at -40 IRE. SC and horizontal phasing shall be done using a vectorscope and waveform monitor.
- C. All audio level alignment shall be done to specification for the type of input it is associated to. Audio balancing from source to source selection shall have consistent output levels when switched.
- D. Equalizers, amplifiers and speakers shall be aligned using pink noise generation and a 31-band, audio spectrum analyzer.
- E. All level adjustments shall be marked with an indicator or mark to show the user the initial set up level when the system was aligned.
- F. The AV contractor may be requested to provide a demonstration of operation to the consultant prior to final payment.

G. After testing and alignment is complete the AV contractor shall contact the consultant to request a final inspection of the project. After the final inspection is complete, training shall be scheduled with the owner.

